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# THE DESIGN AND DEVELOPMENT OF A PERSONAL LEARNING ENVIRONMENT: RESEARCHING THE LEARNING EXPERIENCE

*Rita Kop, National Research Council of Canada*

## Introduction

Education has its roots in age-old cultural traditions that have developed over centuries. To move away from a teaching room bounded by doors and walls to an open and undefined virtual environment has major consequences for learning. It is only recently that attempts have been made to leave the traditional class room behind, initially in the 70s through the radical perspectives of Freire and Illich, and just in the past decades, under influence of developing technologies, learning technologists, teachers and learners have started to question the effectiveness of the teaching strategies developed over generations (Peters, 1999, Illich, 1971, Freire, 1972).

Jon Dron (2002) argued for a learning environment without a tutor, but with technology in the form of an intelligent tutoring system to mimic and replace the teacher roles. In recent years, as a reaction to institutionally controlled Learning Management Systems (LMSs), which still have the instructor at the centre of the educational experience, Personal Learning Environments (PLEs) have become more prominent as the technology is now available to create personalised learning experiences. Worldwide, several research projects are in progress developing and researching PLEs (Downes 2009a, van Harmelen, 2009; Attwell, 2009 - PLEs). The emergence of Web2.0 technologies with their inherent possibilities for communication and collaboration, and the explosion of their use to support social networks made people realize that a new era for informal learning might be around the corner. The logical next step was the development of a learning environment controlled by the learner, where a variety of Web2.0 applications would support social interaction and could be managed by the individual. It was imagined that it would provide a pedagogical framework and support learning through these applications and through semantic web structures, where technology itself could aggregate information in a meaningful way to the learner.

This research paper will analyse what is required to create a PLE that fosters meaningful learning experiences. It will discuss the learning theories behind such an environment, a model of PLE based learning, and how educational challenges in a learning environment without a tutor, such as a lack of learner autonomy and skills required to thrive in a PLE, can be approached. Finally it will highlight several factors that influence the quality of the learning experience and subsequently of the learning outcomes.

## Learning theories behind the Personal Learning Environment

Each learner is unique and will have unique learning experiences. The needs and requirements of each learner will be different, which makes the planning of a PLE that serves as aid to each possible learner a challenge. Current views of learning propose that knowledge is no longer traditional knowledge transmitted from tutor to student. People create knowledge themselves, for example out of experiences in their lives, together with earlier acquired knowledge and while engaging in social interaction. Lave and Wenger for example emphasize socio-cultural perspectives, where knowledge is seen to be situated in its context, avoiding a curriculum dominated by the teacher as expert in her discipline, and embracing a curriculum in which the student takes control of his own learning, making connections with his own experiences and knowledge in cooperative activities with fellow- learners (Lave and Wenger, 2002). Knowledge is no longer transferred, but created or constructed, or developed through active participation in collaborative learning activities, rather than passively received from the teacher.

The Internet has added fuel to the debate on knowledge and learning as learning technologists can see a different form of knowledge emerging through the connective nature of new Internet tools. Downes (2006) speaks of 'connected knowledge', Siemens (2006) of 'connectivism'. They would like to add that 'knowledge ... is distributive, that is, not located in any given place (and therefore not 'transferred' or 'transacted' per se) but rather consists of the network of connections formed from experience and interactions with a knowing community' (Downes, 2006, p1). These views, 'social constructivism', 'communities of practice' and 'connectivism', form a powerful basis for learning in a networked environment.

## How would people learn by using a Personal Learning Environment?

The image below represents a possible learning experience while using a Personal Learning Environment. It has Kolb's learning cycle at its basis, but components have been added to provide a better representation of how people

