Preface

Over the last decade virtual learning environments (VLE) have become increasingly prominent across all stages of the education system from primary schools to higher educational institutions, as well as professional and adult training contexts, all around the world (Siemens, 2004; Weller, 2006). As they have been adopted in different contexts, there has inevitably been some transformation in the terminology used and while the acronym VLE persists in the UK, they are sometimes referred to as learning management systems (LMS) in North America and learning platforms (LP) or course management systems (CMS) in professional training environments. Though initially designed mainly for facilitating distance and online learning environments, such has been the widespread adoption and success of VLEs that they have also been quickly adopted by administrators as a vital component in the delivery of face-to-face education. Moreover, in this context, they have become an important gateway for a new vision of an integrated student experience, in which as well as allowing access to standard learning modules, they also incorporate tools for managing information resources in libraries and accessing electronic databases and other important communication tools for learners, faculty and administrators. VLEs have achieved such a state of normalisation and ubiquity that it is indeed difficult to imagine a time when access to a set of learning materials, particularly in higher education, did not involve logging on to the institutional VLE in order to read the course syllabus, weekly lectures and materials, or contribute to discussion boards or chat rooms.

Beginning from around the year 2000, VLEs started to replace the ad hoc web pages that had typically been designed by educators who dabbled in HTML on their often multi-coloured and multi-functional pages. On another level, the shift has been symptomatic of the increasing role of technology in education as well as of the increasing need for educational institutions to present a unified and standardised corporate brand image to stakeholders and customers. It is no accident then that the rise of the VLE occurred against the background of a new environment for educational institutions within more competitive national and international markets. Although VLEs promised changes in pedagogy, they were typically related to the need to provide a solution that could produce savings in terms of the costs involved with instruction; be used by educators who had no specialist knowledge of programming or technical equipment in order to add content across all courses and disciplines; enable instruction at different locations and at different times by using standardised learning materials; and facilitate more effective ways of assessing and grading students as well as the rich flow of such information across the different administrative services and departments of an educational institution.

During this period, a number of prominent VLEs have been developed by commercial providers to realise these goals, with first WebCT and then Blackboard being the major players in the market. Following Blackboard’s takeover of WebCT in 2006, its estimated share of the market stood at just over
50% in 2010. At the same time, open source virtual learning environments such as Moodle and Sakai have also risen to prominence, with the former in particular becoming a beacon of the spirit of freedom and non-commercialism that had been among the most important structuring principles behind the emergence of the World Wide Web in its first iteration.

This tension between the centralising and commercial tendencies of VLEs such as Blackboard and open source alternatives like Moodle, the latter with its international array of developers, users, and enthusiasts, is a tension that can be found throughout the history of educational technology (Cuban, 2001). Rather than being peripheral to debates about the future of education and learning then, the role and design of the VLE is significant in that it also frames important questions about the nature and direction of pedagogy today and for the decades ahead (Conole, 2008). Along with debates about the marketisation of education and the potential of technology to promote a transformation of learning in the digital age, they also include timely discussions about copyright of information and educational resources; the role of administrators and teachers in designing curricula; the changing landscape of presence-based and distance education; and current debates about open access, to name but a few influential topics.

As implied by those in the open source camp, though intended for use by educators and students, commercially available VLE applications have often been imposed as top-down solutions by educational managers and administrators, and have often been criticised as inflexible tools that emphasise control rather than the ability to foster learner autonomy, creativity, or collaboration as a result (McDonald, 2003; Meishar-Tal & Tal-Elhasid, 2008).

