Knowledge Management in Higher Education Institutions: A framework to improve collaboration

Conference Paper · June 2014
DOI: 10.1109/CISTI.2014.6876876

1 author:

Mário Pinto
Polytechnic Institute of Porto
20 PUBLICATIONS **38** CITATIONS

SEE PROFILE

Knowledge Management in Higher Education Institutions: A framework to improve collaboration

Mário Pinto
ESEIG, Polytechnic Institute of Porto
Porto, Portugal
mariopinto@eu.ipp.pt

Abstract—**The purpose of this paper is to present a framework that increases knowledge sharing and collaboration in Higher Education Institutions. The paper discusses the concept of knowledge management in higher education institutions, presenting a systematization of knowledge practices and tools to linking people (students, teachers, researchers, secretariat staff, external entities) and promoting the knowledge sharing across several key processes and services in a higher education institution, such as: the research processes, learning processes, student and alumni services, administrative services and processes, and strategic planning and management. The framework purposed in this paper aims to improve knowledge practices and processes which facilitate an environment and a culture of knowledge collaboration, sharing and discovery that should characterize an institution of higher education.**

Keywords-Knowledge Management, Knowledge practices, knowledge tools, higher education institutions

I. INTRODUCTION

Higher Education Institutions (HEI) perform an important role in the knowledge-based economy. As learning organizations, they will be able to extend knowledge skills, produce top quality graduates, enhance innovation and creativity and contribute effectively to the knowledge production and intellectual property development [1], [2]. The increase of knowledge assets is itself the seeds of higher education and it clearly contributes to the future of economic and social development. In fact, knowledge management (KM) is gaining acceptance in the academic sector in the last few years, once it becomes clear that universities have a major role to play in the knowledge economy, bringing new challenges for HEI [2], [3],[4].

According some authors [4], [5], we can distinguish two perspectives of knowledge in higher education institutions: i) academic knowledge, resulting from learning and teaching activities, the primary purpose of universities; ii) organizational knowledge, which refers to knowledge of the overall business of an institution: its strengths, weaknesses, strategies, critical factor of success, relationships with research centers, etc. These two perspectives of knowledge could be enhanced by a set of KM practices and tools that facilitate the development of an environment of knowledge creation, collaboration and sharing [3], [8]. Due the appearance of new knowledge producers in the higher education, more and more universities are looking into de possibility of applying corporate tools. Technologies are important to facilitate KM activities, such as discovery or acquisition (research), dissemination or share (teaching), application ok knowledge and their preservation (libraries, repositories) [7], [3], [9]. On the other hand, these issues miss their importance if the institution does not have a strategy and a set of institutional practices which lead to creating, sharing and collaborating between the various actors across the organization [7], [8].

In this paper, the author discusses the concept of knowledge management in HEI, followed by a systematization of knowledge practices and tools to linking the several actors (students, teachers, researchers, secretariat staff, external entities), and promoting the knowledge sharing across several key processes and services in a HEI, such as: the research processes, learning processes, student and alumni services, administrative services and processes, and strategic planning and management. The paper also presents and discusses a framework to improve knowledge sharing and collaboration in a HEI, fostering an environment of continuous learning and discovery, ending with some conclusions and future work.

II. KNOWLEDGE MANAGEMENT IN HEI

KM is becoming a very important issue in higher education, which drives the ability of collect and analyze information, transform knowledge and apply novelties [3], [12]. It is necessary to point out the valuable knowledge, create a methodology for receiving and consolidating knowledge, to perform spread of knowledge among the students and staff, and to generate new knowledge and innovation through knowledge sharing [4], [12]. Bloch [12] argues that knowledge has become a key strategic resource, necessary to prosperity and competitiveness. HEI will experience intensified pressure, influenced by the knowledge economy and also the globalization, with more interconnected entities and where knowledge, creativity and innovation are the essential elements for competitiveness [19].

