Personal learning environments: concept or technology?

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Abstract
This paper reviews and critiques how the notion of PLEs has been conceptualised and discussed in the literature so far. It interprets the variability of its interpretations and conceptualisations as the expression of a fundamental contradiction between patterns of activity and digital instrumentation in formal education on one hand, and individual experimentation and experience within the digital realm on the other. It is suggested to place this contradiction in the larger socio-historic context of an ongoing media transformation. Thus, the paper argues against the prevalent tendency to base the conceptualisation of PLEs almost exclusively on Web technologies (WEB 2.0) that are currently available or emerging, while underlying patterns of control and responsibility often remain untouched. Instead, it proposes to scrutinise these patterns and to focus educational efforts on supporting adult learners to model their learning activities and potential (personal learning) environments while exploring the digital realm.

1. Introduction

It seems fair to say that in recent years the notion of "Personal Learning Environments" (PLEs) emerged mainly as a sort of counter-concept to the centralised provision of institutionally owned and controlled landscapes of tools and services in formal education. Fundamentally, it allowed its proponents to address and question the severe limitations of the mainstream approach to the mediation of teaching and studying activities with digital technologies. The emergence and growing dissemination of loosely-coupled, networked tools and services and their surrounding practices in particular inspired some scholars to speculate about a transformation of the monolithic, centralised systems that dominated and are still dominating formal education. Downes (2005), for example wrote: "The e-learning application, therefore, begins to look very much like a blogging tool. It represents one node in a web of content, connected to other nodes and content creation services used by other students. It becomes… a personal learning center, where content is reused and remixed according to the student's own needs and interests. It becomes, indeed, not a single application, but a collection of interoperating applications - an environment rather than a system" (section on "E-Learning 2.0").

Johnson et al. (2006) suggested that over the years the discourse gradually developed around a number of foci that can be interpreted as an expression of a...
- 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

We will argue later in this paper that these "desires" actually occur in a specific socio-historic context and that they can also be read as an expression of a rising contradiction experienced in various activity systems and in formal education in particular.

2. A wide range of interpretations and conceptualisations

There are clear signs that over the years a wide range of conceptualisations and interpretations have surfaced in the ongoing debates and exchanges. Attwell (2007b), for example, reported his experience from some conference event: "…there was no consensus on what a Personal Learning Environment (PLE) might be. 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…" (p. 1). Even this minimal consensus appears to be rather questionable after a thorough literature review on the topic. Kolas and Staupe (2007) also contested that "the variety of interpretation illustrates how diffuse the PLE concept still is" (p. 750). Johnson and Liber (2008) only recently asserted that "within this label, however, a number of practices and descriptions have emerged--not all of which are compatible, and discussions have raged as to the interpretation of the terms …" (p. 3). There is very little indication that this state of affairs has substantially improved or is currently improving.

2.1 Personal learning environments as a concept or approach
Some authors clearly suggest treating the notion of Personal Learning Environments as a concept or approach. Attwell (2007a), for example, states explicitly that "... it is critical that PLEs are being seen as not just a new application of educational technology, but rather as a concept. The development of Personal Learning Environments represents a significant shift in pedagogic approaches to how we support learning processes" (p. 59).

Downes (2007) seems to express a similar view when he writes: "The PLE is a recognition that the 'one size fits all' approach characteristic of the LMS (Learning Management System) will not be sufficient to meet the varied needs of students. It is, indeed not a software application per se, but is rather a characterisation of an approach to e-learning" (p. 20). He adds that "... the key to understanding the PLE consists not in understanding a particular type of technology so much as in understanding the thinking that underlies the concept…" (p. 20).

Johnson et al. (2006) also seemed to have a rather conceptual perspective in mind: "When examining current technologies, the PLE 'lens' affords us two key actions, ...it allows us to critique current technologies, situating them in terms of what might be characterised as their 'PLE compliance'. Secondly, it generates a 'migration path' to move a current technology from a position of partial PLE-ness to full compliance" (p. 187).

Johnson and Liber (2008) on the other hand got a lot more specific when they suggested that "…the Personal Learning Environment (PLE) concept has emerged within the UK and abroad as a label associated with the application of the technologies of web2.0 and Service Oriented Architecture to education" (p. 3). This particular view seems to be largely shared by Kerres (2007) who claimed that "for the user, this "personal learning environment" is not a separate space on the internet, it is an essential part of the users' workspace. It should be highly integrated with the user's framework of tools for his/her personal use of the internet" (p. 11).

