

## Personal Learning Environments

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## **Personal Learning Environments**

### **ABSTRACT**

The concept of the personal learning environment has emerged in recent years via the work of online theorists, researchers, and developers. This emergence is the result of: 1) the limitations experienced by administrators, trainers, teachers and learners using learning management systems (LMS), and; 2) recognition of the importance of informal, lifelong, and “lifewide” learning. A PLE has been conceptualized as both a broad, holistic learning landscape and as a specific collection of tools that facilitate learning. In this chapter we will discuss the brief history of the PLE, why the PLE is useful, PLE examples, the PLE compared with the LMS, objections and barriers to the PLE, and directions for the future of the PLE.

### **INTRODUCTION**

Seekers of knowledge in today’s world have plenty of options beyond institutional courses or formal classroom-based training sessions. The World Wide Web is a resource that creates the potential for profound learning experiences compared to traditional courses and classrooms. Many methods for improving learning have been explored in the past decade, and a common thread is and the use of new technologies to facilitate learning. Constructivist learning models describe the value of learners making meaning of their own experiences (Wilson & Lowry, 2000). Web-based resources have the potential to enable constructivist learning environments. However, when learners have access to a practically limitless repository of information, it can be challenging to create meaning from that information. The challenge is not to provide access to information but to provide a framework for making sense of the information.

As the web has evolved as an information resource and medium, web tools and processes have also evolved. The term “Web 2.0” has been used to describe this evolution of the web from an information source to a “read/write” medium (O’Reilly, 2005). The development of Web 2.0 technologies has given learners a large collection of tools, sometimes called social software, for creating, organizing, and making meaning from content (chapters 2, 7, 9, 18). Social software has a long history, and can be defined simply as software that supports group interaction (Allen, 2004). Web users can now interact with web content as well as other users in a shared environment that was not possible just a few years ago. Using this software, learners can organize content that has meaning to them and easily share that content and their own interpretation of it. Further, learners can interact with other people with shared learning goals. This new interplay between and among learners and content has not reached the status of a

consensual definition or understanding. However, the concept of the personal learning environment (PLE) is one way to describe this type of web-facilitated learning environment.

The PLE certainly qualifies as an emerging technology as defined in the opening chapter of this volume (Veletsianos, 2009). The PLE is a somewhat new and evolving construct, has gone through at least one hype cycle, is not yet fully understood, and is potentially disruptive with unfulfilled potential. The concept of the PLE has been emerging in recent years via the work of online theorists, researchers, and developers, as the result of the limitations of learning management systems, a recognition of the importance of informal and lifelong learning, and the growth of social software. In this chapter we will discuss the brief history of the PLE, why the PLE is useful, PLE examples, a comparison of the PLE to the LMS, objections and barriers to the PLE, and directions for future PLE development.

## **PLE DEFINED**

The PLE concept has emerged from discussion among a wide-ranging group of professionals interested in designing and supporting online learning environments. At present, no single environment or application instantiates an archetypal PLE. For some, a PLE is a specific tool or defined tool collection used by a learner to organize his or her own learning processes. For others, the PLE simply acts as a metaphor to describe the activities and milieu of a modern online learner. Much like other concepts within this volume (e.g., see chapters 1, 4, and 18) there is not a widely accepted definition of the PLE. However, one common trait in all the early definitions of a PLE is that the PLE gives the learner control over one's own learning process. Because the PLE idea has developed in part as a reaction to learning management systems, it is not surprising to see "personal" control represented in descriptions of a PLE.

The phrase "personal learning environment" appears to have first been mentioned at the annual JISC-CETIS (Joint Information Systems Committee--Centre for Educational Technology Interoperability Standards) conference in 2004 (Schaffert & Hilzensauer, 2008). The development history of the PLE concept has been documented in resources such as Wikipedia ("History of personal learning environments," 2008), and by Mark van Harmelen of the University of Manitoba (van Harmelen, 2008). We refer the readers to these two sources for more detail on the history of PLEs. A key event in PLE history was Scott Wilson's presentation of "the VLE of the future" (S. Wilson, 2005). Soon afterward, the PLE was a theme of the 2005 JISC-CETIS annual conference.