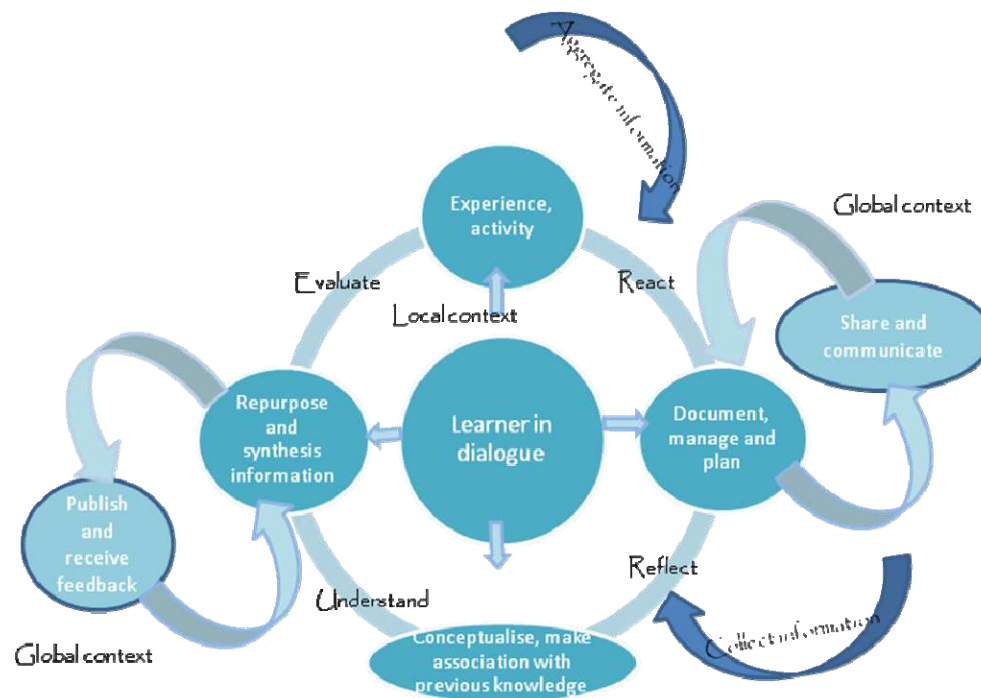


Figure 1 Model of Personal Learning Environment based learning (Adapted and developed from JISC ePortfolios, 2008)

would learn while using the PLE. Most learning experiences are based on six components, although researchers disagree on the emphasis put on the components: gathering of information, social interaction, activity, reflection, conceptualization and repurposing of information (Downes 2006, Kop 2006, Mason 2006, Mayes, 2002). These elements can all be incorporated in a technologically driven learning environment, but the challenge would be their interplay, as this relationship will be one of the determining factors in the quality and depth of the learning that takes place.

A number of technical components are seen to be vital to support this model of learning. A personal profiler that supports the learner at different stages of this learning cycle could store personal information about the user as part of the PLE and supports the learner to find information by suggesting and rating particular information, tools and applications. Information will be accumulated by the learner and fed into the learning cycle at several stages. This could be at the planning stage, the repurposing or conceptualizing stage, or it could be while sharing and collaborating or while receiving feedback from others, depending on the learner's requirements.

Editing and publishing tools will also be important for learners to repurpose the information, to reflect on the information, add to it and publish it, for instance by producing a blog or video. This will help the user to create new content and support distribution to other sources. An editor would support several areas in the learning model, including the recording, activity, conceptualizing and repurposing stages.

A Personal Development Planning tool, an ePortfolio-like application, would also be required for focused aggregation of digital items – ideas, evidence, reflections, feedback etc. which learners can select to share with others. It would offer learners the opportunity to reflect on their personal development, their (lifelong) learning and their employability, skills, career and work-development and communicate with others. It is meant to support meta-cognition and the organizing, planning and recording stages of the learning model. A learner advisor service could be used to support the learning cycle as it would have the role of challenging the learner through feedback by others on his or her learning activities, a 'peer-assessment tool'. Feedback from others on the learning project will stimulate reflection and thinking about the learning process.

Another service that would be useful for learners would be one suggesting helper applications that indirectly support the learning model by providing applications and links, such as connections to LMS systems, chat tools and blog-interfaces and as such are important as part of an indirect support structure.

