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7th Research Workshop October, Leuven

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András Szűcs, Ulrich Bernath

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Introduction

One of the important missions of EDEN is to support the exchange of academic and professional experience, to promote navigation and information reach on the rapidly evolving scene.

EDEN is organising since 1992 annual European conferences for open, distance and e-learning and also bi-annual thematic research workshops and Open Classroom conferences on learning innovation for school level e-learning.

The EDEN conferences have become major events in Europe, with increasing attendance from other continents. They are based on collecting best practice: the papers presented and published in the Proceedings have been serving as relevant resources for the professional community.

The integrating approach of the conferences helps to consolidate the knowledge and to build the international community of professionals. EDEN conferences have been useful in capitalising on the knowledge of proficient actors and also in assisting in the introduction of newcomers.

Research in open, distance and e-learning is indispensable to provide information for development, decision-making and quality of products and services. Even more this is the case as many changes occur and the pace as well as the extent of innovation often seem to be dramatically fast and wide.

The EDEN Best Research Paper Award was launched in 2008. and it is granted at EDEN's Annual Conferences as well as at EDEN's bi-annual Research Workshops. A high quality standard selection process guarantees the branding of the award for scholarly conference papers in the field of open, distance and e-learning.

The selection process takes place in collaboration with the Ulrich Bernath Foundation for Research in Open and Distance Learning and is supported by a Jury, nominated by the Foundation and approved by the EDEN Executive Committee.

The finalists of the Best Research Paper Award Competition at the EDEN 2012 Annual Conference in Porto in June and the 7th Research Workshop in Leuven, have been invited to further elaborate and re-submit their contributions. The present selection contains the enhanced versions of these papers.

In co-operation with the Ulrich Bernath Foundation, our aim is to continue this tradition in order to provide visibility to quality research in the field.

Dr András Szűcs
Secretary General, EDEN

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Chair, Board of Trustees
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for Research in Open and Distance Learning

Budapest – Oldenburg, November 2013

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Table of Contents

Reconsidering "Gen Y" & Co: From Minding the Gap to Overcoming it

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Best Research Paper Award Winner

Abstract

The paper moves from the well-known debate concerning the existence of a *generation of digital(-ised) learners*, also known as "digital natives" or "generation Y" (or similar ones).

In paragraphs 1 and 2 the debate is presented in its complexity, focusing the attention on the evolution of the idea behind this approach, and highlighting different voices within the discussion.

The third paragraph shows results from a research project (named "Learners' voices") run in the academic institutions of Ticino (Switzerland) which ask for a critical re-consideration of the "generational approach" in the field of educational technologies.

Finally, in paragraphs 4 and 5, the text offers some research considerations and lead to open conclusions: it is likely to consider that focusing on the gap is pedagogically and anthropologically useless, even the use of labels can be misleading, and the neutral "Learners of Digital Era" is recommended. Educators, teachers, professors, and instructional designers have rather to work with the *media convergence* concept, in order to overcome the gap and to empower the teaching and learning process in the twenty-first century.

Keywords: Learners of Digital Era; Digital Natives; Generation Y; Digital Learners; Pedagogy for the 21st century.

Introduction: 20 years of "mind the gap!"

One fundamental step to close the gap between "generation Y" and adult learners passes through an adequate comprehension of such a gap. In the last decades the debate was particularly focused on "minding the gap"; in the European year of "solidarity between generations" it is also necessary to understand how to move further.

It is remarkable that in 2011 we had "birthdays" of two expressions which led the discussion about education and new media: in 1991 "generation Y" was invented (Strauss & Howe, 1991), and in 2001 "digital natives" entered the debate (Prensky, 2001a; Prensky, 2001b).After more than twenty years of discussions, it is now time to overcome an understanding of the issue which is likely to replicate the gap...

This paper is intended to show why, both in theory and in practice, there are many good reasons to adopt a fresh perspective. Next paragraph will briefly outline the debate presenting main scholar voices, while par. 3 will present and discuss data from a research run, from winter 2008 to summer 2011, in academic institutions of Ticino (Switzerland).

The gap in theory

We can affirm that – since the 80s – the massive advent of Information and Communication Technologies (ICTs) has significantly impacted people everyday life: people grown up in such full-of-media environment have developed an unchallenged familiarity with ICTs. Furthermore, it is evident how much learning and teaching can profit and be empowered by new technologies. Due to that, many observers of the knowledge society have suggested the existence of a *generation of digital(-ised) learners*, such theorization has gained a great success, and it has been adopted by scholars, educational professionals, teachers, journalists...

