

# An Exploratory Study for the Deployment of a Techno-pedagogical Staff Learning Environment

Laurent Moccozet, University of Geneva, Switzerland – Laurent.Moccozet@unige.ch  
Omar Benkacem, University of Geneva, Switzerland – Omar.Bekacem@unige.ch  
Bineta Ndiaye, University of Geneva, Switzerland – Bineta.Ndiaye@etu.unige.ch  
Vjollca Ahmeti, University of Geneva, Switzerland – Vjollca.Ahmeti@etu.unige.ch  
Patrick Roth, University of Geneva, Switzerland – Patrick.Roth@unige.ch  
Pierre-Yves Burgi, University of Geneva, Switzerland – Pierre-Yves.Burgi@unige.ch

## Abstract

*Beyond the technological dimension of the concept of PLE (Personal Learning Environment), its significance is much closer to the balance between formal and informal learning based on Learner-Centered approach. The combination of these two dimensions of learning involves the development of a specific approach for technological and educational implementations. In the present study, we describe the approach being tested at the University of Geneva. This exploratory step aims at establishing a PLE with the intention of conducting a study of existing ICT practices. Our objective is that learners adapt and make use of the autonomous technological support and profit from the open and flexible environment. We also describe the whole phase of study and the methodology adopted to achieve this. The present study allows us to draw a number of reasonable conclusions about the current use of ICT by university students. Finally, based on these conclusions, we propose a comprehensive action plan for the deployment of a techno-pedagogical PLE for the University.*

## 1. Introduction

In today's world, most people need to keep on updating both their skills and knowledge to meet the challenges of everyday life. This has spurred new learning needs which exceed by far the formal courses, provided commonly by institutions, which allow targeting a general public. Instead, the needed trainings must be more informal in order to better address individual needs.

In the last decade, Learning Management Systems (LMS) have dominated the academic landscape of both North American and European universities, and favored a renewing of teaching in Higher Education. As a consequence, in Switzerland, all higher education institutions have implemented at least one LMS. Yet in recent years, driven by numerous mutations (e.g., lifelong learning) and reforms (e.g., Bologna), European universities further moved away from a teacher centric approach by adding a new paradigm where the learner becomes the main actor in the process of building his skills and his knowledge.

This trend has given birth to a range of new e-learning tools focusing primary on the learner. All of these tools, both formal and informal, can be aggregated in what is commonly called a Personal Learning Environment (PLE). The concept of PLE has emerged relative recently and remains a largely open debate. Its different implications make it difficult to provide a final and definitive definition for the concept. However, it is possible to identify the outlines of what characterizes a PLE.

The main characteristic that differentiates PLE from LMS, an older approach whose use is widely developed in universities, is its focus on the learner that intends to provide some autonomy to the learner. In this way, the PLE is highly customizable, adaptable and particularly flexible. Its objectives are to enable learners to aggregate their knowledge but also to extend and develop their own knowledge. To put the learner in the position to take advantage of this environment, it is necessary to familiarize them with the approach represented by PLE and to put them in the stage to develop their own strategies for exploitation of available resources for their own needs. The extension of these environments beyond the initial training opens up interesting perspectives for lifelong learning. PLE may even represent a bridge between the two types of training and assure the transition and accumulation of knowledge and skills.

From the standpoint of implementation, the different variants of PLE gravitating towards an environment type "toolbox" organized on the principle of "mashups" are systematically defined. They also open access to the ecosystem posed by Web 2.0, the various resources and the services that are available. This brief overview of the main characteristics of PLE which are discussed in more detail in this study indicates that it is not possible to propose a PLE without analyzing the existing situation, especially the customs and practices of the students. The process of introduction of PLE is not a purely technological issue. It encourages other ways to carry out the production and dissemination of the knowledge-resources complementary for the approach traditionally adopted in Universities. In addition, other questions arise, such as the interaction between institutional resources made available to students and PLE. To this end, we propose a study that could cover the entire student population at the University of Geneva (UniGe).

As a consequence, to face the challenge of ICT skills development that is more and more important in Higher Education, we aim at implementing courses-trainings that combine formal and informal modalities by using a personalized learning environment such as a PLE.