A PLE will be different from other information gathering tools as it aims to provide learners with tailor made information in a type of application that is centred on the student and would constitute the student's personal educational record, portfolio, business and educational contacts, communications and creativity tools, library and resource subscription management, and related services. In short, it combines all tools and applications a learner needs to start a learning journey with recommendations of information based on earlier searches and personal profile, in addition to feedback from others on their learning. The PLE can be used by learners in a variety of contexts. They might like to carry out a learning project independently from others, or have contact with others during their learning. The PLE would recommend tools according to learner activity and learner project.

## **Learner autonomy – Self-directed Learning**

To be able to learn using a PLE, a learner will have to be fairly autonomous. Bouchard (2009) and Dron (2007) both suggest that learner autonomy is not a particular quality or level of independence in learning that people have, but a relational interplay between contextual and personal factors. Adult learners make choices about the level of control imposed by others on their learning and Bouchard (2009, p96) identified several factors that are significant in semi-autonomous learning systems. He clustered them in four groups, the first the 'conative' factors, related to motivation, initiative and confidence; the second 'algorithmic' aspects involve the control over the learning activity and the third one, the 'semiotic' factors are related to issues of language and communication used in the learning and teaching processes. The importance of aspects of 'economy' in learner autonomy was recognized as a fourth category; the choice to learn for personal gain such as for future employment, and the possible cost of other study options in relation to the value of the knowledge developed. People learning in a PLE will make certain calculations, overt or not, about the value of what they have learnt for their lives, career, and aspirations. In short, learners will be able to conduct a breakdown of costs and benefits that the particular learning option would bring and make choices accordingly.

When developing and designing a PLE that facilitates the autonomous learning of individuals, these factors will have to be considered to ensure that people will access and use the environment in a meaningful way. The algorithmic factors, for instance, would in a formal class room be the instructor's responsibility, but are in an autonomous learning system linked to tasks that the learner will have to carry out independently, which could be problematic. The conative factors would in a traditional adult education class be very important in learners either participating in learning or not. If confidence levels are low, it is not likely that a person will take up learning by using a PLE. On the other hand, the availability of particular semiotic features, such as multimedia, might motivate the learner to take on a learning project. In addition, the language and multimedia used will play an important role in who will be engaged by a PLE and who will not. Moreover, the look and feel of the learning environment will be an important factor in the level of engagement that will be created in the learning experiences.

## **Creating learning experiences**

ICT specialists in design have drawn up a number of design principles, related to Experience Design and Usage Design, that are of influence in the experience people have when using a web site. For the design of a learning environment some are more important than others, but there are a number of Human Computer Interaction principles on usability and accessibility that designers will have to keep in mind when designing a Personal Learning Environment in order to facilitate the creation of engaging learning experiences. Nielsen (2003) researched usability and identified three issues particularly important to positively affect the experience: these are simplicity, accessibility and relevance. Nathan Shedroff added some issues important for creating valuable experiences. He provides six design principles which together 'generate an enormous palette of possibilities for creating effective, meaningful, and successful experiences' (Shedroff, 2009, p2). These six principles are:

1. Time and duration. A learning experience might start long before a learner touches the computer. An experience in her life might make that she is already thinking about the learning and the information and the collaboration required to engage in learning. A learner might then get immersed in the learning activity and still be thinking and digesting what has been learned long after the actual activity has finished. An awareness of the time cycle involved in building up of true engagement and the continuation time it takes up to move into the next learning cycle are crucial in building structures to accommodate learning.

2. Interactivity. People can interact in a passive or in an active way. E.g. learners might follow a conversation on Twitter, or on a favourite blog or discussion board, without directly participating. On the other hand, someone could be actively blogging and be a central node on a network and create a following on Twitter. People can interact with other people,

but can also interact with resources that they find through aggregating, or through discussions with peers or more knowledgeable others than themselves. Web2.0 has made it possible to make connections between information and people to enhance learning.

3. Intensity. The intensity with which people are engaged with the learning experience would quite often depend on the level of these interactions. Emerging research shows that the closer people are involved with other people who are participating in the learning activity, or when interacting with resources; the more the experience will attract them, will influence how much time and energy they will be willing to invest in the undertaking (Dron and Anderson, 2007; Kop 2010 in press). It is suggested that the creation of a place where people feel comfortable and trusted will aid in this development. Another level of intensity can be reached through active interaction with resources. Metros (2001) for instance described a continuum from a very low level of engagement, eg. in using email to reaching a 'flow-state' by immersion in activity, for instance in computer game simulations, where people would be so engrossed in the activity that they forget that they are learning. Sensorial and cognitive triggers built into the learning experience can aid a move towards a 'flow-state'.

