Understanding PLE as an Essential Component of the Learning Process

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Abstract: This exploratory paper discusses the learning potential of PLE, not simply as a technological artefact but as an instrument of the learning process. It tries to identify the role of PLE in learning process and to point out the conditions to become more efficient learning instrument. Firstly, PLE should foster self-direction and reflexivity, and learning resources should be made available to the learner to support its metacognitive activity. Secondly, since PLE's are more and more inter-connected thanks to online tools, they raise the same issues of knowledge exchange as for online communities: difficulties to connect resources and to exploit the data available. Sharing should be improved by developing solutions bridging personal annotations (personomies) with their collections (folksonomies) and more structured knowledge representations (ontologies). Thirdly, research results should be used by institutions to improve the process of learning and teaching, and the design of VLEs.

1. PLE, an Enriched Concept

The notion of Personal Learning Environment (PLE) as conceptualized by Attwell (2006, 2007) refers to a set of the different applications, services and various other types of learning resources gathered from different contexts. It is constructed by an individual and used in everyday life for learning. It is not an application or a system but a personal assemblage supporting new learning modalities induced by ubiquitous technologies and social software. From the technological point of view, ubiquitous computing allow learning to take place almost everywhere through wireless and GSM networks and mobile communication devices able to access Internet. Because the same technologies are used in the different context of our life, work, home, school, it could be possible to mobilize what has just been learnt and apply it in the context it could be used (transfer of knowledge). Additionally, social software, predominant in PLE, represents technological development that allows people to connect and collaborate, and to create and share. All kind of different and individual knowledge can then be generated and put in common. New ways of learning could emerge from the use of PLE.

However, one has to recognize that PLE is not a fundamentally new concept. Before the era of massive use of technology we live through, learners have always had to organise their own learning and develop some kind of PLE. For informal learning, on one hand, PLEs might have been composed of individual learning resources such as magazines, books, CD, videos, etc., and social communication and sharing opportunities through membership to an association, participating in meetings, etc. For formal learning, on the other hand, PLE were comprised of course notes, conceptual maps, summaries and other personal working/learning documents that students exchange. Face to face peers and friends support, students meetings in cafeteria and tutoring were also part of more traditional PLEs. Now a day, PLEs are much richer in terms of volume of content, exchanged contents and technologies**.**

There is a strong idea underlying PLE concept: autonomy of the learner and what (Bandura, 2003) call self-directed learning[1]. PLE is not something that is imposed on an individual but something that one builds autonomously to suit its own needs and the type of learning he wants to pursue. Self-direction is recognized by the capacity to choose learning resources or learning providers, the time, place and context of learning. It manifests also through the capacity to grasp opportunities to learn that could be supported by PLE.

PLE can bring together seamlessly various types of learning; learning by personal interest or the desire to solve a problem, community learning, school learning, experiential learning, workplace learning, etc.. In short, it can embrace all formal and informal learning. PLE has potential for more meaningful learning by facilitating reinvestment of knowledge in different contexts.

Since lifelong learning is recognized as being crucial in our knowledge societies, it can easily be envisaged that every one will develop their own PLE. In this context, PLE should be considered as permanent, adaptable and evolving, enabling different types of learning, in different context and at different times in life.

Nevertheless, conditions have to be realized to obtain from an assemblage of tools and from their use, a real and authentic personal learning environment. To trace these conditions, artefacts should not be assimilated with instruments according to the instrumental genesis approach (Rabardel, 1995; Béguin, & Rabardel, 2000)[2]. In other word, it means that when reflecting and conducting research on PLE, technologies should be distinguished from their use and from their potential for learning.

2. Roles of PLE in the Learning Process

Fostering Self-direction and Reflexivity

Thanks to its reflexive functionalities such as goal setting, awareness and control over learning resources and results, PLE is not an alternative or parallel concept to VLE, it is an essential complement. Reflexive process, recognized as an essential part of authentic learning, is not usually supported by traditional VLE functionalities. Thus PLE can bridge the gap to completely fulfill integrity and integrality of learning. It has the potential to support the internalisation/externalisation of learning processes and results, and eventually, the full realisation of learning. But there are the conditions for the realization of this potential.

Reflexive tools should be available to the learner and easily integrated in his PLE. The decision of using reflexive tools implies that the learner has already developed metacognition competences, mainly his motivation to analyse, control and improve his learning. Thus reflexive tools should support cognition on the knowledge built and on the knowledge building process. They should be able to represent learner's knowledge (for example, using tags) and extract traces that represent his knowledge building process. The later implies that the learner is able to analyse traces and other information given on his learning.