It is from this context that the idea of a personal learning environment (PLE) or personal learning network (PLN) is derived (Siemens, 2007; Wilson et al., 2007). Both terms emerge as a reaction to the interpretation of the VLE as a somewhat stifling administrative repository for course materials rather than a truly learner-centred learning environment. Though rather ambiguous, the PLE has been increasingly advocated as a decentralized alternative, aimed at providing learners with the opportunity to acquire greater control of their own learning progression, goal setting, and personal development planning. While the definition of a PLE has remained rather amorphous, more research is beginning to be done on the area and efforts to define the potential role of such an environment in contemporary education are being made. PLEs are often connected with a group of personal tools associated with one particular learner thus supporting a more learner-centric and constructivist approach to learning. Rather than being associated with a particular application or being overly technical in orientation, a personal learning environment relates to an aggregate of tools that learners (or indeed faculty members) have chosen and are able to access anywhere. Writing in 2007, Siemens captures this focus:

PLEs aren’t an entity, structural object or software program in the sense of a learning management system. Essentially, they are a collection of tools, brought together under the conceptual notion of openness, interoperability, and learner control. As such, they are comprised of two elements – the tools and the conceptual notions that drive how and why we select individual parts. PLEs are a concept-entity. ... My PLE may consist of an entirely different combination and set of tools than a colleague’s. (Siemens, 2007)

With the advent of Web 2.0 applications, some commentators argue that many of the characteristics of a PLE stand their best chance to date of being realized. These features include, for example, the ability to enable learners to communicate more easily with one another, manage the process of learning more effectively, and take a larger stake in their ownership of content. When stated in these terms, it is difficult to oppose the intent to place the learner and his/her unique needs at the center of the educational
process, rather than assuming that learning must always be the result of a transmission or “push” strategy in which learners are vessels to be filled with content controlled by external curriculum designers, managers, or instructors.

Moreover, given the emergence of so-called digital natives, advocates of PLEs argue that practitioners are closer than ever to being able to realize a form of rich personalized learning initiated by learners themselves, as the students currently entering schools and universities are already familiar with their own group of Web-based social networking and communication tools in their social lives (Prensky, 2001). While the digital native concept is not without its problems and limitations and today’s learner’s are far less competent in the sophisticated use of digital technologies than this myth would have everyone easily believe (Bennett, Maton & Kervin, 2008), many more of today’s learners are at least familiar with the importance of social software for communication and collaboration. Indeed, in the context of Web 2.0 and the read/write Web, the PLE embodies the possibility of learners balancing the traditional transmission or push strategy of education with a pull strategy in which they can access the learning materials they want, whenever they want, and wherever they are (O’Reilly, 2007).

As desirable as this vision of a transformation in education may appear, the current prominence of personalized learning is nevertheless fraught with a number of technological, pedagogical and cultural issues that also need to be addressed in order to make progress toward its realization. These include providing solutions to support a large group of learners with a multiplicity of different tools at their disposable; balancing student choice and learner centrisim with institutional standards for assessment, quality assurance, and instructor expertise; and enabling the use of common tools for communication, collaboration, and the shared construction of knowledge. In addition, advocacy of personalized learning and personal learning environments is in danger of being supported by the same kind of evangelical rhetoric of educational transformation evident in the history of learning technologies, from educational radio and television to interactive whiteboards and tablet computing. Pushed forward by government policy makers in search of something new rather than learning technologies based on sound pedagogy and educational research, the philosophy of personalized learning risks repeating the same errors and aporias if it is not grounded in a carefully articulated pedagogy that is realistic rather than utopian or merely a reaction to the perceived centralising tendencies of VLEs.

At ALT 2009 (the Association of Learning Technologists Conference) a lively panel debated the topic “The VLE is Dead” (Weller, 2007). A number of the arguments cited above were discussed, including in particular the idea that the VLE is a rather incidious force representing everything that is wrong with the new managerialism and spirit of commodification in higher education. While the word learning may be limited by the sole use of a VLE as nothing more than a repository for course documents, the author of this introduction would prefer to emphasise that this capacity depends on the imagination and creativity of the instructor as well as the learners who inhabit it. At the very least, the notion of a VLE as a repository has brought a much-needed sense of structure to educational spaces, albeit at times one that was rather cumbersome and prone to rely on too many individual mouse clicks. Rather than being dead, the VLE is (has always been) in a state of transition. Out of these negotiations and transitions, understanding of the VLE and the PLE will continue to develop over the next five to ten years alongside trends in Web 2, the personalisation and customisation of learning brought about in part by the popularity of mobile digital devices, as well as developments in open educational resources and the virtualisation of the Web. It is far from clear how these centripetal and centrifugal influences will continue to interact and shape educational technology but trends in three dimensional worlds, augmented reality, the semantic Web, and
4G broadband technologies seem set to change the rather flat experience currently on offer in VLEs into one based on enhanced social presence for all involved in the delivery and consumption of education.