Looking at the evolution of the debate, it is possible to identify three approaches to that generational gap due to the different level of adoption of new technologies in everyday life and, as a consequence, in educational experiences (Rapetti, 2011): the *enthusiasts*, the *concerned ones*, and the *critics*.

Many voices, three views

Before getting into a schematic presentation of the three views, it is important to make it clear that this is just one possible systematization of a very extensive literature about the issue, and it is outside of the scope of this paper to provide a comprehensive review of the concerned literature (see, for instance: Barrio et al., 2010; Ferri, 2011; OECD-CERI, 2012; Rapetti & Cantoni, 2010; Schulmeister, 2010; Rapetti & Pedrò, in press).

To get an idea on how many voices populate the debate; it is interesting to know that the cohort of young people received the following labels: Boomer babies; Boomlets; Born digital; Digital kids; Digital Natives; Digital residents; Echo Boom; Gamers; Gen.com; Generation Next; Generation Tech; Generation Why; Generation XX; Generation Y; Generation 2000; Grasshopper Minds; Homo Zappiens; Instant-Message Generation; Millennials; Net generation; Net-agers; Next Great Generation; Nintendo Generation; Prozac Generation; Screen Generation; Coddled, adrift, and slackers; Dumbest generation; Narcissist; Net addicted (to pointless activities); Shameless; The ones who click (instead of thinking); The ones who take Google as Gospel; Violent; online bullies…

The three views are a sort of compass to move within such a large and complex territory:

1. *Enthusiasts* (about the impact of ICTs on learners` skills and behaviours) are firmly convinced that digital technologies are making the generation of younger learners a very skilled one. Within them it is possible to further distinguish three different approaches, depending on the observed area of ICTs' effects on learners behaviours and attitudes:
    a. The historic-sociological approach, stressing the differences between the current generation and the previous ones (e.g.: Howe & Strauss, 1991);
    b. The psycho-cognitive approach, claiming that everyday usages of ICTs have changed the cognitive abilities of young people (e.g.: Prensky, 2001a);
    c. The socio-pedagogical approach, based on the paradox "everywhere ICTs, except at schools", asking for a reform/revolution in school and university systems (e.g.: Oblinger & Oblinger, 2005).

2. *Concerned ones* accept as well this idea of a digitalized generation of learners, but focus on the potential dangerous effects, such as violence, dumbness, harassment, addiction, etc.(e.g.: Bauerlein, 2008).
3. *Critics* question the idea of characterizing the set of skills of the young generation simply in function of ICTs' usages, criticizing overgeneralizations, and requesting deeper studies and localized analyses (e.g.: Bullen et al., 2009).

In order to ensure a comprehensive and adequate perspective to the issue of *Learners of Digital Era* (LoDE), characteristics underlined by *enthusiasts* as well as concerns expressed by *concerned ones* should be considered, taking into careful consideration all the limits pointed out by *critics*, especially when it comes to requesting solid research and not just anecdotal data or overgeneralizations (Rapetti & Cantoni, in press). Such a balanced "LoDE perspective" has informed the research project named "Learners' voices @ USI-SUPSI", aimed to verify from the learners' point of view all the expectations and assumptions put over Gen Y people studying at the Università della Svizzera italiana (USI, University of Lugano), and at the Scuola Universitaria Professionale della Svizzera italiana (SUPSI, University of Applied Sciences and Arts of Southern Switzerland).

The gap in practice

It has to be said that, even if the theoretical production is enormous concerning Gen Y, for what concerns the effective knowledge of) their practices we can register a much lower number of works. Providing a solid evidence-based research about the characteristics of the *generation of digital learners* is much more complex than offering interesting but yet rather generic reflections about the future of didactics. As per today, the most appreciable contribution seems to be the New Millennium Learners research project run by OECD (OECD-CERI, 2010; 2012).