As the PLE idea gained exposure, researcher Scott Leslie solicited and posted a collection of PLE models (Leslie, 2008) that would receive a great deal of attention. Ray Sims included an interesting PLE diagram (see: [http://simlearningconnections.com/ple/ray\\_ple.html](http://simlearningconnections.com/ple/ray_ple.html)) that highlighted not only Web 2.0 technologies but also personal relationships. Sims included meditation, books read and the physical spaces where he learns (office, bicycling in his local area, the library and home). This highly personalized version adds a dimension to PLEs beyond social networking technologies.

Educational technologist David Warlick's PLE diagram incorporated "reflective endeavors" that included reading, writing, giving presentations, and conversing with practitioners. The reflective endeavors were not oriented toward or dependent upon specific technologies to facilitate

interaction. (see: <http://edtechpost.wikispaces.com/PLE+Diagrams#warlick>). We encourage the reader to visit the collection of diagrams to review a variety of PLE representations.

When a PLE has been conceived as a technical system or tool, it has often been described as a collection of several sub-systems in the form of a desktop application or web-based services (van Harmelen, 2008). Schaffert & Hilzensauer (2008) defined a PLE as a collection of social software applications the learner has collected that are useful for his or her own specific needs. Lubensky (2006) sees as PLE as a facility accessed by learners where content is organized and vetted for one's own learning needs. Downes (2006) is similar in his view that PLEs are Web 2.0 in their read-write ability but that they should probably be seen as a way for learners to access a large collection of applications and the network of peer learners. PLE pioneer Scott Wilson (2006) of CETIS defined the PLE as the collection of tools used in one's personal working and learning routine. The PLE involves using a combination of existing devices, applications, and services within what may be thought of as the practice of personal learning using technology.

## **PLE EXAMPLES**

In a comprehensive Educause research bulletin on PLEs, Niall Sclater identified three perspectives on what PLEs should consist of and how PLEs should function. The first perspective is that the PLE should be client software that mediates between the learner and whatever resources the learner wants or requires. The second perspective is that a web-based portal can be an effective PLE without the need for client software. The third perspective is that PLEs are already here in the form of physical and electronic resources learners can manipulate and customize to learn effectively (Sclater, 2008). Following is a brief summary of tools that, from the above three perspectives, can function as all or part of a PLE.

### **Client-based PLE Tools**

PLEX (<http://www.reload.ac.uk/plex/>) is an open source PLE prototype application developed at the University of Bolton. PLEX allows the user to seek out learning opportunities and manage them. PLEX supports standards such as RSS, Atom, and FOAF.

Colloquia (<http://www.colloquia.net/>) is a software application developed for group work. Once installed on each user's computer, Colloquia allows a user to create workgroups based on contexts or projects. These contexts allow for sharing of resources, messaging, and project management. Colloquia was released as version 1.3 in September of 2001 and transitioned to open source in September of 2002. Colloquia is described as a conversation-based PLE. (van Harmelen, 2006).

### **Web-based Tools with PLE Characteristics**

Elgg (<http://www.elgg.org/>) is an open source social networking platform and e-portfolio tool. Elgg is server-based, meaning one can download, install, and host an instance of Elgg.

Chandler (<http://chandlerproject.org/>) is a server-based, open source personal organizer with calendaring and task management and consists of a desktop application, web application and a free sharing and back-up service. Chandler was built for productivity as opposed to learning, but has some PLE characteristics.

EyeOS (<http://www.eyeos.org>) is an open source operating system that resides within one's web browser. So one's files, applications, and settings are available at any networked computer.

Facebook (<http://facebook.com>) is a proprietary web-based social networking platform, but has enough components and flexibility to be considered as a form of PLE, even though it was not built primarily as a learning tool. Facebook includes a somewhat open API, extensibility, file sharing, forums, microblogging, instant messaging, and RSS feeds.

43 Things (<http://www.43things.com>) is a web-based service where users posts lists of resolutions or life goals they wish to accomplish. Users can find others with shared goals and form an ad hoc community for encouragement and accountability along the way. Many of the posted goals involve learning in some way.