4. Sensorial and cognitive triggers – The design of information. 'Trying to find new forms to present, represent and visualize what we are trying to communicate will be important in engaging learners in learning activities. 'The most important aspect of any design is how it is understood in the minds of the audience.' (Shedroff, 2009, p60) Everyone will create mental maps of what they have experienced and the crunch is to design the PLE in such a way that what you would like the learner to remember or know will remain in his mind. 'New cognitive models can often revolutionize an audience's understanding of data, information, or an experience by helping them understand and reorganize things previously understood (or perhaps, not understood) in a way that illuminates the topic or experience' (Shedroff, 2009, p60). The combination of sensorial and cognitive triggers in a Personal Learning Environment will be central to engagement in learning activity. Some people respond strongly to visual triggers, others to auditory or kinaesthetic ones. As learning preferences are diverse, it is vital to incorporate a variety of triggers to suit different learning styles. In addition, visualisation can be used as a tool to communicate concepts, or to represent information in understandable ways. For instance, learning objects, or maps and charts could be used to represent relational multiple data sets.

5. Breadth and consistency. People build up an image of themselves in the world, a 'gestalt'; experiences are experienced in a holistic way and the individual's mind processes all physical and mental aspects of the person simultaneously. For the design of a PLE this would mean that consistency in components design, and a correlation between the individual components will aid the development of a meaningful learning experience. The experiences should 'feel similar and related, even if the details are quite different' (Shedroff, 2009, p96).

6. Significance and meaning. All these dimensions and their interrelation will influence how meaningful a learning experience is to a learner. The developers should 'understand what makes a good experience first, and then translate these principles, as well as possible, into the desired media without the technology dictating the form of the experience' (Shedroff, 2009, p1).

## **Skills and competencies required to learn while using a Personal Learning Environment**

To learn independently using a PLE, people not only need to become fairly autonomous learners, they also need some particular skills and competencies to be able to make the most of a learning environment that is positioned outside the sphere of formal education and that fosters active engagement in learning activities. There is no 'overarching tutor' to guide learners and to challenge their ideas and beliefs or to help in aggregating information and understanding the media and the way they represent information, instead the onus is on learners themselves to make these judgments and to validate information and knowledge, and to find knowledgeable others who can help them with this. Moreover, the new learning environment requires learners to be active in their learning by editing and producing information themselves in a variety of formats and by communicating and collaborating with others in new ways. People need to have a certain level of creativity and innovative thinking, in addition to a competency in using ICT applications to be able to do this. Learners need to be flexible, be able to adapt to new situations and are also expected to solve problems that they come across during their learning journey.

This is not a small list of skills and abilities for development if people have to learn all these by themselves. How to do this? Where to start? What can the learning environment itself mean in the development of these skills? There are no fast answers to these questions as not much research has been carried out to obtain a better understanding of the new ways of learning. Current research by the National Research Council of Canada in Moncton in the development of their PLE 'Plearn'; in the environment and people's use of it for their learning, will make an attempt at answering some of these questions. Anecdotal evidence suggests that people learn some of these skills informally from each other, but that

other competencies, e.g. information literacy develops at a very early age and will be hard to change at a later date. Critical thinking skills and media literacy seem to be best learned in a formal environment as the presence of an expert to challenge beliefs and show opposing points of view to the learner seems required for a critical awareness to develop. Some argue however that these skills will develop while engaging in online communication with others, or via challenging feedback or recommendations through the PLE system itself (CIBER, 2008; Walters and Kop, 2009; Downes, 2009b; Partnership for 21<sup>st</sup> century skills, 2009). The Plearn research in progress will analyze if this is the case. It is also investigating what learning outcomes are facilitated through use of the environment and will report on these at the conference.

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