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Reflections on personal learning environments: theory and practice

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Abstract

The nature of higher education has changed irrevocably due sweeping changes brought about by e-learning. Such changes include the educational experience, the research process, institutional expenditure & academic work. Possibly the newest development is the personal learning environment. This paper explores the question: what might be the higher education effects of personal learning environments (PLEs) within the context of already embedded learning management systems? A short history is given & the theoretical underpinnings of PLEs are investigated. The paper briefly describes institutional practice in terms of widely established learning management systems. Finally, contemporary approaches to PLEs are critiqued & their possible effects upon higher education evaluated.

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1. Introduction

The term “personal learning environment” or “space” or “network” (PLE) is a relatively new concept usually meaning a digital space in which the user has the ability to access, aggregate, create, store, & share learning materials. The materials comprise such artefacts as lectures, notes, assignments, blogs, wikis, forums, with most PLEs also enabling users to socially interact with others. The first recorded use of the term comes from a session title at the 2004 Joint Information Systems Committee/ Centre for Educational Technology & Interoperability Standards conference in the UK. Since that time there has been a continual development of PLEs in contrast to an institutional backdrop that has been quick to erect

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learning management systems (LMSs) such as Blackboard, .LRN, Sakai & Moodle.

A significant difference between the PLEs & LMSs seems to be one of power – the institution traditionally owns pedagogical property rights, & so controls a large proportion of the content on the LMS, whereas with a PLE, the user has the ability to customise the interface, to add functionality & ultimately populate the interface with individually selected content. It remains to be seen if institutions & their IT departments will be able to bequeath their power & control by transferring their professional *raison d'être* to their students.

2. Educational theory & PLEs

A perennial academic exercise is to examine new educational innovation under the spotlight of previous educational theory (Fiedler & Våljataga, 2011).

2.1. Instructivism

The oldest & most traditional educational theory is that of *Instructivism* which has its roots in early 20th century behavioural psychology. Instructivism depicts the learner as assimilating knowledge from expert teachers who impart their wisdom & skills to a largely passive audience. Instructivism has two major tenets at its core. First, the aim of instruction is to have the learner understand a particular syllabus, & second, learners should be directly taught by instructors, who determine the content & sequence of the learning. The instructivist approach is to totally plan a curriculum by breaking down a subject area into its component parts, & then to sequence these parts into a progression, ranging from the simplest to the more complex. This approach is much like a Maths textbook, which starts with the simple principles & builds upon these in order to deal with the most difficult concepts. Coincidentally, textbooks are often a feature of the Instructivist method.

For students, there is little chance for self-discovery, & little time for exploration or discussion, with real-world examples usually subordinate to hypothetical models & often arcane exercises. The lecture is the main medium of the tertiary instructivist teacher & evaluation is usually performed by means of quizzes & examinations, with reproduction of ideal answers the way for students to excel (Diaz & Bontenbal, 2000). Employing the instructivist method is probably still the most popular way of designing & implementing tertiary-level courses, especially in disciplines such as Business, Science, Medicine, & Health.

In the e-learning context, LMSs would seem to be the closest thing to instructivist methodology. By encouraging teachers to place their lectures & teaching resources online, & insisting that students access these resources or fail, most educational institutions can be seen to be simply perpetuating the instructivist pedagogy of the early 20th century. PLEs however, are simply not found in instructivist methods. Student-centred learning is antithetical to behaviorist ideas since it removes control of the learning from the teacher & allows the student to be responsible for their own learning. With Instructivism tacitly underlying much of what passes for e-learning in many higher education facilities, the introduction of PLEs must be seen as an undertaking fraught with risks for many institutions.

2.2. Constructivism

Typically viewed as the opposite of Instructivism is the theory of *Constructivism*, which considers that all new knowledge & learning is based on previous knowledge & past learning, & that we construct our concepts gradually from experience with the world. There are three main constructivist principles: 1. learning & understanding comes from interactions with our environment; 2. the learner encounters cognitive conflict which in turn stimulates learning; 3. new knowledge develops through social interaction (Savery & Duffy, 1995). Other main beliefs of constructivism are that it emphasises learning

& not teaching, encourages learner individuality, conceives of learning as a process, & nurtures natural curiosity. Constructivist learning experiences incorporate authentic tasks in meaningful contexts, it employs real-world learning situations (Jonassen, 1994) & minimises assessment in the learning process.