Kidwell et al. [6] argue that KM is vital to HEI, bringing crucial benefits to educational institution processes such as research, curriculum development, student and alumni services, administrative services and strategic planning. The challenge is convert the knowledge that currently resides in each

individual/service, and make it widely and easily available to any faculty member, staff person or other actors. Bushry and Ranjan [3] pointed that the main challenge in HEI is to create a knowledge environment, and the recognition of knowledge as intellectual capital. Effective KM requires significant change in the culture and values, organizational structures, practices and systems. In addition, several studies reveal the nascent nature of KM in HEI and the urgent need to adopt information technologies that address the needs of the initiatives and practices [3], [17], [18].

In the last few years, significant work have been done in the field of KM in HEI, focusing practices, tools, initiatives, resources and frameworks to manage organizational knowledge, increasing its dissemination and its use [2], [3], [4], [10], [11]. Several frameworks have emerged with the aim of enhance KM in HEI. These frameworks focuses a variety of perspectives, according to a brief literature review [3], [4], [6], [10], [20]. Some authors point to the implementation of information systems, others refer to social networks, knowledge practices, workflow systems or organizational methodologies, in order to manage the creation and transmission of structured and unstructured knowledge. On the other hand, almost all of these frameworks comprise a set of knowledge processes to support and enhance knowledge activities and resources. Sedziuviene and Vveinhardt [4] include the knowledge processes of identification, creation, storage and sharing knowledge in their framework. Alavi and Leidner [8] refer to knowledge creation, storage/retrievel, knowledge transfer and application. The European Guide for good Practice in KM [14] refers to the knowledge processes of creation, storage, share and use, as well as other authors. However, it should be noted that recent approaches point that knowledge is inseparable from its holders and its development represents a continuous process based on the routines and activities undertaken by persons [12]. The creation and sharing of knowledge involves social interaction and face to face communication and collaboration [3]. Generally, these processes imply learning, observing the processes (learning by doing), engagement in practice and social interaction. In this scenario, KM is intrinsically linked with concepts such as continuous learning, innovation, communication, collaboration, and culture of sharing [12], [13].

According some authors [1], [4], [21], HEI have many particularities and specificities, which should be taken into consideration, since they impact the knowledge management issues:

- A large number of students, with different goals, different interests and heterogeneous profiles. The massification of higher education and the increasing mobility of students on exchange programs, emphasized this heterogeneity.
- Students from different countries, with distinct cultures, languages and skills;
- The diversity of training offer, with several courses that seek to develop skills and competences in different areas of expertise;
- The need for students to participate in research, development and innovation processes, and the focus on teaching and learning for new learners and learning for new goals;

This heterogeneous and contextual nature which is found in actual higher education, has brought different challenges to knowledge management in the HEI. To meet these challenges, a wide variety of knowledge management practices have been proposed by researchers and practitioners, to enhance the processes referred above. These practices may be viewed as a structured set of activities that contribute to KM, supported by technological tools, also called knowledge management systems.

III. KNOWLEDGE MANAGEMENT PRACTICES

Kim [5] states that KM practices aim to draw out the tacit knowledge that people have, what they carry around with them, what they observe and learn from experience, rather than what is usually explicitly stated. According to some authors [16], knowledge practices consist on activities guided to the development of learning organizations, encouraging a culture of knowledge acquisition, sharing and usage. Kidwell [6] states that knowledge management practices can lead to exponential improvements in sharing knowledge, benefiting various key processes and services in an higher education institution, such as: i) the research process; ii) learning processes; iii) student and alumni services; iv) administrative services and processes; v) strategic planning and management.

