APPROACHES TO LEARNING AND PERCEIVED USEFULNESS OF PERSONAL LEARNING ENVIRONMENTS[*]

J.L. Arquero[1], E. Romero-Frias[2]

[1]*University of Seville (SPAIN)*
[2]*University of Granada (SPAIN)*
E-mails arquero@us.es, erf@ugr.es

Abstract

In the past years the impact of social media in students in Higher Education has been remarkably significant (Pew Research Center, 2010). In order to exploit the potential benefits of these tools on education, we carried out different experiments using wikis and private social networks. Although the results were positive, we decided to move towards a more open approach using tools not directly linked to educational purposes. This paper reports on an experience in the use of Personal Learning Environments (PLE) to develop competences needed by students for lifelong learning. PLE is a concept that refers to the set of tools, devices, connections and networks that we used to learn. Nowadays building a digital PLE is key to achieve the goals set by the European Union.

The main objective of the paper is to analyse the influence of the approaches to learning of students in the reported effects of the PLE as well as in relevant aspects of the learning process.

245 students enrolled in a course on International Accounting participated in the experience of developing their own digital PLE. Some of the activities proposed used social networks, Twitter, blogs and wikis. The data were gathered though a web based questionnaire in two steps: 1) to obtain a priori self confidence measures regarding communication in academic tasks and web related tasks, and 2) to obtain a measure of the approaches to learning of the students and self confidence measures.

According to students' opinion, the experience was deemed as positive. In order to check the relationships between the impact of the experience and the approach to learning of students, a cluster analysis was performed. Students were classified into two groups. The cluster #1 presents low scores on deep approach and higher scores on surface approach than students classified into cluster #2.Comparing the scores obtained in all the aspects of learning between the two groups, many differences arise. Students in the deep approach group indicated a significant higher impact in all measured aspects.

Results suggest that certain type of students, more flexible and likely to manage information in their own, is able to use PLEs more effectively to learn than those who present a more pragmatic orientation focussed on passing the course.

Keywords: Collaborative learning, Web 2.0, Computer-mediated communication, Learning 2.0, Learning communities, Social Network Sites.

1 BACKGROUND

Social Web or Web 2.0 has become mainstream with the popularisation of tools such as social network and Twitter, particularly among young generations (Tapscott, 2008). The Pew Research Center (2010) reported that 95% of "Millennials" in the United States (generation born between 1977 and 1992) go online and that 83% use Social Networking Sites, such as Facebook. In Spain, the AIMC's survey on Internet users "Navegantes en la red" (October-December 2011) reports data about the usage of different networks by Internet users: Facebook 90%, Twitter 37%, Tuenti 25%, Google+ 25,5%. The use of these services is focused in leisure and social activities, although professional and learning uses increase smoothly.

Web 2.0 comprises a wide variety of tools (social networks, blogs, wikis, etc.) that facilitate the adoption of more active roles by users oriented to creating and sharing content and connexions, not

only to a passive consumption of information. Social software or Web 2.0 services are remarkably effective in connecting people and in facilitating the exchange of information, providing opportunities for improving the development of hard and particularly soft skills (Cobo y Pardo 2007).

The use of Web 2.0 in formal education is the response given by teachers and, to a minor extent, institutions to improve student engagement by proposing an educational use of these tools. This attempt needs to be assessed, as it seems to be a technological determinism behind that assumes an automatic acceptance of these tools by students in an educational context. Experience shows that students are not likely to embrace these new technological proposals if they are not accompanied by a culture change (Cole, 2008).

Nevertheless, the use of social software has lead to the creation of personalized ecosystems of tools and connections that constitutes powerful spaces for informal learning. This is where the concept of Personal Learning Environment takes shape in an Internet context. Ravenscroft et al (2011) highlight this idea: "the emergence of PLEs were themselves based on changing forms of interaction and design within the world wide web through the movement from Web 1.0 to Web 2.0."

Although the PLE could be an effective solution for informal learning in order to achieve the objective of lifelong learning, the experience reported in this study is an attempt to incorporate the PLE concept within a formal educational setting in higher education.