The two main schools of Constructivism are social constructivism & cognitive constructivism. Social constructivism is most often associated with Russian psychologist Vygotsky & his followers, who believed that the teacher plays an active role in facilitating the learner to develop their mental ability through discovery. Social constructivists believe that learning is a social & collaborative activity that is not taught by a teacher, but rather constructed by the learner. Cognitive Constructivism, whose forefather was Jean Piaget, sees learning as being achieved through various developmental stages that are built upon stage by stage. The learner develops through these necessary stages by processes of assimilation, accommodation & equilibrium.

As attractive as Constructivism appears, much criticism has been directed at the constructivist method. The main problem is that constructivists tend to minimise the curriculum compared to the needs of the learner. A decade & a half ago, the “child-centered” version of progressive education from which so much of constructivism flows was reported to be hostile to standards, assessments & accountability. In the child-centered classroom, teachers are supposed to “facilitate,” not teach. Teaching is scorned as being too didactic, representing an almost authoritarian act (Finn & Ravich, 1996).

The advent of e-learning over the last 20 years, including LMSs & blended learning models, has encouraged teachers to use constructivist principles to employ a variety of “scaffolding” techniques within online environments. Such techniques include: activating previous knowledge, breaking complex tasks into more manageable chunks, modeling processes of a task by explicating the steps involved, using notated images to simplify complex processes, & modeling activities before students are asked to undertake similar tasks. Online scaffolding has been shown to be highly effective when students are first introduced to a new concept (Dabbagh, 2003). It facilitates student attention & engenders motivation, which is essential to learning new concepts & tasks.

The best exponents of e-learning have embraced interactive scaffolding (see Sharma & Hannefin, 2007; Stewart, et al, 2007) as a primary method of teaching new ideas, but such pioneers are usually dependant upon innovative technology. Implementing scaffolding techniques on websites/LMSs (or even in traditional face-to-face situations) has never been a simple task, thus as the Internet has matured into its highly socialised incarnation (the Web 2.0), new software & Internet applications have allowed more & more departures from traditional chalk & talk, strictly one-way, instructivist sites in favour of novel constructivist scaffolded sites, which encourage dialogue with fellow students & teachers.

2.3. Connectivism

Connectivism (Siemens, 2005; Downes, 2005) is one of the newest theoretical frameworks for understanding learning & is particularly relevant to online learning & social networks. Connectivist learning occurs through the process of a learner connecting to & transferring information into a learning community. The learning community can be aggregated into a cluster of similar areas of interest, which allows for interaction, sharing, dialoguing, & thinking together (Siemens, 2005). A learning community also forms a node, which arise out of the junction points found on networks (two or more nodes). Nodes may be large or small, strong or weak, depending on the concentration of information & the number of individuals who are using a particular node (Downes, 2005). Knowledge is the basic currency of the node & it may be stored in any number of digital formats.

In real life, the reliability & accuracy of knowledge usually changes over time, depending on new

discoveries & research. Similarly, an individual's understanding of a concept, & their ability to learn about this concept, can also change over time. Connectivism stresses that two most important skills contributing to learning are the ability to seek out current information, & the ability to filter out extraneous information. The connectivist process is cyclical - learners may connect to a network to share & find new information, modify their beliefs on the basis of new learning, & then re-connect to other networks to share their beliefs with others. Learners ideally inhabit multiple networks & multiple knowledge spheres allowing many interdisciplinary connections to be made.

The Connectivist metaphor is obviously contextualised by Web-based experiences & behaviours. The network analogy owes huge debt to then-current professional & social networking sites, & generic user behaviour found on the Internet, & mobile telephony networks. A significant difference between Connectivism & all other major learning theories is that the individual is highly dependant on the learning network or node, without which all learning seemingly stops. Without the connectivity to other nodes or groups, an individual is lost, floundering in isolation & inactivity.