This could stimulate a new form of teaching, more centered around the learner, which encourages the learner to keep on developing his skills throughout his life. Such an environment allows learners to go beyond what is commonly offered by LMSs, which are generally limited to distribute, monitor and manage learning contents.

Initially we review the current status of the concept of PLE. We then outline the process that led to the study and the methodology adopted for it. Finally, we will sum the observations and the most relevant results of the study to derive a number of conclusions upon which we propose an approach to implement the PLE.

## **2. The concept of PLE**

The range of definitions on PLE and its imprecise nature, as noted by Lubensky in (2006) do not reflect the vagueness of the concept, but rather reflect its power and how it is simply inherent in the concept itself. Following a presentation on the topic, Atwell (2007) noted that: "The only thing most people seemed to agree on was that it was not a software application. Instead it was more of a new approach to using technologies for learning." Atwell's own definition (2007) is quite elusive: "A PLE is comprised of all the different tools we use in our everyday life for learning". Fiedler and Våljetag (2010) confirm this by stating that they believe the issue of PLE is more a concept than a technology. They state that the concept of PLE has been

subject to a wide range of interpretations and offers in this respect an overview of various approaches by classifying them into two dimensions: the concept and the technology. They say the concept of PLE has emerged primarily in response to the highly centralized and controlled vision proposed by the LMS developed by the institutions. Johnson et al. (2006) note that the discourse around the PLE has gradually evolved into the expression of a number of objectives that indicate:

- “desire for greater personal ownership of technology and data
- desire for more effective ways of managing technological tools and services
- desire for the integration of technologically mediated activities across all aspects of life
- desire for a removal of barriers to the use and combination of tools and services
- desire for mediated collaboration and co-creation”

These objectives have an undeniable technological dimension and although Fiedler and Våljatag make the importance of the PLE as a clear concept, there remains the fact that PLE must be implemented and defined as a form of technology. It therefore appears that the most appropriate way to approach this concept is to consider both aspects simultaneously. Lubensky (2006) indicates that it is possible to identify a set of issues that occur repeatedly in most of the meanings proposed. He further points out that the instantiation of a PLE depends very strongly on the context of its user and its implementation can take various forms. Van Harmelen (2006) proposes a taxonomy organized in a multidimensional space: collaborative / non-collaborative, closed / open, fixed / customized, uni / multi-institutional, server / peer to peer or hybrid online-only or mixed. He also mentions three extra-dimensions: the pedagogical approach, locus of control of the environment and the concept of extensibility and compatibility on many levels. The introduction of PLE in teaching practices has implications that go beyond the mere introduction of a new tool for learning. Modritscher (2010) points out that learners and teachers have considerably variable skills and behaviors towards the use of ICT for teaching. He particularly emphasizes the fact that with PLE, learners and teachers need to rethink the way they learn and teach with these new technologies. He complements this observation by citing the need to prepare them for the use of these technologies.

Henry, Charlier, and Limpens (2008) summarize ways PLE could intervene in the field of learning. In self-learning and reflexivity, PLE does not present itself as an alternative to the LMS, but as an indispensable complement. There is also a way to connect and combine individual learning and collective learning. Finally, the PLE allows the learners to take ownership of their learning and to take ownership and control of their activities. To better understand the concept of PLE, Henry et al conduct a study of fifteen students who were asked to describe freely their own PLE.

This brief state of the art highlights the current situation around the concept of PLE. It also allows us to define a number of points which enable us to develop our approach. It appears necessary to assess the state of skills, methods and current practices of the learners, and that of teachers to a lesser extent. As proposed by Henry, Charlier and Limpens in (2008), the design of the architecture of PLE requires relying on evidence from observation of potential users of the PLE. One

possible approach is to collect the common behaviors of learners directly by means of a questionnaire. The concept of PLE is not yet known amongst the populations studied. Therefore it is necessary to establish, in current practice, which relevant elements to consider and then to develop our hypotheses for the implementation of PLE. It also appears that the introduction of PLE can not be limited to simply providing an additional tool. However, it must be brought to the learners by attracting their interests. It seems necessary that the PLE should be able to take the learners from where they are in their practices and introduce them to new practices brought by the very use of the environment proposed by PLE. From the point of view of implementation, the PLE is presented more as a facilitator and mediator between the various resources and services available and the learner. It is of course open to the ecosystem of Web 2.0 but should still raise the question integrating the institutional resources traditionally offered.

