

ARTICLE

Learning networks to enhance reflectivity: key elements for the design of a reflective network

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Submitted in: December 2012

Accepted in: May 2013

Published in: January 2014

Recommended citation

Garcia, D. (2014). Learning networks to enhance reflectivity: key elements for the design of a reflective network. *Revista de Universidad y Sociedad del Conocimiento (RUSC)*. Vol. 11, No 1. pp. 32-48. doi <http://dx.doi.org/10.7238/rusc.v11i1.1736>

Abstract

The benefits of reflective practice for professionals who deal with complex settings have been widely reported. Similarly, different types of learning networks (LNs) are emerging as a promising alternative to support lifelong learning. This article addresses the topic of how LNs can be used to support reflective professional practice and, furthermore, contribute to the development of reflectivity in individuals and groups of learners. As the starting point of an ongoing research study, a provisional model for the design of a reflective network (RN) is presented here. An RN is a type of LN that includes additional features to foster the development of reflective capabilities. This article includes a description of a reflective process model, a list of reflective capabilities, a group of key elements for the pedagogical support system for an RN, and some reflections on the challenges of implementing this model and investigating its effectiveness.

Keywords

reflective practice, reflectivity, learning networks, lifelong learning

Redes de aprendizaje para mejorar la reflexión: elementos clave para el diseño de una red reflexiva

Resumen

Los beneficios de la práctica reflexiva para profesionales que tratan con entornos complejos han sido ampliamente documentados. Al mismo tiempo, están surgiendo diferentes tipos de redes de aprendizaje (RA) como una prometedora alternativa para apoyar el aprendizaje a lo largo de la vida. Este artículo analiza cómo pueden utilizarse las RA para apoyar la práctica profesional reflexiva y al mismo tiempo contribuir al desarrollo de la reflexión en individuos y grupos de alumnos. Como punto de partida para un estudio de investigación en curso, se presenta aquí un modelo provisional para el diseño de una red reflexiva (RR). Una red reflexiva es un tipo de red de aprendizaje que incluye características adicionales a fin de promover el desarrollo de aptitudes de reflexión. Este artículo incluye la descripción de un modelo de proceso reflexivo, una lista de aptitudes reflexivas, un grupo de elementos clave para el sistema de apoyo pedagógico de una red reflexiva y algunas consideraciones sobre los retos que hay que afrontar para aplicar este modelo e investigar su eficacia.

Palabras clave

práctica reflexiva, reflexión, redes de aprendizaje, aprendizaje a lo largo de la vida

Introduction

Lifelong learning has become an important activity for professionals who deal with complex practices. However, complex practices are unpredictable and difficult to standardize (Reinhardt, Schmidt, Sloep, & Drachsler, 2011). Such professionals have to perform flexibly in changing contexts where problems are ill-structured and can be framed from multiple perspectives, in and out of disciplinary borders. They must be capable of learning from their practice, from information resources and from others in an independent way. A promising approach for this purpose is learning networks (LNs) (Koper & Sloep, 2002; Sloep & Berlanga, 2010). They are aimed at enriching the learning experience in non-formal education contexts (Hsiao, Brouns, Kester, & Sloep, 2011; Van Der Klink, Drachsler, & Sloep, 2012).

However, networked learning demands complex learning skills, attitudes and knowledge (Rajagopal, Joosten-ten Brinke, Van Bruggen, & Sloep, 2012; Reinhardt et al., 2011; Van Der Klink et al., 2012; Sie et al., 2012). Among these capabilities, one of the most complex yet promising is the capacity to perform deep reflection. Reflective capabilities are supported by the metacognitive skills, knowledge and attitudes that allow a person to build knowledge out of present and past experiences. Learners have different reflective capacities (Chang, Chen, & Chen, 2012), and there is evidence that such capacities can be developed with the proper support.

Recently there have been some attempts to explore the possibilities of information and communication technologies (ICTs) for reflective practice, but they remain insufficient and there is

a need to explore this further (Hsieh, Jang, Hwang, & Chen, 2011; Sie et al., 2012; Uzunboylu, Bicen, & Cavus, 2011). Thus, in a review of 24 published articles, Sim and Heww (2010) identified six major uses of students' and instructors' blogs. Several of them reported findings indicating the suitability of blogs for reflective practice. Recent studies have indicated the positive effects of metacognitive reflection upon metacognitive skills and control of the learning process by the learner (Bran & Balas, 2011; C.-C. Glava & Glava, 2011), the positive effect of online learning communities on students' performance for reflective and active learning styles (Zhan, Xu, & Ye, 2011) and the suitability of blogs for metacognitive reflection to foster learning and learning skills (Cazan, 2012; Clipa, Ignat, & Stanciu, 2012; C.-C. Glava & Glava, 2011; Harris, 2008; Häkkinen & Hämäläinen, 2012; Robertson, 2011; Wopereis, Sloep, & Poortman, 2010), and that this effect is strengthened when it is combined with peer support (Cacciamani, Cesareni, Martini, Ferrini, & Fujita, 2012).