Willson et al. (2006) talked about a design pattern: "The critical design flaws inherent in today's learning systems can be addressed through adopting a new design pattern that shifts emphasis away from the isolated experience of the modular VLE. We characterize this new pattern a Personal Learning Environment, although unlike the VLE this is primarily a pattern concerned with the practices of users in learning with diverse technologies, rather than a category of software" (p. 4). Their vision leaves room for a broader (re-)instrumentation as it is evident in the following quote: "While we have discussed the PLE design as if it were a category of technology…, in fact we envisage situations where the PLE is not a single piece of software, but instead the collection of tools used by a user to meet their needs as part of their personal working and learning routine. So, the characteristics of the PLE design may be achieved using a combination of existing devices (laptops, mobile phones, portable media devices), applications (newsreaders, instant messaging clients, browsers, calendars) and services (social bookmarkservices, weblogs, wikis)…" (p. 9).

2.2 Personal learning environments as technological systems or tool collections
Some authors like Harmelen (2006) were even more explicit and suggested that "…as such, a PLE is a single user's e-learning system that provides access to a variety of learning resources, and that may provide access to learners and teachers who use other PLEs and/or VLEs… " (p. 815). This technological view is shared by Kolas and Staupe (2007) who state that "in order to meet the requirements of a PLE, a powerful computer architecture is needed, where it is easy to locate resources based on context and needs. There should also be a powerful search- and navigation system connected to the architecture. The architecture must ensure relevant, complete and consistent information" (p. 751)."

Dron and Bhattacharya (2007) offered a rather tautological definition: "PLEs are a collection of interoperating applications that together form an individual's learning environment", while Milligan et al. (2006) seemed to envision a particular set of tools: "In a Personal Learning Environment (PLE), the learner would utilise a single set of tools, customised to their needs and preferences inside a single learning environment" (p. 507). They also suggest "a key technological component …is the use of Web Services" (p. 508). They also emphasise a Service Oriented Approach (SOA) and the importance of the issue of interoperability. However, Milligan et al. (2006) also acknowledge that "…what differentiates a Personal Learning Toolkit from any other type of tool is difficult to pin down in terms of features alone; the critical factors are primarily in how the system is used, by whom, and in the context of use" (p. 509). Nevertheless, these authors also suggested that one should have a look at a "wide range of tools and sites that exhibit what we felt were characteristics useful in a PLE context…" (p. 509). In fact, they surveyed a number of ICT tools and identified 77 recurring patterns of use that they further categorised into nine distinct groups. They

further identified a number of key services that recur in the patterns. Together, these use patterns and services make up their PLE Reference model. This reference model was used to create two PLE toolsets (a standalone desktop application and a portal based solution). Severance et al. (Severance et al., 2008), for example, see personal learning environments married to the tools and services that are commonly labelled Web 2.0: "PLEs start with the current and expanding capabilities of the World Wide Web, especially those referred to often as 'Web 2.0' capabilities, those involving individual site customization of appearance, resource feeds, tools and tool placement, and increasingly group or social interactions, and add organizing mechanisms and tools focused on educational efforts to produce an environment that can be optimized for learning" (p. 48)

This exemplary and impressionistic summary certainly serves to illustrate the overarching tendency to discuss personal learning environments either exclusively in relation to the current developments of Web technologies, or to even reduce it to a mere synonym for some sort to technological system or set of tools. If scrutinised, the claim of some authors that the term should be rather understood as a "concept" or "approach" and not as technology, often appears to be little more than lip service. Altogether, the current state of the literature on personal learning environments suffers from a wide range of, partially incommensurable, interpretations and conceptualisations.

3. Is the variety an expression of professional orientations or more fundamental contradictions?
It seems obvious that part of the attested variability of interpretations and conceptualisations can be attributed to the various professional identities and orientations of the people who feel attracted to work on issues around the digital (re-)instrumentation of activities related to instruction and study. Proponents of computer science, for example, are naturally more drawn to the computational (re-)engineering challenges in that area. Educational researchers and practitioners, on the other hand, tend to focus on the overall re-organization and re-instrumentation potentials for typical core activities in educational settings. It is not surprising, that the influence of these differing professional and disciplinary orientations is undeniably reflected in the current state of the discourse on personal learning environments.

However, some of the variability that we observe in the discourse can also be interpreted as an expression of a contradiction that is more fundamental and that is perceived and individually processed in rather different ways. We think that the emergence of "personal learning environment" as a counter-concept can also be understood as an expression of a growing conflict and tension that was, and still is, experienced by individual educational researchers and practitioners.

The situation could be described as the following:
On one hand educational institutions have cultivated elaborate systems around a number of core activities (and their objects). These activity systems (Engeström, 1987) tend to absorb new instrumentation options (from the digital realm) while leaving the general patterns of control and responsibility (rules, division of labour, etc.) largely untouched (Fiedler & Pata, 2009). Central control and provision of instruments (for its core activities) has been a dominant pattern in these institutions for centuries. No wonder that the system tended to "process" emerging developmental offers in the

digital realm accordingly. The result was the creation of Course Management Systems and a palette of digital instruments to be used in specific instructional activities.