Netvibes (<http://www.netvibes.com>) is a web portal where users can personalize pages. Individuals can assemble favorite widgets, websites, blogs, email accounts, social networks, search engines, instant messengers, photos, videos, podcasts, and more in one place. Netvibes is primarily an information gathering service, but one can see in this service the semblance of a PLE.

Two other examples described in reports include a model for an interactive logbook PLE (Chan, Corlett, Sharples, & Ting, 2005) and a "personal learning planner" (Havelock, Gibson, & Sherry, 2006). These are a few examples of tools that could be considered part of one's PLE—highlighted here to show possibilities or precursors of a construct being formed.

## **WHY USE A PLE?**

We know that the majority of what a person learns will occur outside of formal instruction (Cross, 2007). A PLE can be seen as manifestation of a learner's informal learning processes via the Web. Learners have always depended on the support of their peers and peer networks to facilitate learning. In the physical world these peer networks are experienced as lunchtime discussions, student organizations, communities of practice, brown bag sessions and study groups. What was lacking until recently was a way to effectively approximate these informal learning opportunities online. With recent developments in social networking, the Web is now a more people-oriented place rather than just an expansive information repository.

The PLE approach to online learning is buoyed by two factors. First, it mirrors what is happening in learners' "real lives" in terms of using myriad tools and processes for social networking and connectedness. Second, learners may have experienced limitations with what we call institutionally centered learning environments, embodied by learning management systems (LMS)<sup>1</sup>. While LMSs have served universities well in tracking students and orchestrating online courses ("learning management"), the learner is left with a less than optimal environment. It may not be in the learner's best interest to be "managed", but rather to be guided and encouraged. The comparison between a PLE and an LMS is presented in a later section of this document.

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<sup>1</sup> Note that LMSs are often referred to as **virtual learning environments (VLE)**, particularly outside of North America. In this document we use the terms **LMS** and **VLE** interchangeably.

The central line of reasoning for the use of PLEs would be the value of learner-centered instruction. One's stance on the importance of PLEs may rest on how one perceives informal learning and constructivist philosophy. Both informal learning and constructivism have the learner as the primary actor in knowledge building. The clearest argument for the PLE is that it allows the learners themselves to construct their own learning environments by forming communities, and creating, remixing, and sharing resources (Attwell, 2006).

Attwell cites the massive uptake of MySpace versus the limited interactions via an institutionally controlled LMS as evidence that educational technologies have not kept pace with today's learners. Attwell posits that the predominant focus on "managing" via the institutional LMS has not resonated with modern learners, and that the educational system is in danger of being perceived as irrelevant or as an imposition (Attwell, 2006).

In an extensive report on PLEs, researchers with the Center for Educational Technology and Interoperability Standards (CETIS) derived these principles when examining current learning technologies (JISC-CETIS, 2007).

- Learning opportunities should be accessible to students irrespective of constraints of time and place.
- Learning opportunities should be available continually over the period of an individual's life.
- Effective teaching should have as its central concern the individual learning needs and capabilities of a student.
- The social component of learning should be prioritized through the provision of effective communication tools.
- Barriers to learning, whether they are institutional, technical, or pedagogical should be removed.

In a similar report (Johnson, et al., 2006), five major themes were identified as a critique of current learning environments.

- Desire for great personal ownership of technology
- Desire for more effective ways to manage technological services
- Desire for the integration of technological activity across all aspects of life
- Removal of barriers to the use of tools and services
- Desire to facilitate peer-based working

It is apparent from the conceptual definitions and the examples cited that the PLE is a response to the limitations of current learning environments as described in these reports. Following is a comparison of the LMS and the PLE.

### **PLE COMPARED WITH LMS**

A LMS is a software application that has existed in some format since the 1990s in academia as well as in industry. Learning institutions as well as companies began to adopt the LMS in order to control the access to, and to deliver instructional content. Corporations commonly use an LMS to track and report employee training completion and to deliver mandatory compliance training when necessary (Avgeriou, Papasalouros, & Retalis, 2003). Higher education has experienced a

dramatic uptake in LMS use in recent years, and LMS use is now moving into secondary education (virtual high schools, etc.) as well. Following is a summary of LMS characteristics.