This article is the first report of a long-term research project that examines how to incorporate reflective capabilities for lifelong learning and complex professional practice into the design of any LN. In this report, a reflective process model is presented, including a list of reflective capabilities and some key elements that may be useful for designing and creating a reflective network (RN). These ideas were developed to direct the design of an ongoing experiment of an online learning community for professional health promoters, and it is influenced by the needs of their particular practice. However, the key elements presented here could be adapted and used in experiments involving other professionals dealing with practices that demand similar reflective capabilities. A group of studies will be carried out to test the suitability of the experimental model. It is hoped that this paper will contribute to a better understanding of what characteristics a collaborative online learning environment must have to enhance the development of reflectivity, how professionals can use LNs to develop their reflective capabilities, and how they can support each other to achieve this purpose.

Reflective process and reflective capabilities: a proposal

Presented in this section is a reflective process model that can encompass reflection on action (Schön, 1987, 1983), reflection on reflection and reflection in reflection. It also articulates those reflective layers with reflection in action (*idem*). This model is based on the pedagogical approaches of Paulo Freire (1970) and the experiential learning tradition of Kolb (1984), Schön (1983, 1987), Boud (1993) and Raelin (2000). Its general purpose is to transform experience into knowledge. It divides the reflective process into three moments: learning object construction, reflective analysis and outcome synthesis. Although such moments are sequentially related, the reflective process is not linear and can take multiple paths. This implies that the other two can take place at any moment, and also that the reflective process may focus on a different object at any moment. Even if the moments occur simultaneously, they will lead to different outcomes.

To perform the reflective process, it is necessary to use a set of capabilities that include skills, knowledge, and attitudes used to regulate learning processes known as 'metacognition' (Akyol &

Garrison, 2011; Jausovec, 2011). Some of them are specific to the reflective process. The whole group of reflective capabilities is labeled here under the term 'reflectivity'. As with other metacognitive skills (Jausovec, 2011), it is assumed that they develop through practice. Then a description of the moments of the reflective process and the reflective capabilities required at each moment is presented.

The first moment consists of the construction of the object to be analyzed. According to Boud, Cohen, and Walker (1993), and Boud et al. (1993), experience is complex and every detail can be relevant for learning. It is impossible to analyze every detail, since part of experience is unconscious, although it is necessary to select what aspect of experience is to be analyzed. This aspect of experience may work as a learning object (LO) – a mind representation that is partially conscious – since much of its sense and meaning relies on hidden assumptions. It is important to identify an LO in order to frame the reflective process. During the reflective process, other LOs may be identified for further analysis. As the learner does not know what the learning outcome of the analysis of an LO is, he or she may select it intuitively. Not all the LOs selected are to be analyzed at once, but they are added to a list that the learner can retrieve later. Figure 1 shows the reflective capabilities needed at the first moment.

The second moment is the reflective analysis of the LO. During this moment, the learner invokes internal voices (for example, affective, cognitive, etc.) and evokes external voices (other people's reflections, theories, etc.) and performs an internal dialogue (Penn & Frankfurt, 2005). The LO under analysis (understood as a mind construction) is then transformed, complemented or rebuilt with new understandings and meaning, that is to say, new knowledge. Figure 2 shows the reflective capabilities that are used at this reflective moment.

Once reflective analysis develops, it is necessary to announce and synthesize learning. It is also useful and necessary to identify the implications of the new findings in practice (Gore & Vazquez Manzini, 2004). These activities constitute the third moment, where the reflective process links to practice. This moment demands the use of other reflective capabilities (see Figure 3). Additionally, a set of reflective capabilities are used during the whole reflective process (see Figure 4).

The reflective process is an experience in its own right, which can also be transformed into several LOs, such as the nature of the reflection or the performance of the learner during the reflective experience.