On the other hand a growing number of individuals experience that the digital realm is penetrating or absorbing more and more activities in their life. They experience the digital instrumentation of all types of activities (in the workplace, in their social life with friends and family, related to hobbies and leisure, and so forth). Naturally, these individuals begin to experiment with the self-controlled, digital instrumentation also in relation to their learning activities (formal or non-formal). Within this self-directed instrumentation of activities particular patterns of control and responsibility, ownership, provision, and so forth, emerge. These compete with, contrast, and contradict the patterns that are still driving the institutional practices. From a historical perspective, the emergence of the term "personal learning environment" can be understood as an expression of this very contradiction and incompatibility experienced by educational researchers and practitioners already "living in" (not only with) the digital realm. The term that they created to express their tension, however, was and still is processed in fundamentally different ways within the wider research community.

4. Personal learning environments: what is in the term?
In principle there are two, fundamentally different, ways one can conceptually "slice" the term "personal learning environment". These two, fundamentally different, conceptions are reflected in the current state of the discourse and continuously surface in the literature on PLEs.

There is a large group of proponents who basically think and write about "(personal) learning environments". Their notion or understanding of the term focuses almost exclusively on issues of (re-)instrumentation of teaching and studying activity. They treat issues of personalization, selection, maybe adaptation, the separation of form and function, and so forth. All these issues tend to be discussed almost exclusively in relation to the existing (or emerging) state of the leading medium: Web standards, services, applications and so forth (for some recent examples see Godwin-Jones, 2009; Taraghi, Ebner, Till, & Mühlburger, 2009; Zubrinic & Kalpic, 2008). In many cases, fundamental contradictions within the overall activity system are completely ignored or remain untouched.

In contrast to this former, rather technologically oriented, conceptualisation of the term it is equally possible to explore the notion of "(personal learning) environments", or to rephrase slightly, "environments for/of personal learning". Researchers and practitioners, who process the concept accordingly, tend to be more concerned with individuals (or groups) gaining control over their (intentional) learning activities (formal and non-formal) and their instrumentation (see for example Attwell, 2007b; Downes, 2007; Johnson & Liber, 2008).

For educational theorising and research this second reading of the term seems to be far more appropriate and fruitful. First, it appears to be rather short sighted to base the further development of "personal learning environments" as a concept on the current, and certainly transient, state of the Web, as an emerging leading medium.

Second, an educational concept eventually needs to be rooted in an explicit (human) change perspective to develop and maintain any lasting, generative power for theorizing and empirical research in education.

A review of recent literature on Personal Learning Environments (Attwell, 2007a, 2007b; Bhattacharya & Dron, 2007; Chan, Corlett, Sharples, Ting, & Westmancott, 2005; Costello, 2007; Downes, 2007; Dron & Bhattacharya, 2007; Godwin-Jones, 2009; Johnson, Beauvoir, et al., 2006; Johnson & Liber, 2008; Johnson, Liber, et al., 2006; Kerres, 2007; Kolas & Staupe, 2007; Lubensky, 2007; Mazzoni & Gaffuri, 2009; Milligan, et al., 2006; Neuhaus, 2007; Olivier & Liber, 2001; Pilkington, Meek, Corlett, & Chan, 2006; Severance, Hardin, & Whyte, 2008; Taraghi, et al., 2009; Tindal, Powell, & Millwood, 2007; van Harmelen, 2006, 2008; Wilson, 2005, 2008; Wilson, et al., 2006; Zubrinic & Kalpic, 2008), however, produced only a single contribution (Johnson & Liber, 2008) in which the authors make an explicit attempt to anchor an exploration of the concept of personal learning environments within a model of "the personal learner" (p. 3). Though we have referred to and made explicit use of different models (Harri-Augstein & Cameron-Webb, 1996; Harri-Augstein & Thomas, 1991; Thomas & Harri-Augstein, 1985) in earlier works (Fiedler, 2003; Sharma & Fiedler, 2007), we have recently made an explicit effort (Fiedler & Väljataga, forthcoming) of describing our work in direct conversation with the propositions and terminological distinctions made by Johnson and Liber. While this paper is certainly not the place for a detailed description of such modelling efforts, it seems important to emphasise that there is certainly a general and somewhat discomforting lack of theorising on the "personal learning" aspect of the concept under reflection here.

5. Considering the socio-historic context of the emergence of the notion of personal learning environments

The contradiction that we have described above in relation to the dominant (digital) instrumentation of current formal education, and the agency experienced by individuals who "live in" the digital realm, should not be seen in isolation. Rückriem (2009), for example, only recently reminded us that digitalization "… has penetrated every societal process and every societal activity system" (p. 88) and that "global digitalization and networking represent the specific 'leading' and epoch-making medium of our present time and provide totally new and rather inexhaustible potentials to human practice" (p. 89). We currently cannot grasp, let alone predict, the direction and extend of all related transformation processes. The emergence of a new "leading"- or even "dominating" - medium undoubtedly poses formidable developmental challenges for individuals and current activity systems.

