A Collaborative Learning Management System for the Health Integration

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The lines of action of the regional healthcare area “ASUR” of Ancona (Italy) try to reach the unity, not the uniqueness of the overall set of social and health services. According to the health integration plan, the programmatic indications coming from the Administrative Department have to find a concrete realization on the territory. This can be effectively done just involving all the public and private subjects which can assure the health integration. The collaborative learning management system presented in this article is a communication platform that collects all the knowledge acquired by the social and health care operators promoting discussion spaces where innovative solutions for health integration can arise. These are structured as Integrated Care Pathways and undergo clinical trials before being accepted as organizational standards. The system is based on an organizational blogosphere, and social network analysis is used to identify the social and health care staff members which have the widest view of what happens within their organizations. These can be contacted for an interview by the regional Consulting and Service Centre for the Health Integration or they can be invited to open a discussion space on the main health integration problems.

Keywords
internet in healthcare, online collaborative learning, ICP

1. Introduction

The health integration is an ASUR’s (Azienda Sanitaria Unica Regionale) objective that involves all the organizational elements, both at the central level (Direction) and at the peripheral level (Zones) [1]. The Zones (Districts, Departments and Hospitals), together with the Municipalities, (Territorial Ambits, Provinces, Mountain Communities, Voluntary Organizations) are involved in health integration. Each of these subjects preserves its competencies and responsibilities. The ASUR has a light organizational structure with a strong tendency which is oriented more on the control than the central design and organization. Its structure is based on functional solutions with a narrow staff group operating at a directional level. Other groups characterized by different importance and articulations operate at zonal and super zonal level.
Therefore the ASUR’s purpose is to realize a dynamic network of relations to find new solutions aimed at improving the quality of care. This requires a better integration among services, in particular the most correlated ones.
The organizational model is structured in “Project Areas”, which are flexible and innovation oriented. The model has to take into account the technical and professional horizontal dimension, but it must also comprehend the managerial vertical dimension. Every project area represents an organizational modality to deal with the ASUR’s engagements and is regulated by a set of programmatic plans. These comprehend an evaluation of the actual situation, and the arrangement of interventions which assure the continuity of processes. This leads to the development of new standard procedures to optimize the results of care processes avoiding the waste of resources.

A Consulting and Service Centre has been instituted for the health integration. This is connected with the Administrative Department and has supporting competencies for the Administration, the Project Areas and the territorial Zones. Among its tasks there are the preparation of reports on information fluxes, the elaboration of planning documents and operative agreements, the elaboration of basic organizational and functional standards regarding products and services for both institutional and private subjects.

Up to now the Administrative Department has identified five Project Areas which organize progressively the activities of the consulting and service centre for health integration. As shown by figure 1, these are prevalently centered on the main stakeholders, and they are subdivided in sub areas.

The “Maternal-Infantile Adolescents and Youth” Area comprehends the competencies regarding the early childhood (Maternal-Infantile) and the youth (Grown Up Citizens).

![Figure 1 Project Areas for Social Health Care Integration.](image)
The “Disability, and Mental Health” Area articulates in the management of physical handicaps and mental illnesses and disorders.

The “Elder Ones” Area tries to improve the quality of life of self sufficient elderly and to support and help the not self sufficient ones.

The “Addiction, Discomforts and Weaknesses” Area treats drug addiction and other forms of weaknesses and life’s troubles.

The “Subsidiaries” Area defines and develops the relations among the various institutional subjects and the voluntary organizations (Third Sector).

The Project Areas of the health integration have common contents and transversal competencies. These have to be defined in a unitary policy which can be contextualized in the different realities.

The system presented in this article improves the communication among the social and health care operators enabling knowledge sharing and diffusion together with the spread of innovation. The system develops from a network of information constituted by the description of the experiences of health and social care operators. This is implemented by a blog system and it allows to keep track of the skills and the interests of the community (Section 2).

Through the analysis of the pattern of links among the posts of the blog it is possible to detect the stakeholders which have the clearest and most general view of the organizational problems and the main knowledge claims (Section 3).

These individuals can be contacted by the Consulting and Service Centre for Health Integration to be interviewed or to open discussion spaces for the development of new standard procedures. These procedures, codified as Integrated Care Patways, are related to the treatment of specific cases and pertain to a single Project Area (Section 3.1).

2. Knowledge diffusion and sharing through blog systems

The exploitation of tacit knowledge and the spread of innovation processes are the main challenges which the e-learning [2] and knowledge management research [3] will have to cope with in the next future. Through innovative processes it is possible to satisfy the needs of patients and to solve all the organizational and operative problems encountered in daily activities, especially the ones related to the continuity of care. Some issues can be solved effectively only through the involvement of heterogeneous and distributed learning communities [2].