The eighteen chapters collected in this volume have been written by leading international academics, researchers, and instructors engaged in the design, implementation, and evaluation of virtual and personal learning environments over the last decade. Contributors derive from a range of professional and educational contexts in seven countries, including Canada, Germany, Israel, Japan, the Netherlands, the UK and the USA. The volume intends to reflect on current areas of research in the field by incorporating a range of studies, many of which are related to the 3D virtual world of Second Life in particular, as well as by examining a number of tools and applications from the wider Web 2.0 educational context. Following an opening section which sets the scene identifying some of the key themes, terms and concepts related to virtual learning environments, the succeeding sections focus on design (Section 2), implementation (Section 3), and evaluation (Section 4). The aim of the book is to promote further discussion on these topics and to engage in debate that is critical in orientation rather than idealistic, research-based rather than merely descriptive, and committed to exploring the most appropriate forms of pedagogy to engage learners and faculty in online and virtual environments.

OVERVIEW OF THE CHAPTERS

Section 1: Key Concepts

Weller’s chapter, “The Centralisation Dilemma in Educational IT,” identifies a cycle of decentralization and centralization in the adoption of educational technologies that has been particularly in evidence in the adoption of virtual learning environments. During the early phases of the World Wide Web, a more dispersed strategy was influential in which individual departments or educational institutions developed their own platform. This approach has been largely surpassed by a more centralized approach often organized by central governments or regional authorities. In turn this centralized focus has led to a reaction that has produced the idea of the personal learning environment (PLE). While there is often dissatisfaction with centralized models which imply control and surveillance, Weller speculates that a fully realized personal learning environment may not be achievable. In order to pursue this line of research, Weller argues that it may be necessary to examine how it is possible to maintain the centralized system but build in a series of diversified personal elements in addition.

The tension identified by Weller is also explored in the second chapter by Sclater, which looks forward to the implications of cloud computing in an educational context. As Weller implied, e-learning has progressed mainly as a result of the highly centralized and secure virtual learning environment. The PLE is being developed particularly by students as an alternative which gives them increased freedom via the use of Web 2.0 tools such as blogs, wikis, social networking, and podcasting. Sclater’s chapter is one of the first to examine these opportunities, showing how institutions can harness the power of dynamic Web-based content within their existing policy and regulatory frameworks. At the same time it is necessary for institutions to examine the associated risks to security and data protection in order to balance the *sin qua non* argument that the cloud will inevitably lead to decreased costs. Sclater argues that while this may indeed be the case, cloud computing will also pose significant threats to existing business models within education.
The chapter by Chatti, Agustiawan, Jarke, and Specht entitled, “Toward a Personal Learning Environment Framework,” discusses in more detail the argument that PLEs are a reaction to the centralized technology-push approach that has characterized many of the developments in technology-enhanced learning over the last two decades. In order to produce the shift that is required for a more learner-centred or learner-pulled form of pedagogy, the authors consider a detailed framework for developing a personal learning environment, arguing that it is important to integrate perspectives such as design and evaluation in the process.