1.1   PLE as an open and sustainable alternative to VLE

Virtual Learning Environments (VLE) or Learning Management Systems (LMS) are eLearning platforms that have dominated technology-mediated instruction in higher education during the last decade (Moodle or Blackboard, among others). Some experiences carried out in these platforms had a very transformative impact in educational practices, although very often the virtual environment was used to reproduce traditional unidirectional practices of content transmission (Casquero 2011 quoting Conole, Oliver, Falconer, Littlejohn, & Harvey, 2007; Pallof & Pratt, 2007).

As long as VLEs are fully seated in higher education institutions, it is appropriate to contextualise the use of PLEs in this context of learning resources in order to understand better the advantages and disadvantages of each proposal.

Brown and Adler (2008) point out that VLE/LMS do not fulfil all the expectations given to them. For example, Atwell (2007) indicates that learning design is usually more focused on the institution or the course rather than on the students needs to improve learning. Also VLE/LMS constitute closed environments that generally are used to provide contents, replicating the traditional offline system, without generating opportunities to acquire competences and knowledge from experience and interaction with non-formal learning spaces (emergent learning). Nevertheless, VLE/LMS platforms are designed to facilitate management and administrative task done by teachers and also provide optimised feedback systems and privacy spaces for classroom interactions.

However, as pointed out before, Web 2.0 tools allow new pedagogical designs based on creating and sharing contents and connections in the open environment of the Web as a whole or within the huge interaction spaces created by social networks.

In order to solve these problems we decided to adopt a different approach to incorporate Web tools to education, the Personal Learning Environments (PLE). A PLE can be defined in different ways. Atwell (2007) indicates that a PLE is not an application, but "is comprised of all the different tools we use in our everyday life for learning". Nowadays, many of these tools are based in Social software that fits the learning subject's needs. Basically, a PLE is a concept that refers to the set of tools, devices, connections and networks that we used to learn. Social software (Redecker et al., 2010) is considered to be effective in developing essential skills (selecting relevant information, critically interpreting and analysing the socio-cultural context, working collaboratively, sharing knowledge, etc.). The development of a PLE based upon Web 2.0 services allow students to work in a real world context by using tools that could be used in personal basis after ending the formal course or the formal education period. The development of a PLE could contribute to achieve the purpose of lifelong learning.

The use of PLEs instead of Learning Management Systems allows the subject:

- To use for learning purposes tools that generally are used for social purposes (i.e. Twitter, blogs, social networks, etc.) (Adell and Castañeda, 2010).

- To create a sustainable environment for lifelong learning that goes beyond the formal educational period at the University (Atwell, 2007).
- To develop the student's own digital reputation (open e-portfolios) to facilitate employability.

According to Ravenscroft et al (2011), PLEs have the potential to radically transform education based on the following elements:

- a) The appropriation of technologies for learning;
- b) Changing roles for teachers in supporting and scaffolding learning;
- c) The development of Personal Learning Networks or the support of peers as 'More Knowledgably Others' (Vygotsky, 1978);
- d) A shifting locus of learning from the institution to the 'real world'."

1.2 PLE as cultural practice or technological artefact

There are two main approaches to the concept of PLE (Adell & Castañeda, 2010; Ravenscroft et al. 2011):

- From a technologal perspective, it is based in the creation of ecosystem of web services and technological artefacts. The idea of technological determinism is behind this approach. Though this technology is a powerful facilitator to change learning and educational cultures, it could also be used as a new way to perpetuate traditional models of education (Atwell, 2009).
- From a cultural and pedagogical perspective, "personalisation is rooted in the 'deep' matching and development of learners' interests, experiences and motivations with their chosen informal or formal learning trajectories that may be realized through personalised technologies within particular cultural contexts" (Ravenscroft et al. 2011).

The idea of PLE as a cultural practice obliges to question and redefine the role of teachers and students. PLEs seems to be ideal tools for informal learning, but once we try to develop this idea in a formal setting the role of teachers must move from control to facilitator of spaces for interacting, discovering and communicating.