There are many similarities of the connectivist model to current PLEs. The shared facilities & social networking components of PLEs would thus conform to the connectivist nodes. In setting up their learning space, student users of PLEs would have access to several different networks - conceivably institutional groups, various class groups, & extra-mural groups such as friendship, professional & social clusters. Information can be stored on PLEs in a range of different formats. Daily use of the PLE would lead to aggregation of text, pictures, videos & sound files, & allows students to filter the most important information for later re-use in assignments. Team-based learning is facilitated by the shared filespace, & the student is motivated through engagement & the social networking possibilities.

3. Current personal learning environments

According to Johnson & Liber (2008) the PLE movement came about in the UK & USA as a label which recognised the application of the social communication technologies of Web 2.0 to education. In particular, the word "personal" has been a source of conflict & ambiguity. Personalisation has two distinct meaning in PLEs. The first meaning embodies the desire to create learner-centred, but management-driven education; the second meaning is the view that learning is essentially a learner-driven model of education, with the traditional instructivist role of the institution subordinated to the individual student (Johnson & Liber, 2008). There is yet a third view, which sees personalisation as an individual undertaking usually by sophisticated users who are already harnessing a variety of online tools to create informal networks.

The background for the last two views is given by the popularity of personal technologies such as personal blogs, Facebook, MySpace, LinkedIn, & Twitter, which are assuredly more advanced than most of the technology provided by institutions. Extra-mural online services are faster, more efficient, more reliable & have a critical mass of users far in excess of any one institution. Many communication technological practices enjoyed by students off-campus are unavailable within the institution. There is fierce competition for student attention, & the off-campus services are winning if one peruses most student computer screens. Multiple network communities (or Connectivist nodes) are established, much informal learning occurs; real relationships are forged in these communities, but commitment to any one particular site is limited & transitory (O'Brien, 2007).

To date, the reluctance of academic community to pursue research into PLEs is probably related to the newness of the technology & the fact that institutions have the most to lose from decentralised learning systems. Thus, the majority of the debate for the past five years has occurred, not in traditional academic

circles, but in the blogosphere of professional & educational exchange. Sclater (2008) reports that advocates of PLEs take one of three approaches to the implementation of a PLE system: 1. client-side local software programs, 2. server-side Web browser services, which combine a set of social networking tools with LMS-type access; & 3. hybrid approaches which use existing software & Web-based tools.

The first approach argues that new locally-based client software needs to be developed to allow users to connect to the already existing resources on the Internet. The main reason for producing locally-based software is one of ideology. If students are truly to take control of their learning then they need to own the software & it needs to be on their computers not on a remote, controlled server, which can change or disappear at the end of term. Users also need the opportunity to utilise mobile devices such as cellular phones & personal digital assistants in order to take charge of their learning without being tethered to the Internet at all times. One alternative is a system, which utilises client software together with server-side technologies in order to download a range of tools/content, which the user can then possess on their hard drive.

As yet there are few, if any, client-side PLEs, but the argument is that third-party vendors will emerge, & that these programs will enable users to download content & services from a variety of institutions & organizations. One scenario is for a user to not only connect with a university LMS on a regular basis, but also be able to automatically connect to workplaces, newspapers, magazines, & user-chosen sites providing a single familiar interface. The metaphor here is that of Windows software updates which are currently commonplace in the home & office.

The second approach, already begun, uses ordinary familiar browsers to connect to sophisticated Web servers & applications. An example of this approach is the ELGG community, which bears some resemblance to Facebook coupled with a LMS. The argument here is that there is already a number of evolved PLE-like environments & that educators can select the best aspects of each site for use in their courses. Students could select from various blogs, wikis, forums, podcasts, email, chat & archiving sites (see Chatti, *et al*, 2010). If an institution was to lose its LMS access due to hardware or network problems, then the system could continue to work, without disruption to student access. One of the major problems to this system would be the multiple usernames/passwords & interfaces that students would need to accustom themselves to. Such a collection of websites are not scalable across large institutions especially where assessment depends on reliable & transparent access.

Finally, some argue that the PLE is already here in the form of portable laptops, which many students now carry to & from home, work & institution (see Tu, *et al*, 2012). The laptops have large hard disks & contain all the necessary software to access libraries, databases, LMSs & social networks. Many use the Google desktop, which allows searching, & retrieving using the familiar Google interface. All manner of files, media, & content can be downloaded using Google alone. Sophisticated users know how to make very efficient use of Internet services & may not embrace new client or local software.