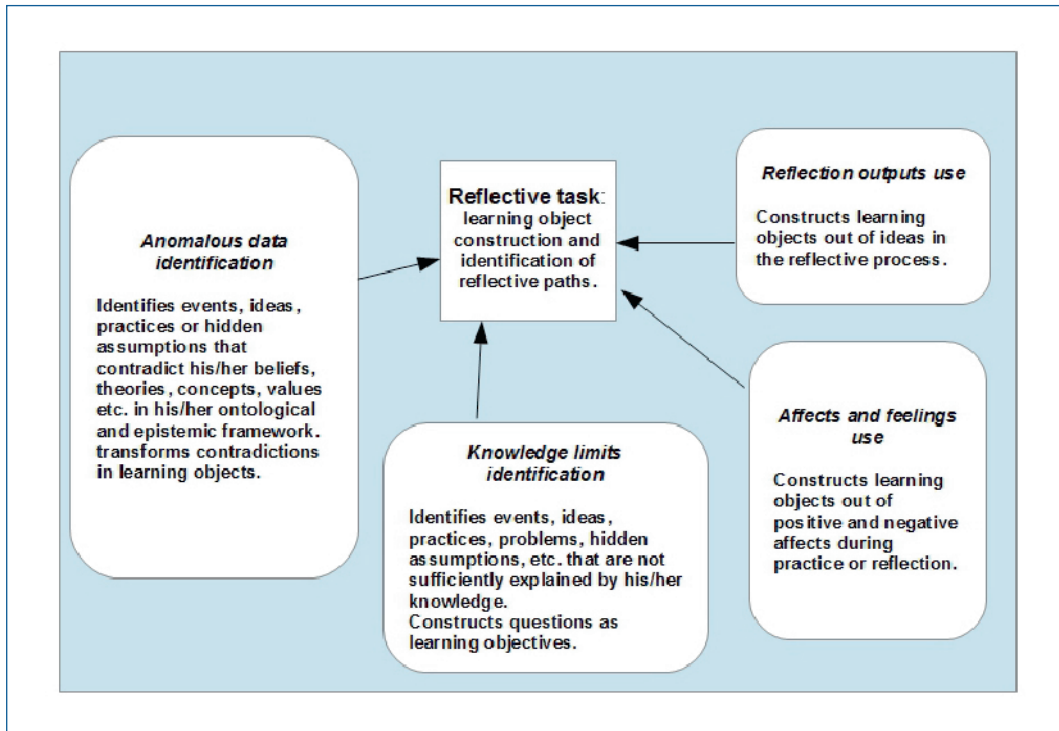


Figure 1. Reflective capabilities during learning object construction (first moment).
Reflective capabilities are used to achieve the reflective task.

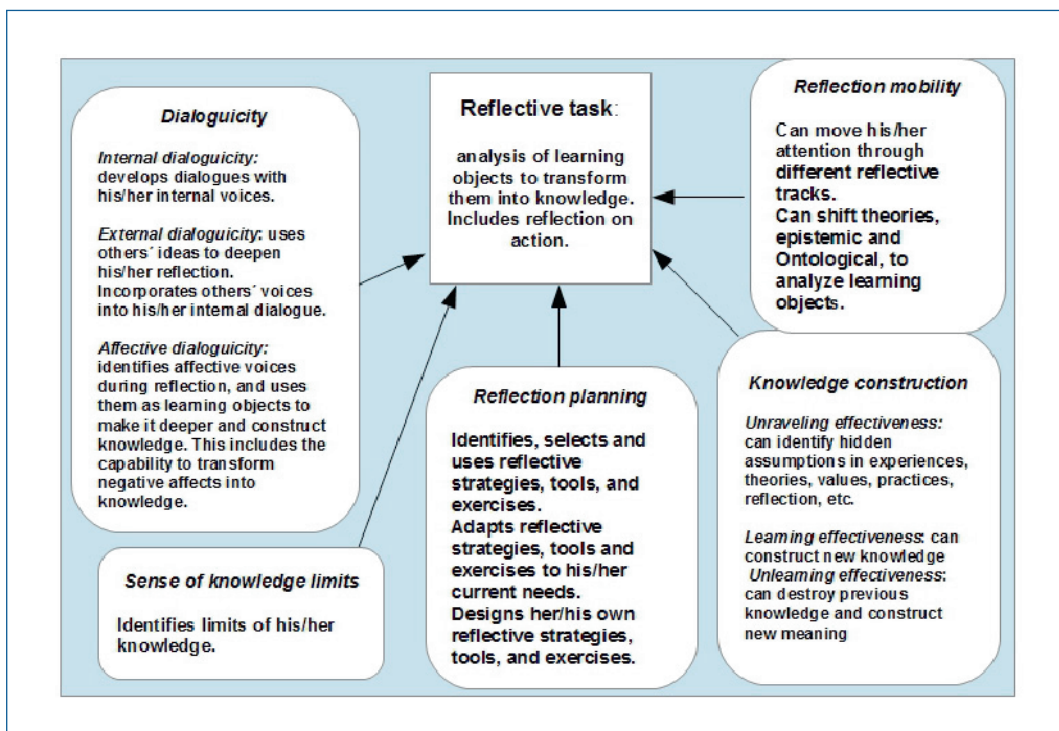


Figure 2. Reflective capabilities during reflective analysis (second moment).
Reflective capabilities are used to achieve the reflective task.