Shaikh & Khoja (2011) describes five categories of roles that Teachers should play in using Personal Learning Environments in education:

- Instruction and learning (e.g. lecturer/instructor, demonstrator, learner, mentor, etc.).
- Use of technology (e.g. sharer, network administrator, technologist, etc.)
- Planing and design (e.g. planner, designer, programmer, etc.)
- Communication and interaction (e.g. coordinator, facilitator, connector, communicator, etc.)
- Management and administration (e.g. leader, change agent, curator, coach, etc.).

Wild et al, (2008) considers that the practice of designing the PLE could constitute an outcome of learning. This is particularly relevant in order to achieve the objective of lifelong learning (European Commission, 2008). PLEs empower learners as gives instruments to control and maintain their own learning autonomously. In this regard, Valtonen (2011) considers the capacity to self-regulate learning as crucial for the adoption of PLEs in education.

1.3 Students' approaches to learning

How students study, rather than what they study, is an area that is increasingly attracting the attention of education researchers (Arquero et al, 2010). Influential works in the area of students' approaches to learning are the empirical studies of Marton and Saljo (1976 and 1984). These studies identified two basic approaches to learning that may be adopted by students: "deep" and "surface" approaches. Biggs states: "Thus, an approach to learning describes the nature of the relationship between student, context and task" (Biggs et al, 2001, p. 137). A student taking a deep approach tries to make sense of what is to be learnt in terms of ideas and concepts. A deep approach to learning has an internal emphasis in that reality becomes visible and intelligible; the student's conception of learning is 'understanding'. In contrast a student adopting a surface approach takes a more reproductive stance seeing what is to be learnt as a series of unconnected facts that need to be memorised for regurgitation at a later date. The perceived task is to merely reproduce the subject matter at a later date, for example in an exam. This is consistent with an external emphasis concerned with the demands of assessment, where knowledge is cut off from everyday reality. It therefore follows that the student's conception of learning is 'reproducing' Gibbs (1995) notes that in general when a surface

approach to learning is taken by students it nearly always leads to poorer quality learning outcomes. This result has been confirmed by Booth et al (1999) and Duff (2004). Later on, Chamorro-Premuzic and Furnham (2008) found that approaches to learning have a significant mediating effect between ability and academic performance.

Biggs et al (2001), Fernández-Polvillo and Arquero (2012) and Kember et al (1997) and suggest the use of questionnaires measuring approaches to learning in order to assess the effect of innovation. Our reasoning flows in other direction. Given that an approach to learning describes the nature of the relationship between student and the tasks, the effect of educational innovations could be different depending on the approaches to learning of students.

2   OBJECTIVES AND METHOD

Once described the experience, the first objective of this paper is to analyse its impact in relevant aspects of the learning process. The second objective is to test the existence of differences in the reported impact due to the approach to learning taken by the student and relevant self-confidence measures.

2.1   Sample

The sample is composed of 245 students enrolled in International Accounting, an elective subject taught at the Business & Administration Degree. The vast majority of students (87%) were enrolled in the business degree, the rest in the joint degree law-business. Most students are enrolled in high courses, more than 75% in 3rd and 4th courses. By gender, the composition of the sample is 37% male, 63% female. Students age range from 19 to 32 years old, with a mean of 19. Valid questionnaires were obtained from 168 students.

2.2   Description of the experience

Supported by social practices and by institutional recommendations, we decided to use Web tools to improve an offline course on International Accounting by establishing a space to create, share and connect all type of content and relationships.

By definition a PLE is a personalized environment. Nevertheless, in order to introduce this concept within the formal context of a course, students were propose to utilize a set of commonly used Web tools that are considered to accomplished different objectives (figure 1).