Collaborative learning is an active process involving peers which is aimed at constructing new knowledge and innovation [4]. This is achieved through dialogue, communication, collaboration and integration. The process is directed by a learner centered approach meaning that knowledge is not communicated by an instructor or an expert, but it emerges through the interaction among learners as a shared point of view on the examined problem.

In general it is important to involve the experts in the process of knowledge creation, but at the same time it is important to take into account the personal experiences of all the learners, to enhance their collaboration and the reflection on the generated solutions [5].

The personal experiences of the participants to the learning process are important to define a shared context or a topic of common interest. This is the first step toward the active involvement of the entire community [6]. Collaboration is essential in order to overcome complex real world problems which could not be easily and effectively solved by single individuals [7]. Finally the reflection on the effects of the provided solutions is essential in order to identify future research lines and to develop expertise [8].

A good starting point to express the experiences and the skills of the employees and to create the conditions for an effective sharing of knowledge is represented by the blogosphere. This is the net of connections tying individual spaces (blogs) where employees describe the encountered problems and their
experiences [9]. It has been demonstrated that a blogosphere can be considered as a constructivist approach to favor the definition of a shared representation of the world. Pieces of information are blogged in a way that take into account the personal point of view of the author [10]. This is made explicit through references to older weblog posts or external resources. External references, and trackbacks in particular, allow the social construction of knowledge. The meaning of a posted item can be expressed through a set of links directed to other resources made by the other members of the community of bloggers.

Blogs have revealed themselves as a powerful way to share and build organizational knowledge even in health and healthcare education [11]. According to the Social Capital theory [12], the social relations among colleagues and acquaintances are vital in the personal advancement.

Blogs are indeed the best way to condivide knowledge and information within a widespread community of employees. This is due to the fact that its members are induced to update the contents of their blogs and to share their experiences by well known incentive mechanisms, the most important of which is represented by the improvement of personal reputation [13].

Blog systems have been widely used in organizational contexts, not only to support the knowledge exchange, but also to favour the collaborative knowledge capture, to improve the information retrieval and to favour the socialization among employees.

The so called Collaborative and Adaptive Learning Platforms (CALP) introduced by the PROLEARN Network community [14] are an example of blog use within organizations “to connect people to people and people to the right knowledge object”.

There are many medical and health related blog examples [11] like the Drug Scope Drug Data Updated blog, the TRIP Database blog and the DLnet blog for health librarians and trainers in the UK. There are also several examples of blogs maintained by not professional authors but an acceptable quality level continues to be granted by a sort of collaborative intelligence governing the learning environment [11].

Blogs and Web 2.0 technologies in general open up new ways for collaborative networked learning in health and healthcare, but it has to be stressed that the simple blogosphere does not imply the improvement of collaborative learning processes. As stated by Mosel [10] the blogosphere has to be intended more as a self directed learning system.

The blogosphere is interesting for its evolving structure that reflects the set of social ties which shapes the community. Through the analysis of the blogosphere it is possible to detect the most important people involved in the learning process and the associated knowledge. These can open discussions on topics of common interest. In this way the system enhances the generation of learning communities and the definition of innovative processes. This is an environment open to all the participants that can encourage the emergency of shared or unusual point of views up to the birth of new possible problem-solving approaches to certain problems.

3. Collaborative learning platform features and architecture

The first problem to be solved in order to define a collaborative learning system based on a blogosphere is to find a way to select the bloggers who can hold the position of instructors within the community of learners.

We have demonstrated [15] that it is possible to select the most suited participants for this role by the analysis of the network of connections which form the hypertext of information contents provided by them. In particular these persons are characterized by the highest values of the betweenness centrality rate. The betweenness centrality has been considered in literature [16] as a way to find the most valuable nodes within a community. The strategic function of these characters is fundamental for the sys-
tem of learners, because they have the widest view of what happens in the net. This is due to the fact that they intercept the majority of the knowledge and information flows within the learning community. The people with the highest betweenness centrality can share their vision on the main knowledge claims of the community in an open debate.

The core of the collaborative learning system is just represented by this open discussion space, which can be implemented by a wiki [17], a collaborative blog, or can be structured as a direct F2F encounter, especially in the first phases of the learning process [6].

We have proved that the selection of the individuals with the highest betweenness centrality rate within the blogosphere of learners allows the attainment of three important results, which are the capture of the tacit knowledge of the most relevant people within the community, the sharing of this knowledge, and the raise of innovation processes. Thanks to the open learning environments, the rewiring effect of the social ties around the instructors leads to the appearance of new individuals with the highest betweenness centrality rate [15]. During the learning session directed by the instructors, the learners can get in touch with unknown people and collaborate with them. This collaboration can lead to the creation of new links, posts or trackbacks connecting their blogs. As a consequence new individuals with the highest betweenness centrality can arise over time. According to the functional requirements of a collaborative learning system that we have taken from literature [18] the collaborative learning system should be structured as shown in figure 2. All the learners keep updated their own blog. These could be connected to other blogs through trackback and pingback links or through blogroll references. A publisher keeps track of the pattern of these connections together with their descriptions and their contents. The pattern of connection that characterizes the blogosphere is a good approximation of the social network which ties the virtual community of bloggers. Periodically a social network analyzer calculates the centrality rates of each blog inviting the authors with the highest centrality rate to open a discussion environment.