Section 2: Design

Having established a number of key contextual factors in the opening chapters, Section 2 considers in more detail the importance of design in the development of virtual learning environments. In the first of five contributions, Vallance, Martin, Wiz, and van Schaik’s chapter, “Designing Effective Spaces, Tasks, and Metrics for Communication in Second Life within the Context of Programming LEGO NXT Mindstorms™ Robots,” reports on the initial stages of research examining the use of a virtual environment underpinned by constructivist principles with science students in the UK and Japan. Participants in the study utilise virtual technologies while situated in physically dispersed locations and explores the assumptions of a Vygotskian social constructivist learning framework. Such a pedagogical framework supports a range of skills based on fostering personal responsibility and decision-making while emphasising the active role learners have to play in contributing to their acquisition of knowledge. Moreover, in terms of science education, the use of a virtual world coupled with a task-based approach founded on social constructivist principles attempts to locate learning within meaningful and authentic contexts in which learners are presented with what the authors refer to as real opportunities to experience science first hand.

Continuing the focus on 3D worlds, Jarmon’s chapter, “Homo Virtualis: Virtual Worlds, Learning, and an Ecology of Embodied Interaction,” provides a highly detailed report on a series of seven research studies in which field note data was collected over a period of two and a half years in Second Life. The main focus of the chapter is the interaction of avatars – their sense of what Jarmon calls their embodied co-presence – with the virtual world and objects around them which mediate and structure their presence online via the spatial, visual, and auditory landscapes found in Second Life. A wide range of participants’ voices are found in the research presented here including high school and university students as well as academics. Findings suggest that the virtual world presents participants with opportunities to occupy a range of subject positions which transform the traditional learner/instructor relationship, enabling them to be as Jarmon suggests, “teachers, designers, researchers, communicators, and collaborators” in the process.

In “Second Life as a Surrogate for Experiential Learning,” DeMers continues this focus on the use of virtual worlds to explore their potential for allowing individuals to experience online forms of social presence and community (de Freitas, 2008). DeMers points out that the initial investment by educators in virtual worlds like Second Life have more often than not merely reproduced the pedagogical context found in traditional face-to-face educational contexts. This in turn tended to produce passive learning environments rather than exploit the full potential of virtual worlds to encourage learners to actively engage in the reflective skills and tasks required by experiential learning. Based on Kolb and Kolb’s (2005) model of active learning in the context of geography courses, DeMers describes how his research stimulates a hands-on and interactive approach coupled with a ‘learning by discovery’ orientation. Con-
sequently, his research of virtual environments is aimed at realizing what he calls the four main aspects of an experiential learning environment, namely, involvement, reflection, analysis, and problem-solving. His findings suggest that such an approach presents perhaps the best opportunity educators have of using online worlds to simulate real-world contexts which may not be realizable either because of geographical or logistical constraints.

A further example of research on virtual worlds is presented in “An Interdisciplinary Design Project in Second Life: Creating a Virtual Marine Science Learning Environment,” by Triggs, Jarmon, and Villareal. Virtual spaces are again deployed to overcome many of the logistical and pedagogical barriers presented by traditional forms of education. Virtual environments in this research study are harnessed to overcome a range of economic, physical, safety, and accessibility barriers to promote discovery based knowledge transfer. This particular research project was based on a cross-disciplinary approach in the area of Marine Science at a US university in which a virtual world was used to produce a collaborative and interdisciplinary pedagogy.

In the final chapter in this section, Hamilton, Langlois, and Watson from IBM Canada describe a fascinating case study of how their multinational organization uses Second Life to create a personal learning environment based on the important notion of mentoring in “Virtual Speed Mentoring in the Workplace - Current Approaches to Personal Informal Learning in the Workplace: A Case Study.” The research is based on the idea as the authors suggest that, “Informal learning accounts for over 75% of the learning taking place in organizations today” (Conner, 1997). IBM utilises Second Life as a virtual social environment and as alternative to telephone and video conferencing in order to enable effective collaborative spaces which promote creativity while also being inexpensive to produce and maintain.

Together the chapters in this section have identified insightful examples of research studies that allow for highlighting a number of key aspects necessary for the design of effective virtual and personal learning environments. Section 3 turns to exploring examples that build on these frameworks to examine how these collaborative social spaces may be effectively implemented.