### **3. Objectives**

The first purpose of this project is to provide the students with a set of learning tools, both formal and informal. Among them, the PLE will be a key component, responsible for linking together the institutional tools and resources with the non-institutional ones.

The second purpose is to propose a comprehensive approach that takes into consideration the educational aspects underlying the introduction of these technologies. The objectives of this approach are: 1) to inform and train the users (students, teachers) about the values and educational usages (pedagogical scenarios) of each tool provided by the PLE and 2) to make a formative evaluation-observation of the tool usages and by that to improve our understanding of these usages and of the student needs with ICTs.

Another purpose of this preliminary study is to ensure that developments resulting from this project can be reused on a large scale in the Swiss academic community.

### **4. Methodology**

Our study is part of the challenge posed by new educational technologies which actually offer many opportunities for innovative learning with huge potentials. In academia, it is not always possible to provide formal training tailored to each person, and some needs can be better addressed by a formal education through a personalized learning environment. This could help stimulate a new form of pedagogy, more learner-centered, and with the aim to improve knowledge and skills.

In this study, we combine a quantitative and a qualitative approach. We establish three main guidelines designed to enrich the debate on the use of new educational web technologies and social media within the UniGe:

- Quantitative Approach:
  - A student survey on the state of current practices and potential interests in using educational web tools and social media.
- Qualitative Approach:
  - Interviews with representatives of different student associations and faculties to better define and refine the requirements provided by the survey.

- Interviews with teachers and techno-pedagogical experts to reach a better understanding of the groups interested in such tools, while taking into account the best interests of the targeted audience.



Figure 1. Sample questionnaire on computer equipments and their usage

In the survey questionnaire, we avoided using the term PLE which is largely unknown to the targeted public. However, we asked students on the usage of new educational web technologies and social media as an integral part of the project PLE. The questionnaire was formalized to better understand what promotes the use of web tools with the aim to improve students' knowledge and skills. We also made use of the questionnaire as a guideline for the personal interviews. These allowed us to raise a few issues, opinions of several members of student organizations, and opinions of educational technologists and experts from different faculties of the UniGe. One objective of these interviews is to initially have an overview of the current use of web tools and their educational and social aspects for a number of teachers and students in the university. Another objective is to identify the key concepts and indicators to inform, confirm or refute the hypotheses derived from analyzing the survey.

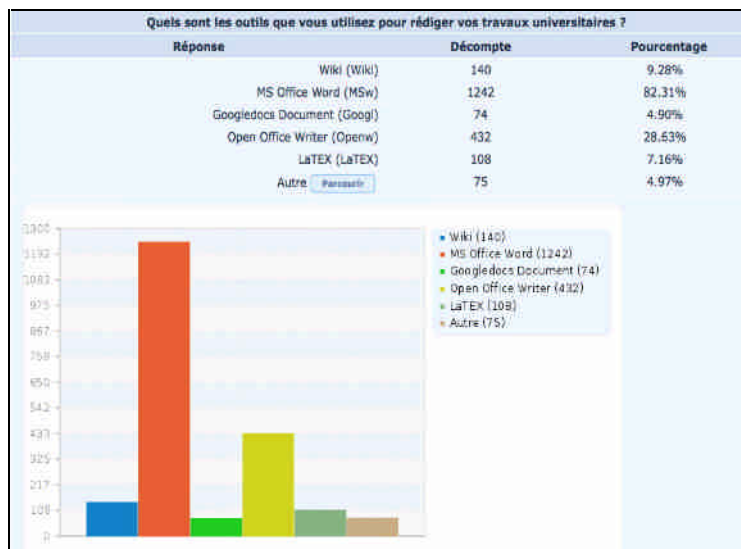


Figure 2. Sample questionnaire on global ICT practices

The questionnaire was sent to all students including those in continuing education, consisting of 14000 people. From these people 1500 have responded. The newly

subscribed students received a paper version of the survey during the registration period session at the University.