4. Faustian effects upon higher education

While research into the considerable effects of LMSs on higher education is its infancy (see Coates, James & Baldwin, 2005), the possible consequences of PLEs have not been imagined by most higher education administrators. It is most probable however, that many of the effects of LMSs are equally applicable to PLEs. It is heretical but necessary to say that all technology has both good & bad effects. The development of the automobile, television, the Internet, even the printing press are all examples of technologies which have caused widespread & permanent changes – both positive & negative - to society as a whole. One view is that all technological change is a Faustian bargain where we gain some benefits

over previous methods, but where we always lose something in the process (Postman, 1995; Sclove & Scheuer, 1995).

4.1. The Educational Experience

Ostensibly most students attend higher education institutions in order to learn, but anecdotal experience describes student attendance more in terms of personal interest & motivation (Moore, Armstrong & Pearson, 2008) & that engagement is a major component of ratings of teaching effectiveness (Beran & Violato, 2009). Students also regard attendance in class as a crucial factor in passing a course & obtaining good grades (Burns & Ludlow, 2005). Since the majority of undergraduate students come straight from a highly structured & didactic secondary school system, the vast majority are not prepared for the independent learning celebrated by some higher education optimists. In reality, most undergraduate tertiary students prefer an educational experience that is somewhat similar in structure to secondary school but contextualised in a more relaxed environment without uniforms, bells or disruptions.

Several years ago, the author gave Communication students at the University of Western Sydney, the option of predominantly attending the unit, 'Electronic Research Methods' via the dedicated website, which contained exactly the same content as the traditional face-to-face sessions. Most students were overjoyed at this freedom & commented on the forward thinking nature of the unit. Attendance at lectures & tutorials was not compulsory so many students took the opportunity to cut classes. Over 34 per cent of students failed in that particular year mainly due to missing deadlines or failing to submit compulsory assessment items. When attendance was made compulsory again, a year later, the failure rate dropped to normal levels (around 10 per cent).

The utilisation of a PLE as the main method of learning would markedly change the educational experience from one of familiar & ordered structure to an amorphous virtual experience. Having to use a PLE would oblige students to forge their own networks, to make unique connections & become overnight autonomous learners. Students would have to forsake their previously safe & protective timetable of units & attendance & embrace unfamiliar territory, replete with a range of online distractions, which are completely alien in a traditional classroom. It is a mistake to think that all our students are computer literate, & an even larger mistake to think that the computer literate ones all currently inhabit Facebook or use Twitter. While there are compelling figures for social networking usage, the statistics do not tell the entire story with many students (especially males) eschewing social networking sites (see <http://www.insidefacebook.com/2010/01/04/december-data-on-facebook%E2%80%99s-us-growth-by-age-&-gender-beyond-100-million/>).

One analogy is that of health & fitness gyms. People visit gyms in order to focus on their fitness & perform exercises, to be inspired by trainers or partners, & not to be distracted by family/friends or a range of other domestic diversions. When people visit the gym, they generally concentrate on nothing else but exercise, & they usually accomplish their goals. Many people are incapable of exercising at home in the same manner as at the gym, even if they own professional equipment (Rigby, 1993). The separation of home & gym leads to separate behaviours & expectations of the two locations. The problem with allowing students to study using a PLE is that the location of study is loosely defined. University work can be studied anywhere there is an Internet connection. Thus, study becomes something that can be done at any time of the day, & is not given sufficient priority by students who are often juggling work, family, personal lives & study.

4.2. The Teaching Experience

A widespread PLE with a critical mass of users has the potential to radically change higher education teaching in similar way to LMSs. For example, due to considerable financial pressures five years ago,

many Australian universities reduced face-to-face contact hours by removing expensive tutorials &/or lectures, & transformed the teaching role from that of leading discussion, to uploading readings to Web pages. The LMS was the fallback mechanism, by which the higher education institution maintained quality control in the face of diminishing contact hours & possible student dissatisfaction. However, LMSs have encouraged mainly one-way communication albeit with copious quantities of online resources placed online in the hope that students will eventually consume them. Although there are exact records of class attendance, no such records are taken of students' consumption of these materials. Moreover, what interactivity exists is usually in the form of discussion forums, which place undue emphasis on the teacher/facilitator to inspire & lead.