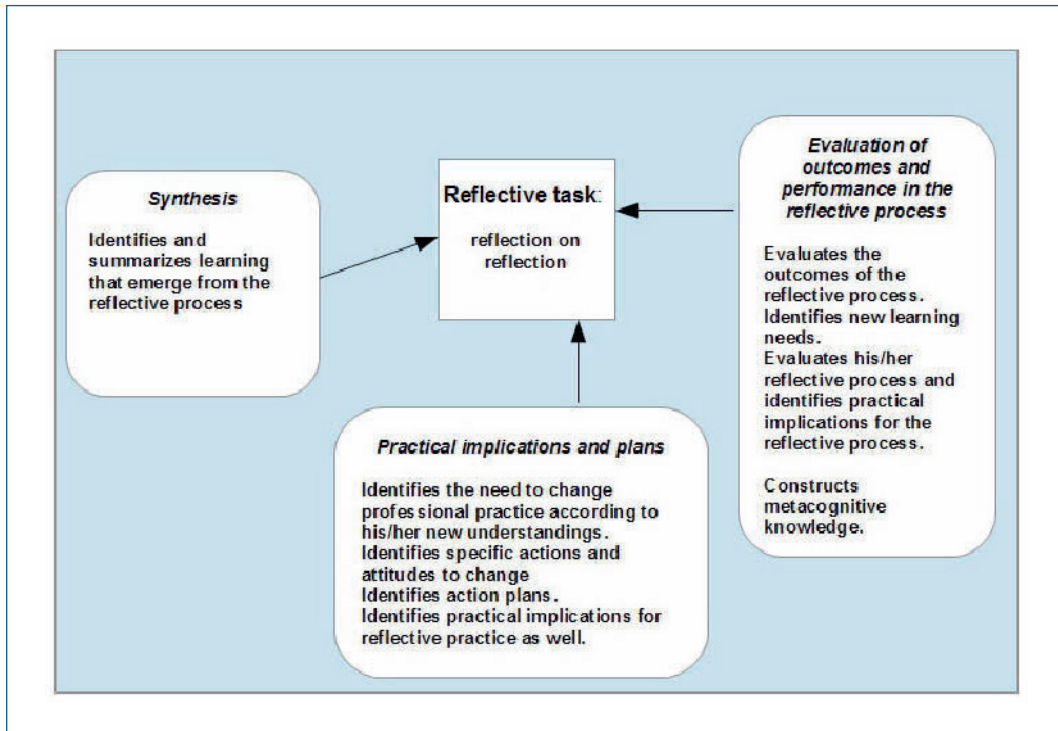


Figure 3. Reflective capabilities when drawing conclusions (third moment).
Reflective capabilities are used to achieve the reflective task.