Learners' voices @ USI-SUPSI in brief

The research as a whole has been designed to combine a quantitative phase with a qualitative (quasi ethnographic) one (Rapetti et al., 2010, Rapetti & Botturi, 2013); in this paper answers to a set of relevant questions of the questionnaire are presented and discussed. Based on the protocol developed in a JISC (acronym standing for Joint Information Systems Committee, see www.jisc.ac.uk) consortium research project (JISC consortium, 2009), meant to explore the students' experience of technologies, the adopted questionnaire was structured in 25 questions, structured as follows:

1. Socio-demographic data (age, gender, course, country of origin).
2. Owned digital technologies.
3. Access to the internet.
4. Online activities and frequency of usage.
5. Most used applications.
6. The role of ICTs everyday life.
7. Learning preferences (in general and concerning ICTs).
8. The role of ICTs in studies/learning experiences.
9. eLearning perception.
10. Rationales in using ICTs for learning.

About the sampling, an anonymous self-selected sample was adopted, out of a target population of about 4500 students, 562 valid answered questionnaires have been collected; the size of the number allows sound statistical data treatments and inferences. The final sample was composed as following.

Concerning gender, we had 318 (56.5 %) female respondents and 244 (43.4 %) male. This is the distribution among countries of origin. Both USI and SUPSI have an unquestionable international attitude, mainly due to the multilinguism of Switzerland, and the proximity to Italy. Therefore, does not surprise to find Switzerland at the first place (316 people, 56.2 % of total), but a significant presence of Italians (24.9 %) and a 12.5 % of people coming from the rest of Europe (grouping Germany, France, others-EU, and others non-EU); while participating students from Africa, Americas, and Asia all together are the 6.4 % Among the respondents, 56.6 % of students attended SUPSI and 45.4 % USI. Concerning the detailed repartition in departments, the two bigger groups were students attending the Faculty of Communication Sciences at USI (25.6 %) and the Department of Business and Social Sciences at SUPSI (24.6 %).

Finally, the age variable details: the mean is 24.5 years; the median is 23 years; the age ranges from a minimum of 17 years and a maximum of 75 years. The whole was divided into three "age groups": 17 to 23 years (58.5 % of the sample), from 24 to 29 (28.1 %) and 30 and over (13.3 %). This is primarily aiming to highlight any possible differences between LoDE belonging to Gen Y – namely, born after 1980 – and the others, who had in 2009, more than 30 years. Furthermore, was interesting to offer a further comparison within the Gen Y itself (Tardini et al., 2010).

Learning preferences expressed by LoDE

In Learners Voices @ USI-SUPSI questionnaire, one of the key-questions was a grid titled "Which is your favourite strategy to learn?" (question 5.2); participants had to choose among the following options: Lectures in classroom, Individual study, Individual lesson, Printed dictionary/encyclopaedia, Multimedia supports, Online platform (eLearning), Search engines, Websites/specialized blogs, Social networking sites, Wikipedia. People were asked to indicate which strategies they preferred, and how much (a lot, fairly, a little, not at all).

The following image shows a quite astonishing result: respondents do not express a learning-style pattern digitally oriented.