The LMS experience has been very successful from the institutional point of view. The LMS creates a sense of order & tidiness to units & courses that often had evolved over the years, by independent teachers working in isolation. By controlling the main access point to online resources, the administration centralizes all its course material resources under one roof, & appears to capably manage its teaching staff, & cater for its students at the same time. The LMS also becomes the repository of academic intellectual property, which it owns & has copyright control over. While many problems of LMSs are now acknowledged, most higher education administrators will not easily give up the comfort that LMSs have afforded them for the past decade.

The addition of PLEs will certainly change this situation. A PLE is a high risk gambit on the part of institutional management because it places the student at the centre of what passes for learning. That is, the institution will no longer be in charge of the exact content a student studies. PLEs are revolutionary insofar as they treat students as self-motivated, self-determining, fully functioning adults. What then is the role of the institution, & the teacher? The teaching role will eventually become one of facilitation, with teachers having to locate, disseminate & manage online resources such as readings, wikis, forums, & chats. Staff-student ratios will most probably increase with teaching staff being responsible for less face-to-face hours, but more consultation, mentoring & leading of virtual discussions. There are signs this is happening already with the large emphasis placed upon e-learning in terms of audits, training courses & student demand.

4.3. Loss of Employment in Higher Education

There is some debate over whether technological change is evolutionary or revolutionary (Mark, 1987). Advocates of the former view are optimists & argue that technology is ultimately beneficial for all of society & that it creates more jobs than it displaces. The pessimistic view is that much technological change is disruptive of the normal evolutionary upgrading of industrial & clerical processes & that today, change is proceeding at a faster rate than previous periods in time resulting in many thousands of jobs being lost, never to be replaced. There is a third view, which ignores the increase-decrease argument & focuses solely on statistics. This view concludes that lower-skilled jobs (e.g. factory, rural) are declining, & that higher-skilled, more professional jobs are on the rise mainly due to the requirements of using new technologies. Whether new technology produces a beneficent effect is usually best decided on a job by job basis (Weaver, 1987).

One of the major casualties of the advent of desktop publishing was the printing industry. Computers & software made working with metal type totally unnecessary & this led to the demise of a range of employment positions which have simply disappeared from the employment landscape. A whole industry is now outdated, with many of the manual typesetting skills being still highly valued by computer-based typesetters.

At several Australian universities, as with other institutions, the entire internal reprographics sections

have been axed because of supposedly low demand for printed materials. Previously, every student needed to receive a paper-based copy of the subject outline, & often, printed notes & readings. Students now receive only the Web address of the subject outlines & learning guides on the LMS. The printing of notes & readings has been tendered out to commercial printing houses, & the net result is greater expense for students, who must pay commercial rates for their educational materials, & poorer quality readers in terms of paper & print quality. With the advent of PLEs, the contribution of printed notes & readings will most probably diminish even further making surviving in-house printing departments within higher education institutions completely redundant.

Libraries are another area of concern due to falling demand for access to printed books & journals. Under successive Australian Liberal government budgets from 1996 to 2007, higher education library staff & funding for books in many institutions decreased although student enrolments expanded. More recently, under a Labor government, the popularity of online databases & low demand for books has led to more redundancies. At one Sydney university, one of the campus libraries has installed dozens of computers & removed its bookshelves almost completely from the ground floor of the building. The Internet-enabled computers can access the library catalogues, electronic databases, & the LMS, but most students use the computers to access Facebook, email & chat systems.

This networking experiment has resulted in increased usage of the library, & ensured job stability. However, the facility no longer resembles a place of study with students inhabiting the computers & holding group discussions, both real & virtual, with their friends. The environment more resembles a “shopping mall” than a library, one student remarked. The attraction of dozens of free computers in the one location has apparently turned the library into the community meeting place for the institution, & this in turn has generated mass social interaction & accompanying noise. Security staff now patrol the library on a regular basis, in order to remove loud, & raucous groups who seem to be enjoying themselves too much. Could this also be the fate of students using socially networked PLEs in close proximity?