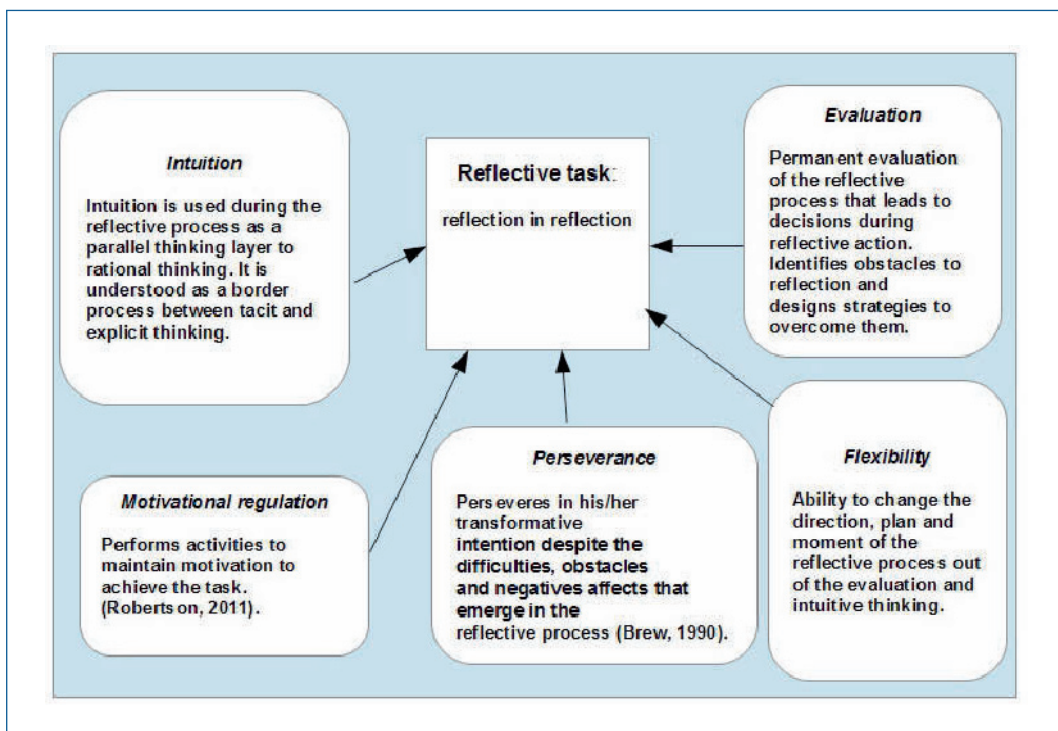


Figure 4. Reflective capabilities during the whole reflective process.
Reflective capabilities are used to achieve the reflective task.

I. General characteristics of a reflective network

The purpose of an RN is to serve as a collaborative learning environment that fosters the development of the reflective capabilities of its inhabitants. Secondly, an RN is guided by two complementary purposes, which are content-centered and serve as vehicles for achieving the main purpose: 1) to act as a collaborative network to support lifelong learning and practice improvement, and 2) to make collective and individual contributions to general knowledge in the subject field. Table 1 summarizes the general characteristics of an RN; many of them are taken from the literature and are common to other types of LNs – especially e-learning communities of practice (Chikh & Berkani, 2010) – while others are specific to an RN.

Table 1. General characteristics of a reflective network. Most of these characteristics are shared with other types of learning networks

<i>Characteristics</i>
Common identity
Free networking
Open curriculum, practice-driven
Self-directed
Metacognitive curriculum
Heterogeneity
Peer regulation and support

II. Support system

The support system is divided into three basic elements. These elements address the cognitive, social and teaching presences described for a successful learning community (Zydney, deNoyelles, & Kyeong-Ju Seo, 2012), although teaching presence should only be an early element of an RN, as it should eventually be replaced by peer support.

1. Support for written reflection

Written reflection facilitates the creation of an external semantic representation of many of the thoughts produced during the reflective process (Chang, Chen, & Chen, 2012; Harris, 2008). Written reflection demands and develops metacognitive skills to describe internal processes; therefore, it can act as the mediator between an internal individual process and collaborative reflection (Akyol & Garrison, 2011). According to the reflective process model presented previously, these representations may be transformed into LOs in subsequent reflective processes by the learner and others. ICTs offer advantages for reflective writing, such as the plasticity of the registers, the possibility of organizing

files and the facilities to enhance communication and interaction with peers by using different levels of privacy (Wopereis et al., 2010; Robertson, 2011; Cazan, 2012).

2. Scaffolding for reflection

Scaffolding aims to support deep reflection while reducing the counterproductive risks of high cognitive-load tasks (Glava & Glava, 2011; Hsiao et al., 2011). As users develop their reflectivity, they may participate in the scaffolding process for newer users. Four modalities of scaffolding are described below. These modalities are related to each other and may coexist in the same virtual learning environment.

a) Track-oriented reflection

There is evidence that adding metacognitive reflection to reflection on content has a positive effect on metacognitive skills (Bran & Balas, 2011; Cacciamani et al., 2012; Cazan, 2012; C.-C. Glava & Glava, 2011; Robertson, 2011). In this model, reflection and metacognitive reflection are split into eight reflective tracks. Track-oriented reflection is meant to help users direct the focus of reflective analysis towards different layers of experience, and the experience of reflecting on experience. Each of these layers is presented as a different track of reflection. Escalating reflection to more metacognitive tracks may lead to higher control of the reflective process. Indeed, the studies by Wopereis (2010) and Rajagopal et al. (2012) suggest including a track to monitor affects during cognition (Robertson, 2011). Figure 5 shows the eight tracks considered in the model.