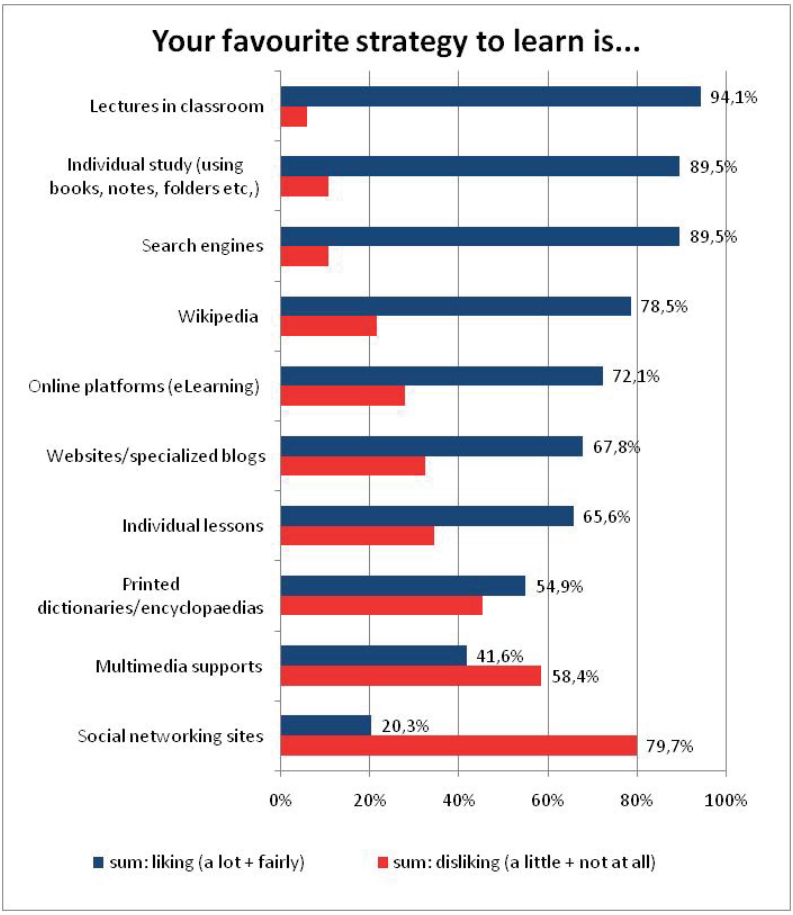

Figure 1. The favourite strategies to learn (q.5.2) – total 512 (50 missing); data expressed in %

The most important piece of information outstanding from such results is that LoDE do express a clear preference for "classical" way to learn, despite they live in a digitalized context of learning. About 9 people out of 10 prefer "lectures in classroom", "individual study", and "search engines" to learn.

If looking only at "a lot" answers, the picture does not change: in the first place there are "search engines" (57.2 %), followed by "lectures in classroom" (52.3 %), and "individual study" (50.8 %); all the other choices are preferred "a lot" by less than half of the sample. LoDE, according to such data, are likely to be more analogue-styled than digital-styled in learning behaviours.

Likewise, at the bottom of the list we find "multimedia supports" and "social networking sites" (in this last case "not at all" accounted for 48.0 % of respondents); such a rejection of social networks suggests that an expectation of a learning transfer from informal to formal learning experiences would not be that solid. An important reflection must be done about the rankings of search engines and Wikipedia versus printed dictionaries and encyclopaedias: it seems that the former ones have fully taken the place of the last ones, most probably because of convenience in terms of speed and cheapness.

A step beyond a simple descriptive analysis was needed, in order to investigate the corpus of assumptions related to socio-demographic aspects expected to influence the adoption and/or the preference of digital technologies in education. Indeed, a relevant part of the literature by *enthusiasts* claims that being younger is a strong predictor of ICTs-attachment for learning needs.

Beside question 5.2, already presented, questions 4.4 and 8.1 have been useful to such enquiry. Question 4.4 was a grid in which respondents had to express "how much ICTs improved" the following aspects of life: The way you practice your hobby or interests, The way you do your student's tasks, The way you learn, The way you have relationships with your friends or your family, The way you share your ideas or creations, The way you collaborate with your peers. Possible answers were: a lot, fairly, a little, not at all. Question 8.1 required respondents to express their agreement/disagreement about a list of statements concerning eLearning and the importance of ICTs in educational experience: eLearning is an important element of my courses, Without eLearning I would be unable to study, eLearning is one of a number of important components of my courses, eLearning makes courses more enjoyable, My university is not very smart in the way it uses eLearning, With

eLearning I interact more with other students, I find difficult to use a computer, I find difficult to use technological devices (e.g. Pda/mobile phone/mp3 player), Having access to a computer connected to the internet is a problem for me, eLearning makes learning easier for me, It would be good if there were more eLearning in my course.

Crosstabs procedure was run for all possible crossings between items of questions 8.1, 5.2, 4.1, and "age classes". In order to verify any statistical influence, 81 tabs were analysed applying Pearson's Chi-Square to check the assumed relationship; while to determine its nature Cramer's V value (converted in %) was used. Such a procedure makes it possible to answer the question: *does Age make any statistically relevant difference?* Out of 81 crossings, Pearson's values resulted significant in 8 cases, meaning "age classes" variable was proofed to have a statistical influence. Nonetheless, this influence is interesting only in two cases (highlighted in bold in the following three tables).