Tool	Type	Use	Activities included in the final evaluation	Assessment
Facebook	Social Network	We set a private group to communicate and coordinate activities in the course.	-	-
Twitter	Microblogging (Information Network)	To disseminate information and to interact with other users.	To search and disseminate information using a particular hashtag #NCI2011.	5%
Blog	Publishing platform	To create content with a critical point of view.	To write two critical articles in the own student's blog on business issues.	10%
		The teacher's blog was used to publish activities and materials for the course.	To write a short essay about the use of the PLE.	5%

Figure 1. Web tools objectives and assessment

2.3   Instruments

The data were gathered though a web based questionnaire in two steps. The first set of questions was designed to obtain a priori self-confidence measures regarding communication in academic tasks (6 items) and SNS related tasks (14 items). This questions were designed to be answered from 0, no confidence at all, to 10 total confidence, being 5 just acceptable. This scale is used due to the familiarity for the students of this range of assessment (identical to the one used in the grade system).

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The first instrument also included the N-SPQ 3f, a questionnaire designed to measure the approaches to learning of the students. This instrument is a modification of the reduced version of the SPQ-3f by Fox et al (2001) adapted by Fernández y Arquero (2011).

This first part of the questionnaire was distributed during the first week of the course.

The second set of questions is based on the instrument used by Arquero and Romero-Frías (2012) and was designed to obtain information on the impact of the innovation in relevant aspects:

- Active learning (7 items)
- Collaborative learning (11 items)
- Content learning (4 items)
- Communication skills (4 items)
- Critical thinking (3 items)
- General assessment (4 items)

The questions are to be responded in a 5 points Likert scale from 1 total disagreement to 5, total agreement, being 3 the neutral point. Scores on individual items were used to build additive scales for each aspect assessed. In order to allow comparisons, those scales range from 1 to 5. This part of the questionnaire was administered once the course was ended.

3   RESULTS

An overwhelming majority of students had previous contact with SNSs. 95% indicated that they had a Facebook account before the course, and close to 50% access this account at least once a day. This percentage rises to 96% when the question points to the Internet in general terms. About 60% of students used a general SNS previously for academic purposes, although 40% never used Facebook or Tuenti for such tasks.

The relevance of laptops and mobile devices is increasing rapidly: 92% of students have a laptop and 52% a smartphone with Internet access.

Regarding the impact of the innovation in relevant aspects of the learning process, in general terms, the experience was deemed very positive by students in all aspects covered in the questionnaire. As table 1 shows, students reported a positive impact of the experience in all the aspects assessed. Use as many sections and subsections as you need (e.g. Introduction, Methodology, Results, Conclusions, etc.) and end the paper with the list of references.

Table 1. Impact of the innovation on learning. Descriptive statistics.

	Active learning	Collabor. learning	Communic. skills	Content learning	Critical thinking	General assessm.
Valid	168	168	168	168	168	168
Missing	77	77	77	77	77	77
Mean	3.8	4.0	3.6	3.7	3.8	3.9
Std. Dev.	0.7	0.5	0.6	0.7	0.5	0.7
t-test sig.*	.000	.000	.000	.000	.000	.000

* t-test comparing the mean against the neutral point (3)

SNS and other tools integrated in the PLE are expected to have a positive impact on collaborative aspects of learning. The results support this expectative (mean: 4). Analysing in depth the component of this score (table 2), students indicated a very positive impact due to the possibility of learning from other students: from the opinions and contributions and by getting questions solved by other students.

Table 2. Collaborative learning items. Descriptive statistics

The tools used and activities developed...	Mean	S.D.
- Helped us to solve questions and doubts about the subject to another students.	4.42	0.60
- Allow all the members of the class to benefit from the contributions and opinions made by the students.	4.39	0.62

- Make easier to approach the teaching staff to get questions and doubts about the subject solved.	4.38	0.72
- Allow sharing easily other interests (academic or personal) with other classmates.	4.21	0.74
- Help to the diffusion and sharing of our own ideas and points of view to the rest of the group.	4.15	0.69
- Facilitate the teamwork of the groups.	4.08	0.73
- Helped us to better communicate with the classmates.	3.92	0.83
- Helped us to learn from and consider the views and opinions of other students on a certain topic.	3.89	0.64
- Allow an easier coordination with other students for another activities out of the subject (v.g. tasks or papers for another subjects).	3.86	0.77
- Helped to get in touch with classmate that otherwise we could not meet.	3.60	0.91
- Helped to adopt a more proactive attitude opening links with classmates.	3.52	0.86

The possibility to access easily to the teaching staff is also highly valued.