Figure 5. Reflective levels and tracks. The RN environment may provide the opportunity to split the reflective experience into eight different tracks. Each track focuses on a different aspect of the reflective experience and yields a different learning outcome. Users should decide which tracks to follow and when. The ability to do this is in a fact a reflective capability to develop that requires the learner to keep a level of consciousness of the processes that take place implicitly, in order to detect reflecting paths to follow on a different track.

b) Reflective exercise

Reflective exercises (REs) are pre-designed tasks to scaffold the analysis of a given LO constructed from a case. Some exercises may be designed to help learners select certain episodes from their practice in order to construct LOs. Advanced learners may develop the capability to design REs for themselves and for other users in the community. REs may include several of the reflective tracks

mentioned previously. Some of the tracks in an RE may be public, while others may be registered privately. This is especially important for exercises that demand analysis of affective aspects and personal episodes of practice.

REs are meant to offer reflective experiences for users. Similar REs have been used as alternative assessment and formative tools (Sarivan, 2011). An RE is expected to have a positive influence on their attitudes towards reflection, and also to develop reflective capabilities in an environment that reduces the cognitive load of the learner, since he or she does not have to design his or her learning strategies. Metacognitive tracks may give the learner the opportunity to learn how to design his or her own RE in the future. This is important, since REs are a provisional scaffolding, not a set of rules to follow, as they may negatively affect motivation and learning (Wopereis et al., 2010).

c) Reflective tools

Reflective tools (RTs) are generic techniques to support reflective analysis of different LOs. Portfolios and journals have been widely used as RTs (see, for example, Chang, Chen, & Chen, 2012; Raelin, 2000; Bran & Balas, 2011). They vary in their independence of the LO, since some of them may be very specific or general. RTs may include several of the reflective tracks described above. Advanced users are expected to develop the capability to adapt existing and even create new reflective tools for their needs.

d) Blended learning: simulations

For those users who have no professional practice, such as undergraduate students, simulations of professional practice may be provided (Van Der Klink et al., 2012). Such simulations may be simplified or complex versions of professional problems similar to the remote internships described by Lansu et al. (2010) or the community-of-practice experiment reported by Chang, Chen, and Li (2008). Simulations may be integrated into blended learning, adding the development of reflective capabilities to a conventional curriculum.

3. Peer support

Peer support is one of the most important elements that contribute to successful networked learning (Berlanga et al., 2008). The availability of learning technology is no guarantee that it will be sufficient to support learning (Van Der Klink et al., 2012), especially with complex cognitive tasks (Hsiao et al., 2011) such as deep reflection and the development of metacognitive skills (Cacciamani et al., 2012). Peer support may be voluntary or involuntary and can work in several ways, as shown below. Most of the learning activities and tools described above can be performed individually; however, as some of them may be too complex for a single learner, they are expected to serve as a stimulus for collaboration. The participation of one learner leaves a track that may help future learners and contributes to their gradual integration into what is known as 'legitimate peripheral participation' (Cacciamani et al., 2012; Chang, Chen, & Li, 2008). Users are also expected to share unsolved problems that could trigger flexible collaboration adapted to learners' needs (Hsiao et al., 2011) as in ad-hoc

transient communities (Berlanga et al., 2008). Table 2 describes the different roles of peer interaction as part of the support system:

Table 2. Peer support roles in a reflective network

<i>Role</i>	<i>Description</i>	<i>Rationale</i>
<i>As a reflective cognitive model</i>	Users provide examples of the use of REs, tools and analysis in the different reflective tracks.	Registers of reflection may show a diversity of possibilities from which the users may learn. These models may also guide users regarding which learning activities they may get involved in at each stage of their career, and adapt the platform and their internal and external relations accordingly (Rajagopal, Joosten-ten Brinke et al., 2012).
<i>As a co-creator of a reflective identity</i>	Modeling to build an identity as reflective practitioners.	To build a collaborative, safe, and caring environment that stimulates a positive attitude towards reflection (Rajagopal, Joosten-ten Brinke et al., 2012; Sie et al., 2012; Wopereis et al., 2010).
<i>As a catalyst of deeper reflections</i>	The result of this interaction is a more complex understanding in learners (Freire, 1970; Lansu et al., 2010; Lin, Hong, & Lawrenz, 2012; Wopereis et al., 2010).	Mutual influence among learners' reflections in LNs (Rajagopal, Joosten-ten Brinke et al., 2012) is a powerful possibility for the learner to interact for a long time with others in ways that would be impossible or impractical without the support of technology. Collaboration in learner networks has the potential to go far beyond sharing knowledge and into the realm of metacognitive regulation (Akyol & Garrison, 2011) to encourage participants to become more reflective people. One way of doing this is for learners to act as mirrors of a reflective process in different learning tracks. Another example of support is the Socratic questioning method (Harris, 2008).
<i>As support for cognitive load</i>	Reduce the intrinsic cognitive load of the task and increase the germane load, as described by Hsiao et al. (2011) for knowledge sharing processes in LNs and by Cacciamani et al. (2012) for epistemic agency.	The important differences in reflective capabilities and strategies among learners may contribute to the formation of a more complex reflective system by adding multiple perspectives and possibilities (Rajagopal, Joosten-ten Brinke et al., 2012). As reflective capabilities develop in a learner, the cognitive load may be reduced, thus allowing the learner to increase his or her efficacy, as reported for other metacognitive skills (Jausovec, 2011). Expert reflective professionals may also benefit from peer support, since the kind of support just described can take place at a deeper level.
<i>As regular support for networked learning</i>	Peer support to create, grow and manage an LN, as part of an RN.	Peer support may also serve for the purposes described in LNs (Berlanga et al., 2008; Hsiao et al., 2011).