Bridging Personal and Collective Learning

The interconnection of PLE is a crucial aspect and raise similar problems encountered by online communities when they want to exchange knowledge. To this respect, Web 2.0 applications represent a substantial advancement: the ability for users to contribute to collective databases combined to their ease of use and a focus on social exchange enabled the creation of massive networks of knowledge and people. Many Web 2.0 services proposed the users themselves to organize this flow of data with social tagging tools[3] where each user can tag the resources they post or contribute to with keywords freely chosen. The resulting folksonomies (Vanderwal, 2005) consist in the collections

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[1] Self-direction includes competences to plan, organize and manage educational activities, to mobilize resources, to regulate ones motivation and to use metacognitive competences to evaluate the quality of its own knowledge and strategies (p. 265). Authors' translation.

[2] An instrument is a mixed entity composed of the artefact and of the use pattern of the user. An artefact becomes an instrument when and only when use pattern is created.

[3] For instance : http ://del.icio.us

of all the set of tags of each user (called "personomies" as en extension of the term folksonomy, but for one person) and can be seen as a way to bridge personal and collective knowledge bases. Social tagging brought a viral solution to annotation of content on the Web by allowing the mass of users to tag the mass of resources. Another aspect is that tagging is simpler because it allows classifying resources with multiple keywords as opposed to unique categories per item (Sinha, 2006). Moreover tagging benefits users first, for they tag for themselves to organize their own data, and second, it benefits the community when all these personomies are collected and made public. However, the exploitation of tools coming from the Web 2.0 culture and the folksonomies raises some issues. It is difficult to make these scattered sources of data communicate efficiently, since most of the data is contained in databases and is thus not visible from the outside (the problem of "the deep Web"). Moreover, tags are sometimes ambiguous and folksonomies do not constitute a sound knowledge representation since they are, in essence, not structured.

Allowing the Change of Ownership

New generation of students who share the culture of Web 2.0 use in their daily life blogs, wikis, RSS flux, podcasts and social software. Building their own PLE, thanks to ubiquitous technologies and social software, becomes natural. By doing so, they gain control on their learning. Institutions must then recognize their lost of control over knowledge content, modes of transmission, learning process and validation. They have to accept the fact that ownership of learning is moving on the students' side. Educational system should not ignore this phenomenon but rather try to find ways to valorise learning that takes place outside the institution and recognize its contribution to personal and professional development. This entails that educational institutions have to develop a better knowledge and understanding of this new situation and learn how to exploit it in a constructive manner.

3. Exploring Solutions

More research has to be undertaken to understand how people create and use their PLE, how it complements other learning environments (VLE, community of practice, etc.) and how their effects on learning can be evaluated. The creativity of people in their way of learning with PLE has to be studied and results used to develop support resources to assist individuals in designing their own authentic learning environments.

Metagognitive Resources

Resources to support metacognition, self-direction and reflexivity are currently used in formal education to improve learning to learn competences and to stimulate learners' motivation. Such resources would have to be reconceptualized and redesigned for an attractive and autonomous use, inviting creators of PLE to be more reflexive. For example profile tools used to describe who one is when accessing a social networking website might be redesigned with a metacognitive approach. Resources to sustain social networking, help the construction of personomies or develop portfolios are other examples of resources that can be turn into metacognitive tools to stimulate learning awareness and regulation of learning within PLE.

Experience has shown that only those who already have metacognitive competences can benefit from these types of resources. For others who lack of these competences, educational institution should try to reduce the divide by offering some type of subtle and appropriate metacognitive coaching, like peer coaching for instance.

Hints and Solutions to Bridge Individual and Collective Learning

As we have seen it before, folksonomies are an easy way to obtain lots of annotations of resources, but they are heterogeneous and difficult to exploit. On the other hand, the Semantic Web[4] offers a framework to integrate data from various origins and to relate them with real world objects via knowledge representations. To achieve this goal, applications need formal schemes, called "formal ontologies" (Gruber, 1993) which relate the different concepts within a given field of knowledge. Any resource can then be annotated according to one or several relevant formal

[4] http://www.w3.org/2001/sw/

ontologies. The problem of these structured representations is mostly their cost of design and maintenance, which prevent applications based on ontology to be widely used.