Section 3: Implementation

In “Communication and Education in a Virtual World: Avatar-Mediated Teaching and Learning in Second Life,” Mon further deconstructs the sage on the stage metaphor of traditional face-to-face education and the way it is often adopted in ill thought-out pedagogical approaches in virtual worlds. Mon rejects the idea that virtual spaces should merely reproduce pedagogical spaces with traditional seating arrangements that enable learners to watch passively as slideshows or videos are displayed. The chapter explores an alternative vision based on the principles of good design in online worlds identified above in which learning techniques are identified to stimulate and support a range of autonomous and collaborative learner interaction. Examples of how educators can use tools and techniques to build and contribute to the virtual landscape are identified as well as how best to approach strategies focused on problem-based learning, the utilization of gaming and simulated role-playing tasks (de Freitas & Griffiths, 2008; Gee, 2007).

In “Mechanics Simulations in Second Life,” Black describes a further example of this approach in the specific disciplinary area of physics where a virtual physics engine has been designed to explore specific experiments in simulated environments. The findings from the study importantly underline both the challenges and opportunities presented by the virtual world, in that the environment enables a wide range of chances for scientists to simulate the real-world in a controlled environment, while at
the same time presenting a series of technical barriers that designers need to master in order to produce optimised learning contexts.

Continuing with specific examples of online environments, which otherwise would be difficult or impossible to replicate in the lab or real-world, Danforth’s chapter, “Development of an Interactive Virtual 3-D Model of the Human Testis Using the Second Life Platform,” examines a number of original ways to teach medical education. Three main areas of potential are identified, including opportunities for modeling doctor-patient discussion and interaction, developing three-dimensional models and simulations of organs and objects, and developing students’ clinical diagnosis skills. In this particular case study, the researchers developed a model of the human testis that medical students could explore in detail by flying through it, thereby gaining detailed first-hand anatomical and physiological experience. Findings suggest that learners benefited in particular from the interactions between the three-dimensional models which are supported with audio and video narratives and the style and mode of delivery which appeals to learners across the educational spectrum from high school to university level. The chapter speculates how the maturation of these capabilities will be able to aid students in the future.

Related to the environments that described above is an important understanding of the role of learners’ virtual identities in the form of their avatars. Nahl pursues these issues in her chapter, “Affective Load and Engagement in Second Life: Experiencing Urgent, Persistent, and Long-Term Information Needs.” She examines the learning curve required of learners and instructors in acclimatizing themselves to the virtual world and the types of support they will need in participating in task and problem-based learning activities in a three-dimensional context. The research draws on data from self-reports written during learner task engagement and identifies a range of learner emotions (such as learner irritation, anxiety and frustration vis-à-vis their virtual selves) related to their cognitive skills in the midst of a constant stream of complex information streams. The chapter is important in focusing on the complex challenges faced by learners in adjusting to their virtual selves and for not taking for granted the unproblematic transition from their real-world to virtual identity. The research gives rise to knowledge about how learners can develop coping strategies for dealing with this virtual transition process.

A number of these above-mentioned case studies have focused on developing pedagogical approaches that fit with the virtual environment. In this next chapter, “Investigating Modes of Student Inquiry in Second Life as Part of a Blended Approach,” Webber continues this theme by turning to consider an Inquiry Based Learning (IBL) approach, which has been integrated into a mandatory undergraduate programme in a UK university. Using Second Life alongside WebCT and a traditional classroom environment within a blended learning format, the chapter discusses how Second Life in particular facilitated learner achievement and aided autonomous modes of inquiry. The research concludes by discussing further aspects of this blended framework and how the virtual environment can be utilized in future.