Individually and collectively we seem to be living through a transition phase that produces mounting contradictions for existing activity systems and individuals. The emerging leading medium, however, is gradually changing what we perceive as a potential object of activity, or an artefact that can be turned into a helpful instrument. We see this as a co-evolutionary process, since human needs, imagination, and activity in turn will shape the further development of the leading medium and new human abilities emerge. No doubt that individual and collective learning activity (formal or non-formal) is equally affected by these transformations. Educational intervention and research needs to respond to these challenges and support the necessary individual and collective developmental moves and trajectories.

Since we are still in the early stages of a massive, co-evolutionary transition phase that will most likely result in the emergence of computation, digitisation, and the overall digital realm as *the* dominant medium, we need to expect a disparity in developmental trajectories of "living in and with the digital realm". In many ways we can currently witness how more and more areas of human activity get gradually augmented and transformed by getting "morphed" into the digital realm. In early stages of this process the dominating developmental move seems to be the search for and acquisition of functional equivalents (email replaces letters or phone calls), then new configurations of instruments are explored, and finally new affordances (potentials for action) emerge through a co-evolutionary development of the dominant medium and human dispositions. Education and its digital (re-)instrumentation is no exception to this general pattern.

6. Educational work in the face of the ongoing transformation
Early stages of fundamental media transformations in general seem to dominated by the replication of old patterns within the new medium (Giesecke, 2002). Therefore, it should come with very little surprise that many educators and educational researchers seem to maintain the view that it is quite appropriate to limit their efforts on the (re-)design, (re-)instrumentation, and implementation of particular learning activities, while mostly reproducing traditional patterns of control and responsibility. In fact, this position and enactment is somewhat to be expected. However, from an educational perspective it certainly needs to be addressed.

In the light of the ongoing socio-economic developments and the emergence of digitalisation and networking as the leading or dominant medium (Rückriem, 2003, 2009) for the co-evolutionary transformation of individual and collective life (way of being) and its instrumentation, we need to scrutinize traditional patterns of control and responsibility in education, and in higher education in particular.

From an educational intervention perspective, we need to make an attempt to re-configure learning activities so that the individual personal adult learners can actualize and execute control and responsibility on that level by modelling and actively shaping their own (personal) learning activity and its specific (personal learning) environment (Fiedler & Väljataga, 2010; Väljataga & Fiedler, 2009). It is important to note here that any (intentional) learning activity, be it attached to a formal educational setting or not, can potentially benefit from the personal modelling of the activity itself and the active shaping of a specific (personal learning) environment for its execution.

We consider it as a valuable, educational goal in itself, that the individual develops personal control of different types of intentional learning activity (formal or not), a certain level of transitory fluency between them, and the active shaping of their specific (personal learning) environments. We think that this goal merits diverse and multifaceted educational interventions that hold the potential to open up progressive, developmental moves for the personal (adult) learner.

To summarise:
- we need to scrutinise traditional patterns of control and responsibility in (higher) education
- personal (adult) learners need to be able to model and actively shape their own learning activities and their specific environments

- a potential (personal learning) environment for a particular learning activity is made of all the resources (artefacts, natural objects, people) that an individual is aware of and has access to at a given point in time and that s/he can turn into instruments to mediate her actions (Fiedler & Pata, 2009)
- we need to stimulate the explicit exploration of the digital realm in relation to particular learning activities and the conscious shaping of their potential (personal learning) environments

7. Concluding remarks

Since we seem to be living in an early stage of a fundamental media transformation (digitalisation and networking) that currently can be characterized by a huge disparity and variety of developmental stages and trajectories, we should not orientate our conceptualisations of human change and development (in education, counselling, therapy, and so forth) on the current state of the leading medium and its most prominent artefacts (digital, material, or conceptual).

If we do so, we run the risk that many individuals simply engage in the temporary exploration of with a succession of "new toys" without ever connecting their experiences with a wider model of themselves as personal (adult) learners. A simple collection of potential resources (artefacts, natural objects, people) does not make a "personal learning environment," if there is no personal model of intentional learning activity in the first place, or if people run on out-dated models from previous times.

What is currently presented as "personal learning environments" as such, or as their instantiations, obscures the fact that these collections of digital artefacts are mostly a snapshot of the current state of development of the emerging leading medium. From an (adult) educational perspective, however, we need to support individuals (and groups) to gain awareness and control over a range of intentional learning activities and their environments, and eventually their overall development as personal (adult) learners living *in* (and not only with) the digital realm.

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