A wide variety of organizational practices have been proposed by researchers and practitioners, yet it is often unclear how these practices relate to one another in their contribution to organizational performance. Based on a literature review, a categorization of knowledge management practices in higher education was made [3], [5], [6], [12], [14]. Table 1 shows the most addresses practices found in a literature review:

TABLE I. KM PRACTICES

KM Practices	***Description***
Communities of practice	Communities of practice are formed by people who engage in a process of collective learning in a shared domain of human endeavor: who deal with a common organizational process, who have interest in solving similar problems, who works in the same project, etc.
Best Practices	Identifies and incorporates the practices considered most suitable to each task. It may result from benchmarking or incorporation of best practices among organizations.
Learned lessons	Represent the acquired and validated knowledge, as a result of the development of a particular project or activity
Formal training	Structured sessions with instructional material designed to support the processes of teaching and learning about a particular subject; it can include seminars, conferences, workshops
Social interaction	Collaboration, social bookmarking, chat rooms, discussion forums
Competence maps	Is consists in the representation of knowledge and skills / competences available in the organizations
Corporate Education	Strategy to develop and educate employees, customers and suppliers, in order to align them with business strategies

IV. KMOWLEDGE MANAGEMENT TOOLS

The purpose of KM tools is to support the organizational processes and practices, enabling an environment that facilitates the knowledge sharing and creation, and also the communication and collaboration among the organization. More than technological systems, these tools could be viewed as virtual spaces that promote knowledge conversion between explicit and tacit dimensions of knowledge. However, it is important to note that without a strategy and an organizational culture based on continuous learning, sharing and collaboration, the knowledge tools bring few benefits to knowledge management in general, and HEI in particularly.

Table 2 summarizes a set of knowledge tools addressed by the literature review as being useful in supporting KM processes and practices, in a HEI [3], [9], [16], [17], [18].

TABLE II. KM TOOLS

KM Tools	*Description*
Knowledge repositoires	Document management; edition collaboration; versions control; documents sharing; support for all content types (text, audio, video, graphs, xml, web, etc.); searching and retrieval advanced mechanisms.
Knowledge maps	Categorizing and indexing knowledge in taxonomies; creating knowledge maps; pointing to organizational knowledge; inserting tags and labels in documents; alerting to relevant information.
Workflow tools	Business processes automation; support automated flows of activities, tasks and information; support documental flows
Learning system	Evaluation and progress tracking: exercises quiz and tests; collaboration tools; reusable learning and object libraries; support different types of contents: text, audio, video, etc.; classes' workgroups; authoring, scheduling and reporting tools; searching and matching tutorials
Corporate portal	Environment personalization; filtering relevant information; search and retrieval advanced mechanisms; news, activities, tasks and calendar management; unified access environment to other tools: documents management, workflow, knowledge maps, groupware, etc.; integration with other applications
Collaboration tools and web 2.0 applications	Interaction, collaboration, participation of people: blogs, wikis, social bookmarking, tagging, content sharing, virtual meetings; instant messenger, videoconference; real-time conversation; grouping calendar and scheduling, etc.
Ontologies	Categorize or group the information/knowledge. Used in the web semantic to assimilate and codify knowledge, defining the relationships between the concepts of a particular domain (or area of knowledge).

V. FRAMEWORK FOR KM IN HEI

With the aim to enhance and facilitate the KM practices and process in a higher education institution, we purpose the following framework, presented in Fig. 1. The framework seeks to establish a relationship between the common KM practices and processes, and the technological tools that can leverage these issues, promoting an environment that increases a culture of knowledge collaboration, sharing and discovery in the several core activities of teaching, learning, research and administrative services and processes in a higher education institution.

The framework presented in Fig. 1 is organized in three main layers: i) technological infrastructure; ii) knowledge system; iii) knowledge management practices, promoting the processes of knowledge creation, storage, sharing and application.

The technological infrastructure comprises network facilities, databases technology and several other information and communication technologies, such as emailing and intelligent agents, for example, which allow communication and collaboration between the different actors (students, professors, researchers, secretariat staff and external entities).