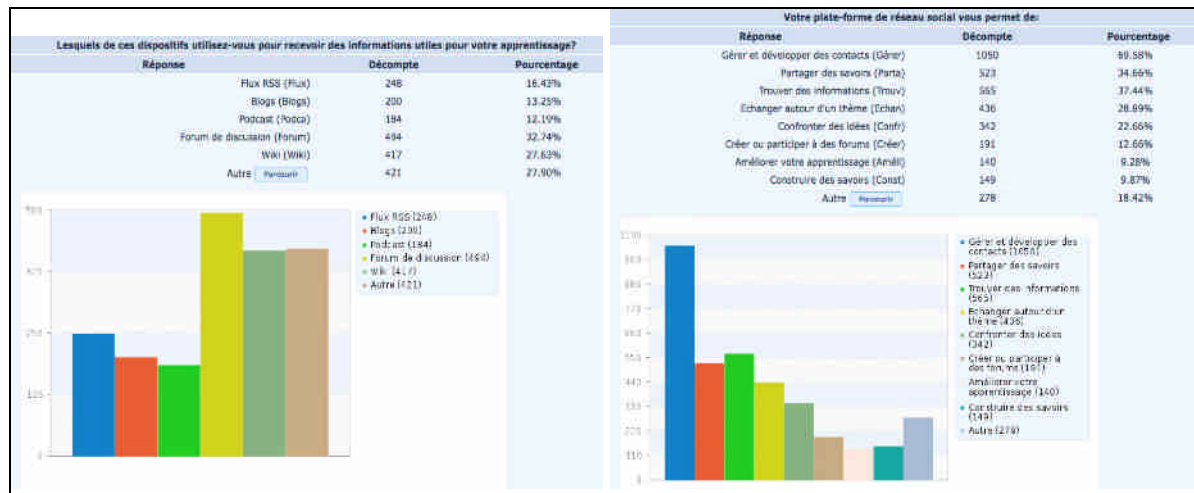


Figure 3. Example of questions about online ICT practices and usage

The 32 questions of the study were designed to identify a number of aspects. The first set of questions is directly related technological equipments that students may have and the way they use them (Figure 1). The second set of questions was designed to determine the general usage of information technology for practical purposes concerning the training of students (Figure 2). The third set of questions was designed to identify the best online practices. These practices integrate the personal resources as well as the institutional resources and the cloud resources (Figure 3). The last part of the study investigates the current practices of tools and resources from the Web 2.0 social networks. These tools and resources are the basic elements underlying the concept of PLE. Determining the current usage of these elements is essential to guide the design of future PLE.

## 5. Results

Analyzing the results of the study and the interviews can result in a number of reasonable conclusions that can be used in developing a strategy. This study provides a snapshot that corresponds to the whole situation. The three guidelines employed to evaluate the use of new educational web technologies and social media in the UniGe resulted in a large amount of data. Although the study was mainly meant as exploratory, the results showed some trends on the use of these technologies amongst students and helped us to identify the four main axes that would help us with the implementation of a PLE. These main axes are now described below.

### 5.1 Axis 1: Three major categories of pedagogical resources

From a general point of view, it is possible to identify three major categories of pedagogical resources used by students in their academic activities: local, institutional and cloud. The local resources are the personal resources made available through the students' computers. The institutional resources refer to all resources made available through the internal network of the University, through Dokeos and Moodle mainly. The cloud resources refer to the online Web 2.0 resources such as Google Docs, Delicious, Zoho, etc. We noticed that the local and institutional resources are widely integrated into the current practice of students, mainly because it is imposed by the current educational context. Another reason is

the increasingly frequent use of digital media in doing homework (e.g. word processors, presentation software, etc.) and the widespread use of institutional platforms by teachers to disseminate course materials.

The cloud resources are still underused. This suggests that more development is needed for integrating the cloud resources into the students' practice while maintaining the local and institutional resources that are already used. A gradual improvement in all three categories makes it possible to promote interest in the use and acceptance of external resources as supplements to existing resources.

What we did not get from our investigation but would be interesting to see is how nowadays students use the institutional resources and integrate them with their local resources.

### 5.2 Axis 2: Two levels of integration of Web 2.0 tools

We can differentiate between two possible usages of Web 2.0 tools that form the basis of PLE: personal usage and an institutional usage. The first usage is for example the use of online note-taking tools by the students and sharing and combining the content to carry out their educational activities. It is a collaborative practice among student that defines the first level of usage. The second usage (the institutional usage) involves the introduction of Web 2.0 tools into the practice of educators led by teachers. This level of use which is more educationally demanding requires a strong commitment from the side of teachers. Besides that, putting an online course on the Internet has implications to the copyright aspect that did not exist previously in the class room and also not in the nowadays virtual learning environments. It is therefore essential to differentiate these two types of use and develop their own strategies.