The emphasis on the potential role of virtual learning environments in science education is further emphasized in the chapter by Achumba, Azzi, and Stocker in “Low-Cost Virtual Laboratory Workbench for Electronic Engineering.” The research reports on how requirements related to costs, physical presence, time, and space often prohibit the use of lab-based environments for undergraduate engineering students. These resource constraints and scarcity of equipment may be felt in particular in developing countries. The research explores the use of a virtual lab that can be used as a rich and viable alternative within which learners and instructors can model experiments and conduct research in an authentic manner regardless of time and place. The virtual solution examined in this chapter incorporates a Bayesian Network-based assessment structure in order to promote an integrated assessment strategy and is es-
Section 4: Evaluation

In the final section of the book, four chapters consider issues related to the evaluation of virtual and learning environments. In “The Development of a Personal Learning Environment in Second Life,” Andrews, Stokrocki, Jannasch-Pennell, and DiGangi discuss findings from qualitative research on the use of the virtual world as a personal learning environment. The study was designed by a joint collaboration of researchers and volunteers from nonprofit organisations in order to provide disadvantaged learners with opportunities to explore their own creativity and negotiate new virtual identities. Utilising a participatory action research methodology (PAR) the research examined the learner characteristics which may enable curriculum achievement and success in these new environments.

Developing a framework for the evaluation of Web 2.0 tools and their use in educational contexts is a particularly important area in need of further elaboration. Meishar-Tal and Schencks’ chapter, “A Framework for the Assessment of Wiki-Based Collaborative Learning Activities,” articulates a strategy of assessment that could be used in a collaborative environment based on the use of wikis. Issues related to both the technological and pedagogical perspectives of evaluating wikis are examined, with the first part of the study exploring the key characteristics of the framework, and the second part analyzing the applicability of the framework in relation to MediaWiki reports.

In addition to wikis and blogs, digital game-based learning has emerged as another area of research in the last few years that builds on many of the components of virtual environments. Hainey and Connolly consider existing research in this area in their discussion of software engineering education entitled, “Evaluating Games-Based Learning.” The chapter explores how traditional educational strategies such as role-play and case studies may be inadequate in classroom and lab contexts due to the lack of more highly developed authentic contexts (Lave & Wenger, 1991). Simulation and games-based approaches may provide one area for potential solutions to these challenges, though as yet few sustained empirical studies have been published. This chapter attempts to map future directions in the field by considering an appropriate pedagogical framework concerned with evaluating gaming environments.

In the final contribution to the book, Olaniran’s chapter, “Challenges Facing the Semantic Web and Social Software as Communication Technology Agents in E-Learning Environments,” looks forward to the impact of developments associated with the next generation of the internet, the so-called Semantic Web. In this environment it is assumed that the three-dimensional virtualisation of the web has become more commonplace through its assimilation into the everyday browsing experience. While it is often assumed that the Semantic Web will lead to enhanced opportunities for ever greater information management, Olaniran indentifies a number of integral socio-cultural and technological barriers to entry, which will need to be understood and overcome if its full potential is to be realised effectively.

At this point in the history of VLEs it is clear that they have passed through a series of independent but overlapping stages in their development. These include: 1) Early attempts by independent instructors and faculty members to construct their own Web sites to manage their course materials and facilitate learning, largely independent of administrator control; 2) The emergence and large-scale success of centralised and standardised VLEs such as Blackboard for which sophisticated programming skills are not required; 3) The growing importance of open source solutions such as Moodle and the reaction against commercial alternatives that are considered to be less focused on pedagogy, primarily constructivist pedagogical
approaches; and 4) An increasing concern with personalised and customised learning, a trend captured but not fully developed in the use of the acronym PLE or PLN, which draws on the growing importance of mobile digital devices and social software. To some extent, the final stage in this unofficial brief history returns to the start, with individual faculty and learners taking greater control of the technologies and communicative mediums available to them.

A decade ago in 2002, the author of this preface remembers ignoring the comments of a fellow faculty member who protested against ceding control of his own self-developed course web site in the face of impending Blackboardisation. His argument was that he simply could not trust administrators to reliably deliver the flexible solution he required or keep up with the speed of change needed to integrate new and innovative Web-based tools. Ten years later, having come full circle, the author finds himself having greater understanding of and sympathy for his arguments. In the years ahead the problem remains how best to resolve what Cuban (2001) identified as the technology hype cycle and Weller (this volume) has called the decentralisation/centralisation dilemma, in order to produce an effective and workable balance of these competing interests.

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REFERENCES