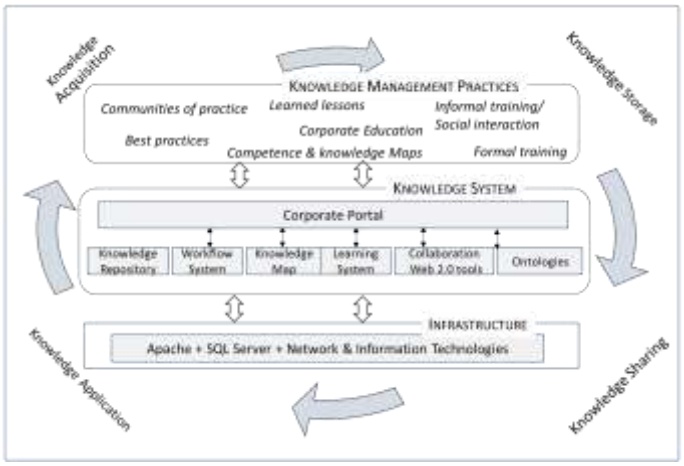

Figure 1. Framework for KM in Higher Education Institution

The framework has been implemented as part of an internship program of an undergraduate student. We used a set of open-source tools to implement the framework presented in Fig. 1, such as: Dspace (knowledge repository), Alfresco (workflow system), XMind and Cmap (knowledge maps and ontologies) Moodle (learning system), XWiki (collaboration) and Joomla (corporative portal).

The platform is available for this institution to just three months. At this time, the repository is mainly used for scientific publications of teachers, while the learning system is widely used to support the practices of formal training. Interestingly, the workflow system had a very interesting adherence, in particular with regard to procedures established by the norms of quality. Collaboration tools have been used mainly in informal training environments and in the profusion of various communities of practice. Some knowledge maps have been produced, mainly trying to map the competencies of the various members of each department. Were also produced maps of knowledge centered on some projects carried out by the institution. The next step is to implement knowledge maps focused on key processes and critical knowledge for students. The corporate portal works as point of access to other tools, also providing news, event calendar, etc.

Knowledge acquisition involves the development of existing contents and the generation of new knowledge, namely in activities related with research and development and also

learning activities. Collaboration tools can facilitate teamwork as well as social interaction, informal training and communities of practice. This practices clearly contribute do knowledge creation and discovery. Collaboration tools (groupware) and web 2.0 applications also facilitate de development of organizational practices such as learned lessons and best practices, which are excellent means for discovering and conveying knowledge.

Knowledge repositories allow knowledge, often dispersed among a variety of retention supports, to be effectively stored and made accessible. Knowledge maps and workflow systems also provide knowledge representation/classification and facilitate the retrieval to organizational knowledge. On the other hand, corporative portals with search and retrieval advanced mechanisms increases the access to knowledge, and often promote access to contextual knowledge, depending on the profile and the activity of each user [16], [18].

Collaboration and workflow systems are, per excellence, tools that enable knowledge sharing and dissemination. They support communication, coordination and collaboration both in terms of administrative services and strategic management, as at the level of teaching, learning and research activities. A corporative portal contains, frequently, groupware and workflow functionalities, so it supports knowledge transfer. Collaboration tools promote formal and informal interaction, crucial to knowledge sharing and discovery. Knowledge maps facilitate the understanding of the competencies held by organization, consisting in a very visual way to categorize concepts and understand who holds certain competencies or skills. Competence maps are very useful in several core activities as research, learning or teaching. Learning systems are naturally a key issue in a HEI, facilitating knowledge sharing, knowledge acquisition and application, and supporting formal and informal training. Knowledge practices such as corporate education are vital to extracting the strategic value of knowledge, disseminating the culture, values and mission of the HEI.

VI. CONCLUSIONS

The proposed framework seeks to align the technological tools with organizational practices and processes, in the specific context of an HEI, in Portugal. Nowadays it is being tested just three months, so there are not many data or conclusions about its potential value. Future work will focuses on the framework evaluation, seeking to identify their strengths and weaknesses. This can be done performing an analysis from the perspective of a case study, which will help to evaluate and improve the framework.

REFERENCES

[1] A. Kok, "Intellectual Capital Management as Part of knowledge Management Initiatives as Institutions of Higher Learning", The Electronic Journal of Knowledge Management, vol. 5, Issue 2, pp. 181-192, 2005.