### 5.3 Axis 3: Opportunistic Practice

The finding is quite radical: apart from a few tools such as Facebook, Google, Wikipedia and YouTube, students do not practice and / or do not know most of the Web 2.0 tools. It would therefore be possible in the first approximation to consider it as a lack of digital literacy. It also shows that the Web 2.0 is a space in which identities are mixed. Entertainment and education activities take place in the same virtual space without explicit separation. Thereby, we note that an environment such as Facebook is at the end used in an opportunistic way for several activities, including training. One could imagine that this usage arises naturally from the presence of integrated features: they are there, available, directly usable without requiring any additional technical knowledge or the discovery of another environment. This opens a track likely to be analyzed for the development and integration of these environments with the PLE. A hypothesis that arises is that students are not proactive in terms of usage of Web 2.0 tools. They use them when they are getting familiar with them, but they seem not interested in discovering more and probably have no desire to test several tools performing the same activity. A recent study confirms these observations. Nielsen (2010) refutes a number of myths: "it's dangerous to assume that students are technology experts ... In particular, students don't like to learn new user interface styles. They prefer websites that employ well-known interaction patterns."

### 5.4 Axis 4: PhD students as "early adopters"

We observe that doctoral students could be the most likely to require resources outside the university. Available institutional resources such as LMS are not directly

addressed to them, although they use them. They are in a period turning point in their careers as they are about to finish their studies and go into professional life. They must therefore, more likely than other students juggle between institutional and non institutional aspects of their work. Therefore, they are more inclined to seek collaboration and this with many more different people. Therefore, they are probably the ones who would most likely benefit from a PLE-type environment, or at least have the potential to do so.

## 6. Discussion and outlook

The survey results open perspectives of investigation and pose new questions that motivate a strategy to develop a PLE as depicted in figure 4. The innovative character of this project urges us to launch an awareness campaign, informing and training students together to develop a technical solution that will meet the anticipated needs during preliminary study. The aim of the campaign is to enable a better understanding of online resources and to prepare the university students to the introduction of PLE. It aims to effectively implement an educational approach that integrates both a technological and a functional dimension.

The pre-study strongly suggests considering students as the first target for a campaign on awareness, information and training on PLE, so as to enable them to develop transversal competencies in online resources. This campaign will combine educational and technological aspects of ICT usages through a “didactic dashboard”.

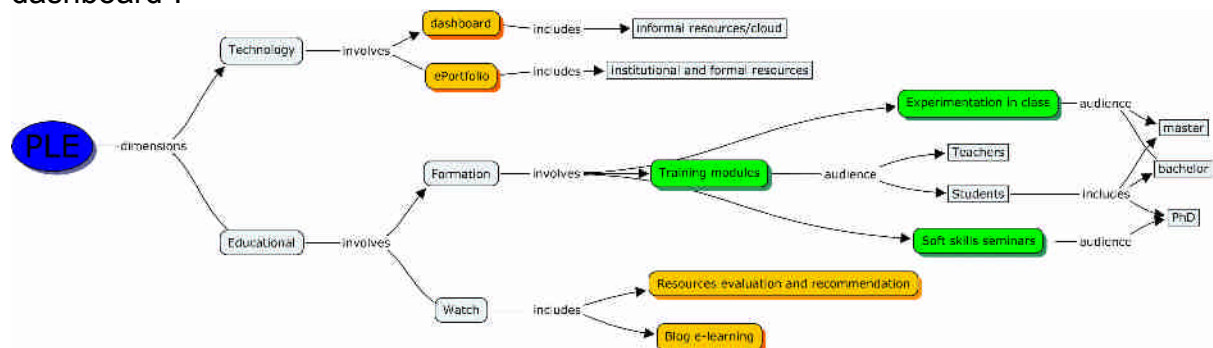


Figure 4. PLE deployment concept map

### 6.1 Educational requirements

#### 6.1.1 Techno-pedagogical watch

A techno-pedagogical watch activity is expected to help selecting ongoing tools and resources with regards to their usefulness for learning and teaching activities. This screening can then be integrated and offered to PLE users who can use them if they want to. The watch will be organized around a community of experts made of members coming from all partners' institutions. Different information sources will also be available to this community: blogs, e-learning tools collections and evaluations, reviews of the scientific literature, etc.