- LMSs concentrate on the course context.
- All resources are loaded and linked within the overall structure of a course.
- LMSs have an inherent asymmetric relationship between instructor and learner in terms of control of the learning experience
- The learner's role is one of passive acceptance of content and limited permissions set by the LMS.
- Every learner experiences content exactly the same way. Each learner interacts with content in identical fashion.

Compliance with standards such as SCORM and IMS has caused LMS design to further solidify. LMSs are built on access control and rights (permissions) management, and only approved users can access the system. Finally, the scope of operation of the LMS is usually restricted to a single institution (Wilson, et al., 2006).

There are certainly limitations to the current institutional approach to online learning (chapter 4, 10, 18). The LMS is not open to activities occurring outside its realm. The modern learner is steeped in an online environment of free-flowing content and interaction, is learning to navigate its complexity, and may view the institutional LMS as limited or inferior (Sclater, 2008). Researchers have identified from the literature perceived failures of current online learning environments:

- Accessibility has only partially been achieved by moving the medium of dissemination onto the web. However, barriers to accessibility remain in the form of institutional procedures and usability.
- The institutionalization of learning technology presents a further barrier, because with institutional ownership of technology comes the requirement for students to re-learn the technologies of access to learning at each education provider.
- Current pedagogical practice is still teacher-centric. The promise of e-learning in enabling effective management of a diverse student population has only seldom been realized. At its worst, the VLE can be characterized as a giant photocopier.
- The process of education is primarily institution-centric, rather than learner-centric. (JISC-CETIS, 2007)

Scott Wilson and colleagues (Wilson, et al., 2006) examined the design of LMSs and the alternative design presented by PLEs. The researchers compared LMSs to standards such as the VHS videotape and the QWERTY keyboard, and proposed that the LMS had become the de facto standard in online learning.

Unlike LMSs, PLEs attempt to manage the relationship between the learner and various web-based services. PLEs do not attempt to integrate all the tools within one environment but rather to facilitate the sharing of content. The relationship of the learner with the PLE is a symmetric one in which the learner can produce and receive information within the same system. PLEs

focus on facilitating connections using whatever standards are required. Finally, the scope of PLEs is global, in that there are no limitations to the PLEs reach via the Internet.

A PLE brings with it a host of changes for the learner, the institution, and the content. Anderson (2006) details several advantages of the PLE over the traditional LMS. With PLEs, the learner has a sense of self or identity beyond the classroom. As they direct their own learning, learners control the environment in which they work. The learner personally organizes the environment instead of operating within an environment that makes sense to the instructor or institution. The learner has responsibility for his or her own content. No longer a passive consumer, the learner is now in an ownership role. The learner's reach extends much farther than the traditional classroom and LMS. While taking part in various online communities of practice, the learner develops an online personality (Anderson, 2006).

Shaffert and Hilzensauer (2008) identified how facets of online learning differ in an LMS compared to a PLE, particularly in terms of the role of the learner, personalization, the social component, content ownership, organizational culture, and technical issues. Shaffert and Hilzensauer outlined clear challenges learners will face shifting to PLEs as a learning medium. Learners will be required to: effectively select and review learning content independently; use several tools at once in a combination; understand the strengths of various web 2.0 applications and services; have a better appreciation for intellectual property and ownership; and, be internally motivated to learn.

Because technologies associated with the PLE are evolving, the PLE may become more advantageous over time. The accommodating nature of the PLE to new tools and services makes it difficult for LMS developers and vendors to keep pace. However, there are instances of current LMSs employing tools of the Web 2.0 evolution such as chat, blogs, and wikis. The tension arises however in that these Web 2.0 tools are outward manifestations of an underlying ethos--of social learning, communities of practice, and open resources (Downes, 2005). For example, some LMSs offer student blogs, but the blogs may not be accessible to readers outside the LMS. While an LMS can include Web 2.0 elements to its systems, it is rooted in the traditional instructor-centric model of instruction. Curricula are determined, courses are designed, networks extend only to the boundaries of the institution, and participation is limited to students paying tuition, and often only the students in a particular course (c.f. chapter 4).