The topic of the discussion is suggested by a broker that chooses a set of metadata and permalinks from its inner representation of the blogosphere. The retrieved arguments are selected considering the representation of the most recent posted articles.

This is the first step of a collaborative learning process which can be managed by a third module that is the workflow management system. A typical workflow begins with the definition of the objective of
the learning session and the assignment of the roles within the defined learning community. The final step usually is a test to evaluate the acquired knowledge of the participants and their level of satisfaction. The process comprehends also intermediary feedback steps to evaluate the participation level of the group and the quality of the learning process.

To further grant the awareness of the skills of the bloggers together with their actual interests, a gatherer module will be used to retrieve the posts which are related to the queries submitted by the bloggers. The gatherer, the publisher and the broker will be implemented extending the functionalities of existing knowledge management systems (KMS) and content management systems (CMS).

Once detected, the social health care staff members with the widest view of the problems faced by the organization are contacted by the Consulting and Service Centre for the Health integration. The selected people are interviewed in order to gather their experiences, opinions and observations associating them with a precise Project Area.

Afterwards the Consulting and Service Centre can decide on its discretion to invite the selected people to open discussion spaces on the emerged problems or it can contact other experts to lead the collaborative learning experience. The process can be carried out through direct face to face encounters or by the use of virtual discussion spaces like wikis or other blogs, which are more suited for collaborative projects and studies.

The selected instructors have to follow the functions and the activities which the Administrative Department has defined for each of them.

3.1 Functions and activities

Every Project Area carries on a set of activities having five main objectives which are the acknowledgment, the coordination, the modeling, the monitoring and testing and the support.

The acknowledgment function is carried out by three main activities. Firstly there is the gathering of information and data regarding the condition of the population in care related to the needs of the Area. Secondly the gathering of information and data on the main features of the services attributable to the Area. Finally the report of the activities and the performances of the Project Area.

The goal of the coordination function is to joint all the interventions and the healthcare interoperability services belonging to the Area and to program and control all the different levels of interoperability.

The modeling function has been added to define standards for the intervention plans, the offered activities and their accessibility.

The monitoring-testing function has to deploy information and monitoring tools for the offered care services and tools for monitoring the formative needs of the social health care staff which belongs to the area.

A troublesome and difficult task for social and health care structures is to implement the best practices represented by the evidence based clinical guidelines, translating them in local management protocols [19].

The so called ICP (Integrated Clinical Pathways) are plans which specify with a great level of details the steps in the care of patients affected by specific clinical problems [20], anticipating the expected clinical course and describing the involved disciplines together with the timing of the sequence of actions [21].

This process may involve figures with an heterogeneous set of competencies, both in the social and in the health field [20][22][23].

The objective of an ICP is to improve the patient care, reaching or even exceeding the existing quality standards. This improves also the clinician-patient communication and the patient satisfaction. It has been demonstrated that the adoption of integrated care pathways leads to the reduction of costs of pa-
tient’s care [24][25][26], improves the results in patient’s care [27][28], increases patient’s satisfaction [29][30] and improves the communication between doctors and nurses [31].

In order to achieve the best results the definition of a new ICP is a process that follows a set of precise and standardized steps [32] the most important of which are the selection of an important area of practice, the generation of a multidisciplinary group, the identification of the main involved actors in the pathway to be built, the development of the integrated care pathway specifying the sequence of the actions of care and the expected progress of the patient, the final test of the ICP and the discussion of all the variations from the expected results of the pathway.

These steps fit well with the activities of the project areas and with the main steps of a collaborative learning activity. This implies that the activities which are carried on within a collaborative learning group should end with the definition and the test of a new organizational ICP.

4. Conclusions and future work

The use of the blog system as a tool for the sharing of experiences and knowledge opens new possibilities for the online collaborative learning systems. It has been demonstrated that the blogosphere is particularly suited as self directed learning system, but it allows also to externalize the most promising and interesting ideas favoring the emergence of processes of innovation. The presented theoretical framework is particularly suited to serve an heterogeneous and diffused group of learners as the health and social care operators interested in improving the integration of their activities and the quality of care.

They have to be still identified optimal solutions to guarantee the consciousness of the contents offered by the blogosphere and strategies to induce the people selected by the system to start collaborative learning processes acting like instructors, tutors, moderators and inspirers.

We are going to test the presented collaborative learning platform in a health and social care context. The obtained results will allow us to examine in detail the potentialities of the system and will lead us to identify the most suitable applicatory contexts.

References


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