The second question aimed to investigate whether there was any influence of the approaches to learning of the students and the perceived effect of the innovation.

In order to check these relationships a cluster analysis was performed. Students were classified into two groups, according to their approaches to learning (table 3).

Table 3. Final clusters centers

	Cluster	
	#1	*#2*
Deep approach	15.33	21.79
Surface approach	14.33	11.10

The cluster #1 (n: 64) presents low scores on deep approach and higher scores on surface approach than students classified into cluster #2 (n: 75). In general terms, students in cluster #2 present a more appropriate approach to learning, in comparison with their counterparts.

Comparing the scores obtained in all the aspects of learning between the two groups, many differences arise (table 4).

Table 4. Impact of the innovation on learning by cluster

		N	Mean	S.D.	t-test sig
q_active	1 surface	64	3.5848	.74022	.000
	2 deep	75	4.0286	.46202	
q_colabor	1 surface	64	3.9105	.44639	.000
	2 deep	75	4.1903	.38603	
q_comun	1 surface	64	3.4375	.61560	.000
	2 deep	75	3.8100	.55726	
q_content	1 surface	64	3.5156	.70833	.000
	2 deep	75	3.9200	.55012	
q_critical	1 surface	64	3.6563	.58484	.001
	2 deep	75	3.9689	.44913	
q_val_gral	1 surface	64	3.6445	.84492	.000
	2 deep	75	4.1300	.53170	

Students in the deep approach group indicated a significant higher impact in all measured aspects.

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Therefore, students that present an a priori more appropriate approach towards learning are also more likely to obtain a better result from innovations.

Although, in general terms, students indicate an adequate self confidence in performing communication and SNS related tasks, students in the deep approach group indicated higher self confidence in communication tasks, questions related to blog and wikis tasks (table 5).

Table 5. Self-confidence scores by cluster

		N	Mean	t-test sig
SC_comm	1 surface	68	6.6225	.001
	2 deep	78	7.2821	
SC_facebook	1 surface	68	7.0662	.165
	2 deep	78	7.4776	
sc_twitter	1 surface	68	7.5147	.063
	2 deep	78	8.1923	
sc_blog	1 surface	68	6.3775	.005
	2 deep	78	7.3889	
sc_wiki	1 surface	68	6.4118	.031
	2 deep	78	7.1410	

There were no differences in the perceived SC about general purpose SNS tasks.

Analysing in depth the communication related items (table 6), except from con_2 "take good notes in classes" there are significant differences in the SC associated to more technical aspects of communication between students classified in deep and surface approach groups.

Table 6. Communications self-confidence items by cluster

		N	Mean	t-test sig
Con_1 Write a one or two sentence answer to a given question	1 surface	68	6.71	.001
	2 deep	78	7.64	
Con_2 Take good notes in classes	1 surface	68	7.60	.884
	2 deep	78	7.64	
Con_3 Write a one or two page essay in answer to a given question	1 surface	68	6.18	.007
	2 deep	78	6.94	
Con_4 Write a report on an accounting problem or topic	1 surface	68	5.38	.004
	2 deep	78	6.23	
Con_5 Write a well organised and sequenced essay with good introduction, body and conclusion	1 surface	68	6.96	.032
	2 deep	78	7.51	
Con_6 Adapt the stile to the king of writing and to the specific audience	1 surface	68	6.91	.000
	2 deep	78	7.73	

Finally, examining actual academic performance, students at deep approach cluster obtained better results in the exams (7.1 versus 6,2; t-test sig: 0.004).

4 DISCUSSION

The main aim of the present paper was to assess the impact of using a PLE in an offline course on International Accounting. The PLE include a selection of digital tools that fits the learning subject's needs.