III. General architecture of a reflective network

The key elements of the type of RN presented above can be integrated into different types of existing LNs. Every case may demand different procedures and decisions to integrate a functional architecture. These elements may also be included in the design of a new LN and may actually result in different designs. Figure 6 shows an example of the general architecture of a learning community for undergraduate and in-service health promoters. Such a prototype is currently being built and studied as an experiment. Results of the studies will be reported in the future.

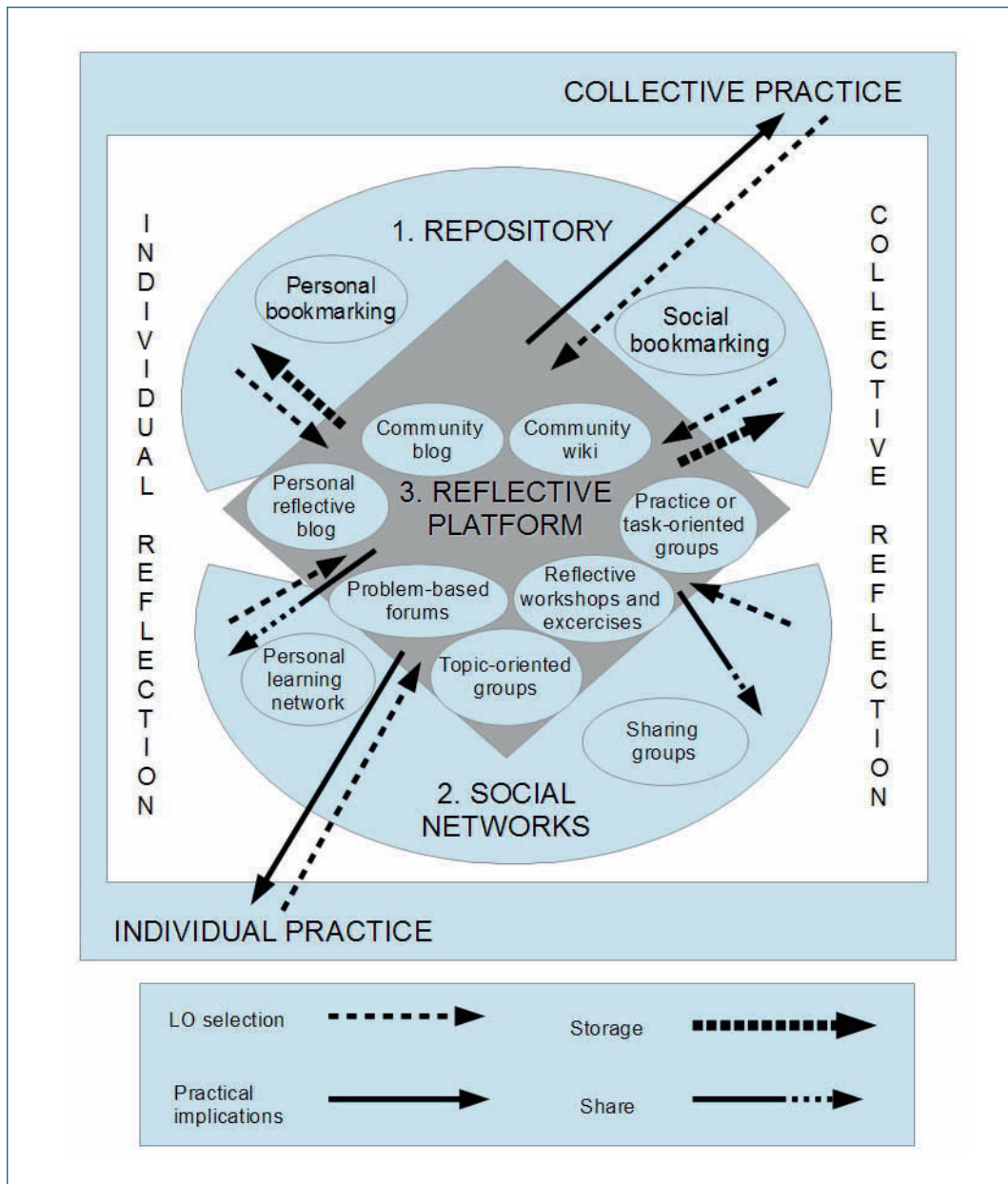


Figure 6. Technological platform for a RN. The case of manantialdenubes.org. The platform has three connected elements: 1) a repository for learning objects and relevant information, 2) social networking services and 3) a reflective environment. Arrows show the main relations between the three elements and to professional practice. Most of the reflective process takes place in the reflective platform where reflective scaffolding can be best supported by environments designed ad hoc.

From idea to reality: multiple obstacles

Implementing a prototype based upon the keynotes presented here is a path strewn with difficulties. Like any LN, it must have a set of characteristics for effective collaborative learning (see Rajagopal, Joosten-ten Brinke et al., 2012) in addition to those that are specifically designed for the development of reflectivity. An RN is subject to a number of risks, and it is important to consider the sociocultural aspects of its members and the nature of the knowledge being built, among other factors (Joubert

& Wishart, 2012). Learners may have to do more than develop networking capabilities such as those described by Rajagopal, Joosten-ten Brinke et al. (2012). This may imply that, before any evidence on the results of an RN on reflective capabilities emerges, it will be necessary for a critical mass of users to reach the adequate level of involvement (Koper & Sloep, 2002), and for them to master basic networking capabilities first. This will be necessary not only to test the features of the prototype, but also to create the environment for new users to reach this stage. It is likely that a founder network – a group of advanced learners to support other learners (Robertson, 2011) – will be needed. It is possible that such a group will not develop spontaneously, so it may be necessary for them to receive support in blended environments, and for them to train as future peers-tutors (Hsiao et al., 2011) of other professionals. Special tutor support like the coaching and feedback described by Stein, Wanstreet, Slagle, Trinko, and Lutz (2012) may be necessary. However, founders should not be trained as expert tutors, but as expert learners.