#### 6.1.2 Training

The aspect of training is particularly important when considering the objective of the PLE and e-portfolio is to target independent users or self-directed learners. Such autonomy develops only with the help of scaffolding activities. It requires first an initial training on technology and then an introduction to its educational uses and



formats. Such trainings can take different forms (workshop, seminar, training modules, etc.) which will be offered to different audiences (BA, MA and PhD students, teachers, etc.).

## 6.2 Technological requirements

Based on the PLE pre-study, we inferred an interest in the development of a dashboard/e-portfolio environment for integrating different applications and contents. The dashboard can be compared to a single entry point for all available tools and services. Such a dashboard seems to respond to students' practices, as it enables them to quickly check the available resources, which are either pre-integrated (but may be disabled by the user) or integrated by the students themselves. By their collaborative nature, resources will not be limited to those provided by a single institution, but will be shared between institutions or gathered directly from the Web. Another objective of this development is the creation of user profiles (templates) dedicated to the Dashboard. These models will be pre-filled from a predefined set of resources, and will then be associated with user profiles - bachelor, master, doctoral student, teacher, etc. Each user can thus be offered a default environment, with the possibility to customize it by removing or adding resources.

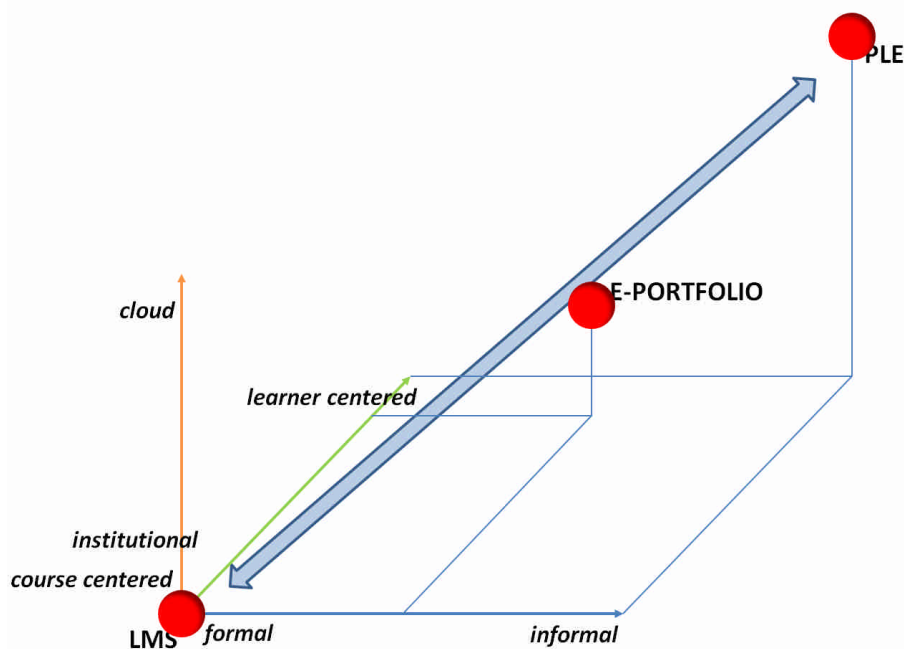


Figure 5. Virtual Learning Environments 3D continuum

In order to provide students with a continuum between the institutional and non-institutional resources as well as between formal and informal training we propose to introduce an e-portfolio. As illustrated in figure 5 with a representation of virtual learning environments in a 3-dimensional continuum (formal/informal, course centered/learner centered, institutional/cloud), the e-portfolio stands at a quite intermediate position linking the two extremes: LMS and PLE. Combining the three types of VLEs can offer a continuous, complementary and complete environment. Introducing a gateway between LMS and PLE is essential, especially as the

students express clearly their commitment to the LMS that offer selected resources, relevant and validated for them.