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The results are indicative of a positive impact in all the aspects of learning measured. This impact is similar to the results obtained using specifically designed SNSs (Arquero & Romero-Frías, 2012) with the advantage that general purpose tools are available outside the academic context and most of the students have previous experience (at least with some of them). This previous experience could act as a facilitator that allows obtaining similar results in comparison with specifically designed tools where students have no previous experience.

When comparing results of students presenting different approaches to learning, second objective of the paper, several differences appear. Deep approach students tend to consider the educational experience as having a higher impact in terms of acquisition of competences, present higher levels of self confidence in their own capabilities (specially in communication tasks) and finally obtain better grades in the exam. In this way they could have an active role in the learning process not as a mere consumer of content but as a participant.

Further evidence on the impact of ICT in education is needed, particularly in the use of social software and PLE approaches to education.

REFERENCES

[1] Adell Segura, J. & Castañeda Quintero, L. (2010) "Los Entornos Personales de Aprendizaje (PLEs): una nueva manera de entender el aprendizaje". En Roig Vila, R. & Fiorucci, M. (Eds.) Claves para la investigación en innovación y calidad educativas. La integración de las Tecnologías de la Información y la Comunicación y la Interculturalidad en las aulas. Stumenti di ricerca per l'innovaziones e la qualità in ámbito educativo. La Tecnologie dell'informazione e della Comunicaziones e l'interculturalità nella scuola.Alcoy: Marfil – Roma TRE Universita degli studi

[2] Arquero, J.L., González, J.M., Hassall, T., Joyce, J., Germanou, H. & Asonitou, S. (2010). "The Approaches To Learning Of European Accounting Students". EuroMed Journal of Business. Vol: 5-3, 345-362. Doi 10.1108/14502191011080854

[3] Arquero and Romero-Frías (2012). "Personal learning environments and approaches to learning". British Accounting and Finance Association. Accounting Education SIG Annual Conference. Sheffield, 21 – 23 May 2012.

[4] Attwell, G. (2007). "The Personal Learning Environments - the future of eLearning?" eLearning Papers, 2(1).

[5] Attwell, G. 2009. Personal Learning Environments: The future of education?, SlideCast, available at: http://www.pontydysgu.org/2009/01/personal-learning- environments-the-slidecast/

[6] Biggs, J., Kember, D. and Leung, D.Y.P. (2001). The revised two-factor study process questionnaire: R-SPQ-2F. British Journal of Educational Psychology. 71 (1) 133-149

[7] Brown, J.S. & Adler, R.P. (2008). "Minds on Fire: Open Education, the Long Tail, and Learning 2.0". Educause Quarterly, 42(6):16-32.

[8] Booth, P, Luckett, P and Mladenovic, R (1999). The quality of learning in accounting education: the impact of approaches to learning on academic performance. Accounting Education 8 (4), 277–300

[9] Casquero, O., Portillo, Javier, Ovelar, R., Romo, J. & Benito, M. (2011). Evaluating the affordances of an iPLE Network in an undergraduate level online course. The PLE Conference 2011, Southampton.

[10] Cobo Romaní, C. & Pardo Kuklinski,H. (2007). Planeta Web 2.0. Inteligencia colectiva o medios fast food. Grup de Recerca d'Interaccions Digitals, Universitat de Vic. Flacso México.Barcelona / México DF.

[11] Cole, M. (2008). Using wiki technology to support student engagement: lessons from the trenches. Computers & Education, 52(1), 141-146.

[12] Conole, G., Oliver, M., Falconer, I., Littlejohn, A., & Harvey, J. (2007). Designing for learning. In G. Conole & M. Oliver (Eds.), Contemporary perspectives in e-learning research: themes, methods and impact on practice (pp. 101-120). London: Routledge.

ARQUERO, J.L. & ROMERO-FRÍAS, E. (2012). "Approaches to learning and perceived usefulness of Personal Learning Environments". *Fifth International Conference of Education, Research and Innovation*. Madrid, 19-21 noviembre 2012.