It is very important for users to be heterogeneous not only in their levels of expertise in the subject matter, but also in the level of development of their reflective capabilities, and even in characteristics like the profiles for metacognitive reflection (A.-E. Glava & Glava, 2011) and learning styles (Zhan et al., 2011), in order to provide a proper match with the heterogeneity of new users and improve reflectivity (Hsieh et al., 2011).

An RN may not be attractive to users unless it effectively responds to their practice-related problems and interests, adequately adapts to their current level of expertise and enables everyone to visualize the benefits of joining and participating in it (Sloep & Kester, 2009). It is therefore very important to conduct an analysis of potential users (Sloep & Berlanga, 2010, 2011). The problems users face in their practice are rarely framed as 'I need to be more reflective'. It is quite important to demonstrate to users that an RN is as useful for solving problems as it is for becoming more reflective, and that the latter has an effective and positive influence on practice improvement, though this may take time (Harris, 2008). Although an RN is designed for users to share a common reflective environment to improve distinct practices, it may also be adapted for teamwork to reflect on common projects and develop common reflectivity with the beneficial effects described by Nederveen Pieterse, Van Knippenberg, & Van Ginkel (2011).

Some of the features of the model proposed here cannot be properly envisioned unless specific software is developed for the reflective platform.

It goes beyond the scope of this paper to present a research plan to evaluate the effectiveness of the keynotes presented here. A series of studies evaluating some of the features of the model may be necessary before attempting to evaluate the whole. It is also clear that a long period of time will be required to follow up on the progress of learners, as suggested by (Wopereis et al., 2010). This includes not only the development of individual reflective capabilities in the members, but also of the network, which implies creating a long-term experience of reflective collaboration. Many issues emerge as research questions, some of which can be investigated in the short term, while others may have to wait until an RN, as presented here, becomes a reality. Some of these issues are: How can an RN be optimally integrated into daily professional practices? What are the RN's contributions to the actual development of reflective capabilities for novices, intermediate and advanced users? What are the differences in use and needs of users at different levels of reflective expertise? What potential

does an RN have to develop new methodologies of knowledge creation? What potential does an RN have to combine individual reflective capabilities and styles in collaborative tasks and projects?

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