Table 1: Crosstabs' synthetic results "age classes" * question 4.4

The fact of being older...	...increases of...	...the likelihood to consider that ICTs improved significantly...
	0.8 %	"the way you practice your hobby or interests"
	0.5 %	"the way you do your students' tasks"
	0.1 %	"the way you learn"
	3.9 %	"the way you collaborate with your peer"

Table 2: Crosstabs' synthetic results "age classes" * question 5.2

The fact of being older...	...increases of...	...the likelihood to be more in favour of...
	0.2%	"lectures in classroom"
	0.6%	"printed dictionary/encyclopaedia"
	0.3%	"online platforms (eLearning)"

Table 3: Crosstabs' synthetic results "age classes" * question 8.1

The fact of being older...	...increases of...	...the likelihood to answer that...
	4.0%	"It would be good if there were more eLearning in my courses"

As tables show, the age factor does explain – when it does it – just a very small portion of noted differences: overall, data indicate that the older the learners, they are 4.0 % more likely to ask for more eLearning, and 3.9 % more likely to declare that ICTs impacted on the way they collaborate with their peers.

Some research considerations

It is interesting to compare the above-discussed data with similar ones, obtained replicating the same questionnaire after three years in the Università della Svizzera italiana[1] (Frick & Tardini, 2012).

Generally speaking, with regard to learning experiences

> *The perception about the contribution of ICT is positive, especially concerning academic activities: ICT have improved the way students perform their tasks (88.1 % a lot/fairly), the way they collaborate with peers (83.1 %) and the way they learn (77.0 %). As regards the activities related to private life, the contribution of ICT is considered as less important. (ibidem, p 3)*

And this consideration must be paired with the following one:

> *The ownership of a smartphone or palmtop has nearly tripled in the last few years: in 2009, 24.2 % of students had one, today they are 67.9 %. The most popular smartphone is iPhone (38.9 % of respondents owns one of it). (idem).*

In order to understand how the reality is changing rapidly. But, concerning the preferred strategies to learn, the situation has not become different at the same speed:

> *The way of learning preferred by respondents are lectures in the classroom (90.2 % appreciates it a lot/fairly), followed by the use of search engines (88.5 %), individual learning on paper (84.7 %) and learning through websites and specialized blogs (79.6 %). There is still little appreciation for social networks as learning tools (only 26.8 % appreciate them a lot/fairly, however increasing if compared to 2009: 20.3 %). In contrast, social networks are becoming increasingly popular for online communication for the study. (idem).*

Similar results ask pedagogists and scholars to offer a wise interpretation of such a scattered and complex situation. In reason of that, two recent contributions seem to be useful to observe the topic with the necessary critical detachment.

[1] It has to be said that this most recent dataset, and the subsequent report, was released after the Oporto conference.

The first one concerns people and come from research in the field of developmental psychology. Every person involved in learning experiences has to deal with a socio-educational-cultural "prism", and vertices are: the person, the other people, the learning object, and the cultural instrument (Zittoun & Perret-Clermont, 2009, p.394). But, any learning experiences – being it formal, informal, non-formal – takes place in a given "frame" of meaning (idem, p. 390). This means: i), when reasoning about ICTs and learning we must take into account all the vertices; ii) what works in a certain "frame" do not automatically can be replicated in another one.

Secondly, as recently remarked by Vìtor Reia-Baptista, when reasoning about ICTs and learning, it is necessary to distinguish between media education and media literacy, and to not confuse them with ICTs usage competence or media ability.

Conclusions

This brief account of a much wider research has proved that within the studied community of learners age does not matter at all, or explains very little, when it comes to preferences and beliefs connected with ICTs in learning, no gap exists between younger generations and their 30+ colleagues.

The image emerging from such results suggest that LoDE do prefer a quite rich learning diet, encompassing both face to face, established media and new media; only encyclopaedias and dictionaries appear to be outdated, and clearly substituted by their online counterparts, which play a major role for (quick) information search and retrieval. A very little preference for educational usages of social networks suggests, moreover, that LoDE are not ready/interested to adopt such applications for their learning in the university, maybe keeping them just for informal learning.

Of course, being "Learners' voices at USI-SUPSI" run at university institutions of a regional area of Switzerland, outcomes of our research call for further and deeper analyses meant to compare different variables; especially the ones related to differences between countries/cultures, and levels of schools.

In conclusion, such results suggest deepening studies about the *media convergence* issue (Rivoltella, 2006). Learners of digital era seem to be larger than dominant/*à la page* descriptions about them. They are not ICTs-addicted, neither techno-luddites (Cantoni & Tardini, 2010); rather they arrange the best learning environment,

adopting new and old media, in order to fit and respond to their educational needs and interests.