Therefore, to bridge formal virtual environments (LMSs) with informal ones (the didactic dashboard), we propose to insert an e-portfolio environment with didactic activities fed by teachers and students. These activities mainly consist in:

- Provide an easy management of student productions (i.e., collect, select, reflect, present).
- Allow a better monitoring of the student activities by the teachers.
- Integrate reference lists of competences and learning outcomes to help students manage their progression in learning.
- Ensure the interoperability and the sustainability of the contents.

## **7. Proposed solution**

### **7.1 Educational Solution**

The educational solution is planned along three directions: the technological watch organized around a blog, the training with the development of dedicated modules based on activities and the acquisition of transversal IT skills with seminars for PhD students.

#### **7.1.1 Blog for technological watch**

A publishing space will be designed and implemented to promote techno-educational collaborations. Its main purpose is to collect, process and redistribute information to a community of people interested in the use of new educational technologies for social learning and institutional teaching in general. It will support the techno-pedagogical watch activity. The blog will be represented by an online sharing and publication space managed by a community of scholars and practitioners of e-Learning. It will also allow readers to post comments and votes. In this way, the dissemination of information should be structured and organized by the selection of keywords, ranking levels and links, as well as via RSS feeds and mailing lists.

#### **7.1.2 Development of training modules**

The PLE pre-study included a survey, which allowed grasping a good understanding of the e-learning needs for both students and teachers. ICT skills are well known: research of information, collaboration and communication, choice-manipulation understanding of ICT tools, creation and management of numeric resources-documents, critical thinking, etc. A detailed analysis of students' needs will allow developing training modules adapted to various publics and learning situations. In the design of these training modules, we will take into account the pre-existing ICT students' skills, those they would like to develop, the web tools they are using to learn, the types of "workflow" activities they do (taking notes, searching for information, working on learning platforms, etc.). We will also ask them about the amount of time, pace and training type they would prefer. During this phase, we will also use the results emerging from the techno-pedagogical watch (using experts, blogs, and scientific literature) about new educational technologies.

#### **7.1.3 Soft Skills Seminars for PhD students to develop transversal competences**

The purpose of these seminars is to enable PhD students to practice and develop mastery of certain categories of Web 2.0 tools and PLE, useful for their learning

and research activities. The goal is to combine theoretical and practical workshops to help them first to effectively exploit all these resources essential to their academic activities and, second to develop an intelligent strategy so to become independent while these technologies continuously evolve.

The audience of PhD students is well suited for these seminars. On one hand, PhD-students form a population consuming external resources available on the Web. On the other hand, many doctoral students are involved in teaching. Once trained, they can be a vector of active dissemination for the use of PLE and e-portfolio by recommending or introducing it into their teaching practices with students.

These seminars will provide a basis for the formative evaluation process of the project aiming at improving seminars adapted for various audiences (bachelor and master students).

## 7.2. Technological solution

The current e-learning infrastructure at the UniGe is primarily made of two LMSs (Moodle and Dokeos) an e-portfolio (Mahara) and a streaming platform (Mediaserver). The objective is to deploy the dashboard and enable the current architecture to communicate with it while keeping the infrastructure as much independent as possible. For this to happen, the existing infrastructure must be adapted to support communication and integration, as shown in figure 6.