The emergence of PLEs is less about establishing a new path in online learning than it is a response to the limitations of current online offerings. PLEs are not creating a market, but rather addressing an already apparent state of affairs. In a PLE, the learner is not restricted to only institutionally approved groups and resources. The PLE becomes the gateway to the Web where learners evaluate resources and make meaning of content. Learners are free to join any networks that make sense to them and offer value. This type of activity aligns with the concept of communities of practice (Wenger, 1998). We contend that communities of practice have more potential to be realized with the PLE than the LMS. Wilson, et al. (2006) summarizes this effectively.

The VLE is by no means dead, and those with investments in this technology will attempt to co-opt new developments into the design in order to prolong its usefulness. It is however the view of the author that the key distinctions between

the VLE and the PLE are of a more conceptual nature than purely of features, and that ultimately alternatives such as the PLE model will develop in sophistication, making the VLE a less attractive option, particularly as we move into a world of lifelong, life-wide, informal and work-based learning (Wilson, et al., 2006).

## **CHALLENGES TO PLE IMPLEMENTATION**

While the case for PLEs might be argued in educational technology circles, there are significant challenges to PLE success. These challenges are both technical and social. The majority of technical challenges involve how PLEs will integrate with institutional LMSs. We do think that institutional LMSs will exist long into the future. Therefore, the question is how will PLEs operate effectively within and outside the boundaries of institutional LMSs.

PLEs are challenged by the sheer scope of the online world. While LMSs provide demarcations between approved users and the outside, online communities can contain many thousands of participants and resources. Wilson, et al., (2006) contend that emerging PLE technology might solve the issue of limitless resources by facilitating local filtering within a learner's PLE. In effect, trusted persons and processes become the "personal librarians" for the learner, mining through mountains of information and directing the learner to valuable resources (Martindale, 2007). We can see instances of this now with tools such as blogrolls and RSS readers. Users can construct and share lists of "who they are reading" (blogrolls) and what they are reading (RSS feeds). Microblogging tools like Twitter (<http://twitter.com>) show whom a user is following and who is following the user.

The technical hurdles for PLEs can be considerable depending on one's definition of a PLE. A PLE as "a loosely joined combination of software applications aligned with a single learner to support specific needs" poses fewer technical challenges than does "a single application that can share data with all possible social software formats and e-learning applications". While a PLE can be a loose collection of social networking software, better utility and ease of use would come from tighter integration of these applications. Because PLEs are generally comprised of several social software applications, the skills necessary to manage all of these applications are considerable. The rate at which Web 2.0 applications arrive, expand, and sometimes disappear creates a challenge to learners looking for new components for their PLEs. Successful PLE learners must be able to navigate multiple navigation systems, passwords, and content formats to benefit from the myriad offerings on the Web. Sclater (2008) describes the daunting task of simultaneously juggling multiple learning contexts and interfaces.

Any new system makes demands upon the user. Indeed, this user experience is common with any new tool or gadget. Each new tool represents what might be compared to a new grammatical rule to learn. Therefore a multiplicity of tools represents an increase in complexity on the user. The user must manage this complexity, but the more tools a user has, the more difficult the management becomes. Not only must users learn new interfaces each time a new component is incorporated, but they must also learn how that new component interoperates with existing tools. PLE learners are required to spend higher proportions of their time learning and re-learning user interfaces of emerging Web 2.0 personal technologies (JISC-CETIS, 2007).

Johnson et al (2006) write about the cognitive burden on the modern PLE learner faced with so many interfaces.

An institution-controlled tool presents the user with a fixed interface of controls (instruments) that the user must learn to use effectively if they are to access the service provided. It is a feature of the current Web environment that the use of a large number of these interfaces creates an obstructive user experience, made worse by the lack of flexibility the user has for integrating the different services they access. To operate within this environment, the user must manage a number of different dispositions and skills required for different interfaces. (Johnson et al, 2006)

Moving away from the tightly controlled environment of an LMS with a clear delineation between expert and learner, the informal online learner is faced with the challenge of constant evaluation of resources. Schaffert and Hilzensauer (2008) contend that there is a need for media-literate learners for proper administration of these PLEs.