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Personalisation and Tutoring in e-Learning – The Key for Success in Learning in Later Life

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Abstract

The number of older adults willing to engage in learning activities after retirement is increasing substantially; along with this development the need for innovative learning concepts responding to the specific requirements of older adults is obvious. Aspects such as socio-economic variances, diverge learning tradition and capability as well as mobility constrains characterize older learners. E-learning is very suitable to cope with the high heterogeneity of older learners. Learners can learn according to the own learning pace and interests. E-learning is effective and motivating for learning in later life, if key-principles of guidance and support are fulfilled. In this article, the evaluation results of an e-learning course for older adults ('eLSe' courses) are presented. The main focus of the research was to investigate if a high level of personalization possibilities in a course can help to balance heterogeneous characteristics such as age, gender and pre-knowledge within a learner group. The key factor is the satisfaction with the course in different settings. In total, questionnaire data of 17 courses with 157 course participants was evaluated. Findings suggest that satisfaction with the courses was equally high for all age groups and for men and women.

Keywords: E-learning, older learners, learners' support, personalization, learning in later life

Introduction

The number of people aged 65 and above in the EU will almost double until 2060 (EC, 2009). 'Third age' is becoming markedly longer and technological and societal progress is accelerating; more and more older adults can potentially enter educational programs at universities or other educational institutions (Bubolz-Lutz, 2000). Though, the number of adequate course offers especially dedicated for older adults greatly underperforms the numbers of potential participants. For example in Germany 12-14 % of the older populations actually engage in educational programs (Kohli & Künemund, 2000; Friebe, 2009). For other countries the numbers are even lower (Gatzke, 2007). The situation can be seen as precarious if we consider recent research circumstantiating, that learning is a very supportive way for preventing mental and physical decay, and supporting a self-determined life. Numerous psycho-gerontologist studies have proven the positive effects of learning in later life for the maintenance of physical and mental health, for instances the WHO (2004) model of healthy live identifies activity and education as core factors of prevention from age related handicap. Learning in later life means also to support the intergenerational dialogue and to promote knowledge transfer across generations (Kolland, 2000). The most prominent question is how to promote learning in later life and which concepts to develop in relation to individual learning motives and capabilities are favored. Thus, it is important to research on:

- **Learning concepts for Learning in Later Life:** the European learning landscapes showcase a good number of isolated good practices, but there is still crucial to promote discussion, analyse a systematic and procedural way, and promote knowledge transfer.
- **Learning motives & process:** organisational, cognitive and affective processes are of equal importance for understanding the motivation and effects of learning for personal development and subsequently for the society.
- **Identify the role of Technology-enhanced Learning:** for overcoming personal as well as spatial learning barriers, and support seniors to engage in learning programs according to their specific needs.

In this paper we present research outcomes of the project 'eLSe- eLearning for Seniors', a project especially developed for satisfying concrete learning needs of seniors while respecting their very individual learning motive (the trigger), preconditions (the starting point) and assistance needs (the support demand) (Hetzner & Held, 2009). Two main research questions are discussed in this paper. Firstly, how individual

characteristics like age, gender and previous ICT experiences impact the learning process in an e-learning environment. Secondly, different support approaches based on learner satisfaction within the learning experience are compared in order to identify the best support method for the heterogenic group of older adults.

E-learning for older adults

Aside of the project eLSe, which has been continuously evaluated, some further research can be found about how older adults use e-learning to develop ICT skills. According to a recent study in Germany, already 16% of older adults use e-learning in its broadest sense for supporting self-directed learning, e.g. using online dictionaries or CD-ROMS (Bitkom, 2013) or even enroll in e-learning courses. However, the great majority of older adults still learn ICT skills in face-to-face courses, as these are widely offered in Germany (Reichart & Huntemann, 2008). In other countries like the United Kingdom, e-learning courses for older adults are more common (Kimpeler et al., 2007). Studies about the effectiveness of e-learning for older adults have shown that this can be a very good method of learning also in older age (Chu, 2010; Stoltz-Loike et al., 2005; Hetzner & Held, 2009). Though, effective e-learning courses for older adults must be designed very carefully. The learner experiences many degrees of freedom: learning in their own pace, time, place and the possibility to decide which learning contents to learn. Therefore guidance by means of a clear course concept with a good structure and manageable learning blocks is needed (Bates & Poole, 2003). Stoltz-Loike et al. (2005) emphasize the need of training tasks and tests as part of the material and Hetzner and Held (2009) stress the point that especially for older adults, communication possibilities like chat, forum and e-mail between the participants and with the tutor are extremely important. These tools support social learning, and learning in the group is essential also in e-learning environments, learners need to feel at all times that they are not alone. Additionally, support is seen as the key for success in the eLSe project (Hetzner & Held, 2009).