[13] Pew Research Center (2010). Generations 2010. Retrieved from Pew Research Center (14 February 2011): http://pewinternet.org/Reports/2010/Generations-2010.aspx

[14] Chamorro-Premuzic, T. and Furnham, A. (2008). Personality, intelligence and approaches to learning as predictors of academic performance. Personality and Individual Differences 44 (2008) 1596–1603

[15] Duff, A. (2004). Understanding academic performance and progression of first-year accounting and business economics undergraduates: the role of approaches to learning and prior academic achievement. Accounting Education 13 (4), 409–430

[16] European Commission (2008). The use of ICT to support innovation and lifelong learning for all - A report on progress. Brussels: European Commission. Retrieved from European Commission website (31 July 2009): http://ec.europa.eu/education/lifelong-learning-programme/doc/sec2629.pdf

[17] Fernández Polvillo, C. y Arquero, J.L. (2012). "Evaluación de Innovaciones y Enfoques de Aprendizaje. Presentación Preliminar de un Instrumento de Medida". En: Buitrago Esquinas, E. y Sánchez Franco, M.J. (editores): Espacio Europeo de Educación Superior (EEES).Innovaciones Metodológicas en la Economía y la Empresa, Edición Digital @tres, S.L.L., Sevilla, pp. 223-234.

[18] Fox, R., McManus, I.C. & Winder, B. (2001). "The shortened Study Process Questionnaire: An investigation of it structure and longitudinal stability using confirmatory factor analysis". British Journal of Educational Psychology, 71: 511-530.

[19] Gibbs, G. (1995) Assessing Student Centred Courses, Oxford: Oxford Centre for Staff Development

[20] Kember, D., Charlesworth, M., Davies, H., McKay, J. & Stott, V. (1997). Evaluating the effectiveness of educational innovations: Using the study process questionnaire to show that meaningful learning occurs Studies in Educational Evaluation, 23(2) 141-157.

[21] Marton F. & Saljo R. (1976). "On qualitative differences in learning - 1 Outcome and process". British Journal of Educational Psychology, (46): 4-11.

[22] Marton F. & Saljo R. (1984). "Approaches to learning", in Marton et al (Eds.) The Experience of Learning, Scottish Academic Press, Edinburgh.

[23] Pallof, R.M., & Pratt, K. (2007). Building on-line learning communities: effective strategies for the virtual classroom. San Francisco, CA: John Wiley & Sons.

[24] Ravenscroft, A., Attwell, G., Blagbrough, D. and Stieglitz, D. (2011). 'Jam Hot!' Personalised radio ciphers through augmented social media for the transformational learning of disadvantaged young people. The PLE Conference 2011, Southampton.

[25] Redecker, C., Ala-Mutka, K., Bacigalupo, M., Ferrari, A. & Punie, Y. (2010) Learning 2.0: The Impact of Web 2.0 Innovations on Education and Training in Europe (Final Report). Institute for Prospective Technological Studies. European Commission. Retrieved from: http://ftp.jrc.es/EURdoc/JRC55629.pdf

[26] Shaikh, Z & Khoja, S (2011). Role of Teacher in Personal Learning Environments. The PLE Conference 2011, Southampton.

[27] Tapscott, D. 2008. Grown Up Digital: How the Net Generation is Changing your World. McGraw-Hill.

[28] Valtonen, T. & Kukkonen, J. (2011). Students Readiness for Personal Learning Environments. The PLE Conference 2011, Southampton.

[29] Vygotsky, LS, (1978), "Mind in Society - The Development of Higher Psychological Processes." Editors: Michael Cole, Vera John-Steiner, Sylvia Scribner, and Ellen Souberman, Harvard University Press, Massachusetts, USA.

[30] Wild, F., F. Mödritscher, & S. Sigurdarson (2008). Designing for Change: Mash-Up Personal Learning Environments. eLearning Papers 9(2008): 1-15, http://www.elearningeuropa.info/out/?doc_id=15055&rsr_id=15972 (accessed March 24, 2011).