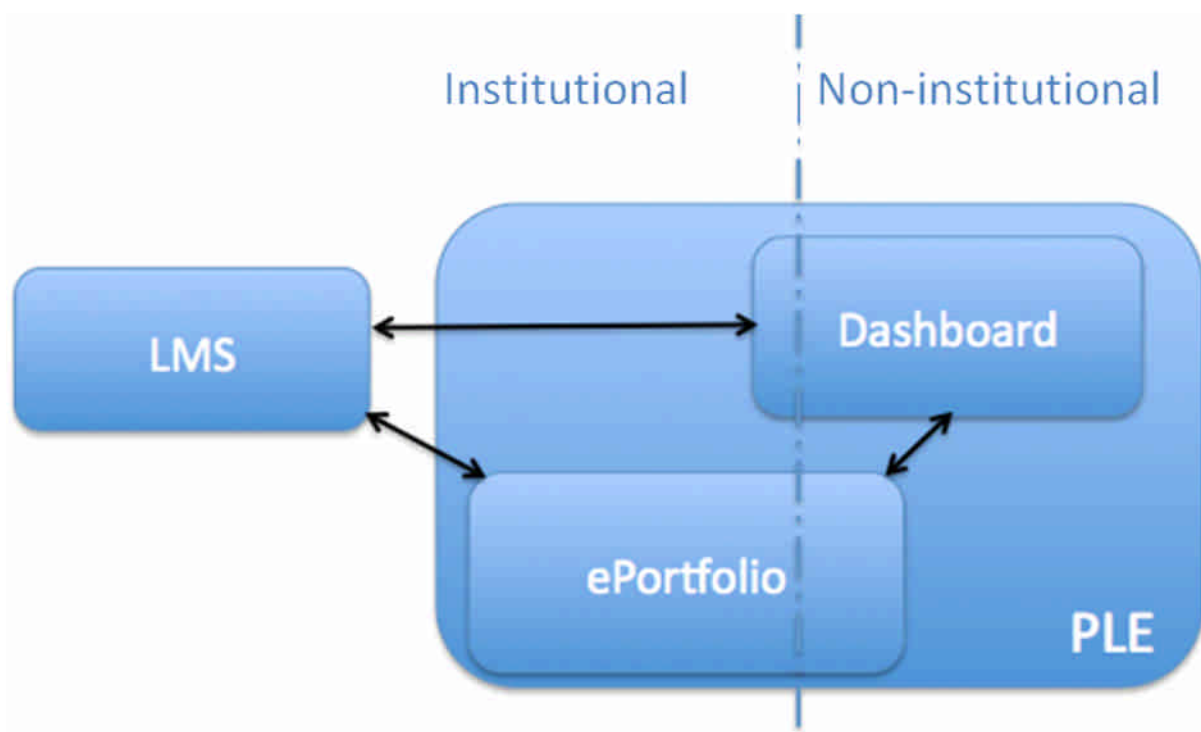


Figure 6. PLE structure and integration in the institutional environment

## 8. Conclusion

We have described the approach and methodology in place at the University of Geneva for the deployment of a PLE. Our approach is built around a study of both qualitative and quantitative sides whose purpose is to examine the practical uses of resources tools and personal, institutional and informal (Web 2.0 and cloud) for training activities. On the basis of this study and the results of our analysis, we can

draw several reasonable conclusions on which we could build and develop a number of perspectives for the design and deployment of a PLE. We concluded our study with a concrete proposal which is organized along two axes: teaching that combines technological, education and training on the one hand, and technology which introduces the PLE as a didactic dashboard.

## **9. Acknowledgements**

This preliminary study was supported by SWITCH ([www.switch.ch](http://www.switch.ch)) under the AAA projects. We would like to thank MM. Jean-Marc Rinaldi and Jean-François Stassen Observatory of Student Life for their advice and support in the results analysis and Mr. Laurent Opprecht for his valuable inputs for the proposed solution.

## **10. References**

- Attwell, G. 2007. Personal Learning Environments - the future of eLearning? eLearning Papers 2(1). <http://www.elearningpapers.eu/>.
- Fiedler, S., Völjtag, T. 2010. Personal learning environments: concept or technology? The PLE Conference, ISSN 2077-9119. Retrieved from <http://pleconference.citilab.eu>, Barcelona, Spain.
- Henri, F., Charlier, B., and Limpens F. 2008. Understanding PLE as an Essential Component of the Learning Process. ED-Media AACE, 3766-3770.
- Johnson, M., Beauvoir, P., Milligan, C., Sharples, P., Wilson, S., and Liber, O. 2006. Mapping the Future: The Personal Learning Environment Reference Model and Emerging Technology. In D. Whitelock & S. Wheeler (Eds.), ALT-C 2006: The next generation - research proceedings, 182-191. Totton: Association for Learning Technology.
- Lubensky, R. 2006. The present and future of Personal Learning Environments (PLE), <http://www.deliberations.com.au/2006/12/present-and-future-of-personal-learning.html>.
- Modritscher, F. 2010. Towards a recommender strategy for personal learning environments. *Procedia Computer Science* 1(2): 2775-2782. 1st Workshop on Recommender Systems for Technology Enhanced Learning (RecSysTEL 2010).
- Nielsen J. 2010. College students on the Web. <http://www.useit.com/alertbox/students.html>.
- Van Harmelen, M. 2006. Personal Learning Environments, Sixth IEEE International Conference on Advanced Learning Technologies (ICALT'06), 815-816.