...the change from content that was developed by expert and/or teachers towards possibilities and challenges to make use of the bazaar of learning opportunities and content leads to the necessity of advanced self-organising and searching in the Web – in other words: media competent learners. (Schaffert and Hilzensauer, 2008)

Sclater raises a number of PLE implementation issues. System interoperability between LMSs and PLEs might be considered a utopian vision due to the business interests of LMS vendors. Why would a LMS vendor allow a PLE client to access the LMS functions without the user directly using the LMS? One must also examine the underlying assumption that learners are prepared to be responsible for managing their own learning environment and content. And there are questions about how the PLE reconciles with the traditional elements of formal education such as syllabi, assignments, grades, and schedules. And the PLE “movement” at this point lacks a recognized charismatic leader or champion to push the development of PLE standards [while successful open source initiatives such as Apache and Linux did have recognized leaders (Sclater, 2008)].

Emerging technologies struggle to coexist alongside (and sometimes replace) current dominant technologies. There are three scenarios in which PLEs could coexist with LMSs. The first scenario would be the PLE existing in a “parallel life”, dominating the informal learning space while the LMS continues to dominate formal education. The second scenario would see LMSs gradually open their structures to include interoperability with PLEs. The third scenario would be the LMS attempting to co-opt elements of the PLE. This last scenario would likely reduce the transformative power of the PLE (Wilson, et al., 2006).

## **FUTURE DIRECTIONS**

Attwell (2006) writes that PLEs should operate online and offline, work on multiple devices, allow granular permissions control, support multiple learning contexts, be open to multiple sources, provide powerful searches, be easily updated, be easily installed and maintained, be extensible, provide multiple presentation options, have built-in interoperability, be based on standards, and help learners sequence their own content. With this as a checklist, clearly there is much work to be done for the PLE to be realized. Attwell (2006) and Sclater (2008) both

comment on the relatively slow uptake of Web 2.0 technologies in formal education, which limits the trajectory of PLE growth.

For the PLE to gain ground in educational practice, instructor-centered instruction would have to become less dominant (Schaffert and Hilzensauer, 2008). While technology might enable better PLEs in the future, the key effort development would be higher education institutions and corporate training departments supporting learner-centered learning. Attwell (2006) states that 21<sup>st</sup> century industry will require employees to have ever-increasing technical competence to stay competitive. Modern workers will, by necessity, practice lifelong learning and take control of their learning processes. As learning becomes multi-episodic, the PLE will play a role in aiding modern learners.

There are a number of technologies and initiatives in development that could affect the PLE concept. For instance,

- The e-Framework for Education and Research (<http://e-framework.org>) is an attempt to create standards of interoperability for LMSs and related tools.
- Google's Open Social (<http://code.google.com/apis/opensocial/>) is a set of common APIs (application program interfaces) for building social applications across many websites.
- The Open ID project (<http://openid.net/>) is a shared identity project that allows Internet users to log on to many different web sites using a single username and password (an identity).
- Moodle (<http://moodle.org/>) is a free open source LMS that has the potential to be more learner-centered than the typical LMS.
- The Open Courseware Consortium (<http://ocwconsortium.org/>) is a collaboration of over 200 institutions to share open learning resources.
- Mash-up Personal Learning Environments or MUPPLE (<http://www.icamp.eu/watchwork/interoperability/mash-up-ples/>) is a wide-ranging approach to PLEs. focusing on the over-arching methods for creating an interoperable framework for different social networking applications and services.

Clearly there are issues facing the PLE, and a number of directions for future research and development. In terms of directions for research, we need a better understanding of: how various social software applications are best used for learning; the implications of decentralized learning environments for institutions such as universities; the implications of learners being responsible for their own environments; how to maintain identity and manage privacy across multiple sites and services; and, how PLEs can work alongside and integrate with institutional LMSs.

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Index Terms:

blog, blogging

constructivism

informal learning

learning management system, learning management systems

LMS

microblogging

open source

personal learning environment, personal learning environments

PLE

RSS

social bookmarking

social networking

social software

virtual learning environment

VLE

Web 2.0

wiki