In order to bridge formal knowledge representations (ontologies) and informal knowledge representations (folksonomies), several directions are currently being investigated (Limpens *et al.*, 2008). Some researchers have tried to extract the semantics that underlie folksonomies. The hypothesis of this kind of approach is that between the personomies collected in folksonomies, it exists some common ties which can be discovered thanks to statistical (Jäschke et al, 2008) or social network analysis (Mika, 2005). Using these methods, it is possible to organize the tags and to derive some relationships between the tags, allowing the suggestion of relevant tags when searching resources. Other approaches consist in using Semantic Web technologies to automatically generate annotations while creating or exchanging contents. For instance, when someone post on a blog, the system can create annotations stating the subject of the post according to its title, or the tags associated to it. Since the representations (ontologies) underlying this process follow the standard of the Semantic Web, resources are more easily available and can be connected to related resources (Breslin et al, 2005). Several works proposed to bridge social tagging applications with ontologies: by automatically sorting out tags and linking them to ontologies (Specia & Motta, 2007); or by proposing users to connect, while tagging, their tags to concepts from ontologies (Passant, 2007); or finally by directly structuring folksonomies with the formalisms of ontologies (Gruber, 2005; Buffa et al, 2008). Thus, content of collaborative knowledge base can be organized and structured thanks to the tool of the Semantic Web, while keeping the simplicity and sense of sharing of the Web 2.0 applications.

Institutional Resources

It is important that institutions recognize and take advantage of learners' empowerment. Teacher would be primary actors to be targeted. They should be accompanied in finding innovative ways for encouraging efficient use of PLE, easing the blending of learning from PLEs and VLEs.

Institutions should also offer a wider access to prior learning assessment and recognition. Most often, prior learning is recognized in programs offered to adults through continuing education. Research indicates that prior learning assessment improves learner confidence, self-esteem and motivation to learn. It helps learners develop clear educational goals and plans. Younger learners should also be able to demonstrate and obtain recognition for learning acquired outside of formal education settings. Consequently, flexible and adaptable studies programs would have to be developed. Such approach could be judge as to demanding for the educational system. The gain in educational efficiency by pinpointing learning needs more accurately should be evaluated.

Figure 1 shows the three types of resources described herein for better interactions between PLEs and between PLEs and VLEs.

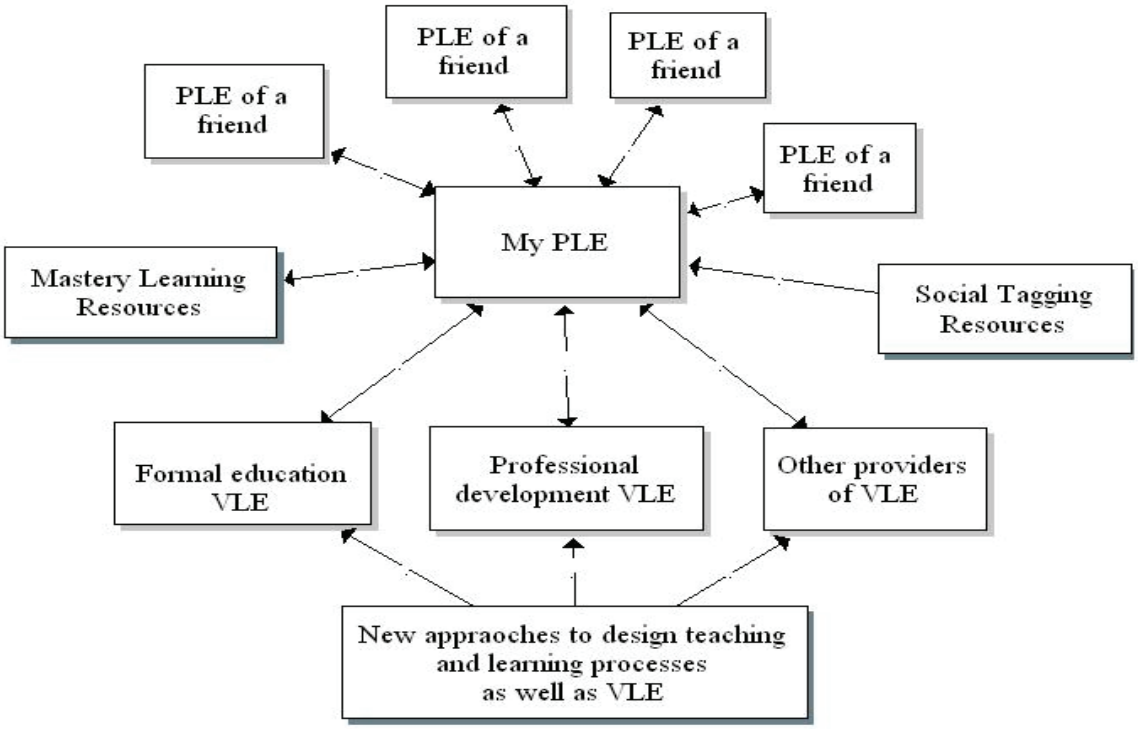

Figure 1. Resources for better interaction between PLEs, and between PLEs and VLEs.

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