[2] R. Abdullah, M. Selamat et al, "A Framework for Knowledge Management Systems Implementation in Collaborative Environment for Higher Learning Institution., Journal of Knowledge Management Practice, 2005.

[3] M. Bhusry and J. Ranjan, "Knowledge Collaboration in Higher Educational Institutions in India: Charting a Knowledge management Solution", International Journal of Computer Science, vol. 8, Seltember 2011.

[4] N. Sedziuvienne, J. Vveinhardt, "The Paradigm of Knowledge in Higher Educational Institutions", Engineering Economics Journal, Nº 5, 2009.

[5] G. Shams, A. Rad and A. Hooshmand, "Knowledge Management Practices in Higher Education Institutes: A Different Approach", Proceeding of EDULEARN Conference, 6-8 July 2009, Barcelona, Spain.

[6] J. Kidweel, K. Linde et. Al, "Applying Corporate Knowledge Management Practices in Higher Education", Educause Quartely, nº 4, 2000.

[7] P. Maponya,"Knowledge Management Practices in Academic Libraries: A Case Study of the Univertity of Natal, Pietermaritzburg Libraries", , 2004.

[8] M. Alavi and D. Leidner, "Knowledge Management and Knowledge Management Systems: Conceptual Foundations and Research Issues", MIS Quartely, vol. 25, nº 1, pp- 107-136, 2001.

[9] M. Pinto, "Knowledge Management Systems and Intellectual Capital Measurement in Portuguese Organizations: A Case Study", World Conference on Information Systems and Technologies, 27-30 March, 2013, Portugal.

[10] J. Ranjan, S. Khalil, "Application of knowledge Management in Management Education: A Conceptual Framework", Journal of Theoretical and Applied Information Technology, pp- 15-25, 2007.

[11] M. Suciu, L. Piciorus and C. Imbrisca, "Intellectual capital, trust, cultural traits and reputation in the Romenian education system", The Electronic Journal of Knowledge Management, vol. 10, Issue 3, pp- 223-235, 2012.

[12] C. Machado, J. Davim, "Knowledge Management Fostering Innovation: balancing Practices and Enabling Contexts", in Management and Engineering Innovation (eds C. Machado and J. P. Davim), John Wiley & Sons, Inc., Hoboken, NJ USA. doi: 10.1002/9781118733202.ch6

[13] I. Nonaka and N. Kono, "The Concept of BA: Building a Foundation for Knowledge Creation", California management Review, vol. 40, nº 3, pp. 40-54, 1998.

[14] European Guide for good Practice in KM (CEN - Comité Européen de Normalisation), http://enil.ceris.cnr.it/Basili/EnIL/gateway/europe/CEN_KM1.htm

[15] M. Pinto, "A Framework for Knowledge Management Systems in Higher Education Institutions", The 2nd Virtual International Conference on Advanced Research in Scientific, 2-6 December, 2013, Slovakia.

[16] F. Maio, "Project for Knowledge Management Systems at Higher Education Institutions", Master Thesis in information technologies, Polytechnic Institute of Porto, 2013.

[17] K. Kalaimangal and N. Yasin, "Knowledge Management System and Higher Education Institutions", International Conference on Information and Network Technology, vol. 37, 2012, Malaysia.

[18] M. Lindval, I. Rus at. Al, "Software Systems support for knowledge management", Jounal of knowledge Management, vol. 7, nº 5, pp.-137-150, 2003.

[19] D. Cranfield and J. taylor, "Knowledge management and Higher Education: A UK Case Study", The Electronic Journal o Knowledge Management, vol. 6, issue 2, pp. 85-100, 2008.

[20] R. Stevens, K. Brown and J. Russel, "Introduction the Intellectual capital Interplay Model: Advancing Knowledhe Frameworks in the Not-for-Profit Environment of Higher Education", International Education Studies, vol. 4, nº 2, 2001.

[21] Deuren, Rita, "Capacity Development in Higher Education Institutions in Developing Countries", Working Paper No. 2013/30, Maastrich School of management".