5. The mistaken Facebook analogy

PLE advocates frequently point to the incredible popularity of MySpace & Facebook applications with young people over the last seven years. The number of users of these social networking sites can now be counted in the hundreds of millions worldwide with no sign of abating. Organisations, advertisers, public relations bureaus & educational institutions have jumped on the bandwagon – having a Facebook presence is almost as essential as having a website. The question is whether a popular form of social networking is really the best analogy for people studying & learning.

Scholarly study of social networking services such as Facebook & MySpace is a relatively new area of research, given the newness of the technology & changing tastes in the userbase. Selwyn (2009) presents an interesting, if unremarkable analysis of 612 students’ usage of Facebook at a UK university. Selwyn concluded that educational & university related message were a small minority (4%) of the 68,000 postings during an 18-week period. The majority of the postings concerned ordinary day-to-day themes such as leisure, entertainment, paid employment, interpersonal relationships & home life. Educational issues do not warrant much discussion, even in passing, in students’ social lives. This surely is to be expected - one’s social life is not the same as one’s student life. Why would anyone expect students to use Facebook for discussing educational issues?

The underlying assumptions of this study highlight a serious error of judgment on the part of Facebook advocates. Such advocates who regard Facebook as a pedagogical model are technological determinists who view the popularity of social networking in terms of the program itself. Advocates fail to understand

that the popularity of social networking comes about through human needs being satisfied in a timely, efficient & convenient manner. Needing to stay in touch, curiosity, friendship, humour, affiliation, self-esteem & many other social needs are being satisfied on a regular basis by using social networking services. However, fulfilling educational needs are not easily accomplished through Facebook. These needs are usually best fulfilled by finding mentors or colleagues, who motivate & support in one to one, real life situations. Displaying one's ineptitude by seeking educational advice on Facebook is likely to lead to low self-esteem & possible public ridicule.

Despite its popularity, Facebook has been the subject of continual controversy since its inception. The Wikipedia site (http://en.wikipedia.org/wiki/Criticism_of_Facebook) lists countless issues critical of the social networking giant. Especially problematic are privacy concerns, member safety, the use of advertising scripts, data mining, & censorship issues. Many of the user pages have been criticized because of highly controversial content such as holocaust denial, pro-anorexia, & obscene materials. Facebook itself has been successfully sued on a number of occasions for violations of intellectual property rights.

One of the most significant risks for users is that of being bullied, stalked or even killed. There have been numerous incidents showcased in the media where individuals have been bullied online using Facebook, or where groups have formed Facebook profiles on order to attack & abuse other people. On 21 Aug, 2009, an 18 yr old English girl was sentenced to 3 months after being found guilty of bullying one of her classmates on Facebook. Some have claimed that Facebook's lax privacy settings & the copious amounts of personal data can lead to cyberstalking. Burglars have used Facebook profiles to ascertain when people are going on holidays & so easily gain entry to their homes. Such stalking incidents are not uncommon - the author once taught a student who had posted personal details on a Web page, only to have received anonymous telephone calls from someone who had viewed her profile, & wanted to meet up in secret. There have also been several cases where people have been murdered after meeting first on Facebook.

6. Conclusion

All of the problems (perhaps more) associated with social networking sites, are equally possible on an officially endorsed PLE. The sheer volume of potential data would certainly inhibit student material being checked or moderated. One contentious issue specific to higher education is determining what an institution does with the PLE data from a graduating student? Is it deleted or left accessible? One argument is that it needs to be kept for the sake of the student's lifelong educational career, or when the student returns as a graduate student. By establishing a PLE, the institution might possibly provide the means by which students can criticize & defame courses, other students, & teaching staff, ultimately damaging its reputation. LMSs entail no such ability to publish material, & must regarded as a much safer e-learning medium for this reason.

Freeware, shareware & commercial PLEs are beginning to enter the marketplace vying for a place in the lucrative e-learning industry. The question is whether institutions are choosing this new technology because of real & measured needs of students, or because PLEs are seen as keeping up to date & a useful tool to attract new students. Higher education must become more critical of its technological choices since once a PLE becomes the chosen medium of e-learning, then the institution will certainly have to bear the consequences.

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