In the eLSe project senior citizens with none or few or basic ICT skills and competences have access to an e-learning environment fully conceived and tested to match their needs in terms of knowledge, flexibility, diversity and support. The eLSe-project supports a large number of older adults to become involved in and benefit from the information and knowledge society. The eLSe program includes two courses: basic, for older adults with no or almost no ICT knowledge, and advanced courses for those with basic ICT knowledge and interested in specific online activities and contents.

Learning takes place online in a special adapted e-learning environment. The approach was chosen due to numerous reasons. Already in 08/2006 (Held et al., 2007) and on behalf of the German Parliament, the Innovation in Learning Institute at the University of Erlangen-Nurnberg realized a systematic analysis of e-learning offers and concepts in Germany and in other European countries. The researchers at ILI have come to the conclusion that e-learning can support the very specific learning and personalization requirements and that older people are among the target groups that qualify most for technology-enhanced learning. They came up with seven key reasons for the suitability of e-learning environments for learning in later life:

1. eLearning comes to people and not vice-versa. This aspect addresses seniors' frequent mobility constraints due to physical impairments, domestic responsibilities (e.g. taking care of relatives) or living outside urban areas, where ICT- training offers are not available;
2. e-learning works best for those with variable free timeslots. The Post-professional life is often characterized by free variable daily rhythm and plenty of leisure activities. In these cases, asynchronous e-learning offers are extremely adjustable;
3. furthermore, it is a fact that, due to their life experience, many seniors are experienced in self-management and motivated to try something new, a fact that well supports the demands of e-learning;
4. e-learning enables people to choose their own learning speed, as they are not driven by others, and it enables them to repeat things as often as they wish. These aspects effectively support the changes in memory processing that occur as we get older. For example, older adults have difficulties in novel situations in which they must respond flexibly to memorize things;
5. in addition, it should be emphasized that mentoring and tutoring can be done much more individually in e-learning. A factor that again adapts to the individual needs of older adults is that
6. competitiveness and pressure to perform amongst course participants, which often is seen as rather a problem in face-to-face offers, is almost non-existent. The pressure of having to be as fast as the other participants declines extremely in virtual learning environments. This aspect is of major importance since third agers tend to have less self-confidence and are more afraid to make mistakes. In learning processes, fear leads to increased activity in the amygdaloidal nucleus, which decreases cognitive processes;

7. mutual support amongst participants in virtual learning communities is one further positive aspect. Community building is supported by personal and technical assistance. Learners are engaged in the whole learning and teaching process and gain self-confidence.

These seven key reasons for e-learning for seniors have been continuously analyzed in the course of the eLSe Project. The e-learning project runs since 2004, meanwhile over 1000 learners had access to the eLSe online-courses. All course have been continuously evaluated, thus an impressive database of evaluation results could be build up, which allows us to scrutinize the above enlisted key factors and check their validity under different circumstances.

In the present research, we wanted to find out evidences for the following hypotheses:

1. The high level of personalization within an e-learning course compensates possible age-and gender-related as well as pre-knowledge differences in the learning experience
2. The way support is provided – face-to-face, by senior tutors, by non-seniors tutor- affects the learner-satisfaction within the learning experience

Study Method

Participants

Between 2008 and 2011, 11 basic and 6 advanced e-learning courses for seniors (in the scope of the eLSe program) took place coordinated and supervised by the Innovation in Learning Institute at the University of Erlangen-Nuremberg. During this period a total of 310 persons took part in these 17 courses. All participants were asked to fill in a questionnaire at the end of the course. 51 % filled in that questionnaire, which is a reasonable proportion for a voluntary questionnaire. The final sample size is 157 persons with a mean age of 67.8 (SD = 7.12). 99 persons were women. The courses differed in the approach to support, i.e. the form tutorial support was offered to the participants in the course. Four courses were supported by tutors, who worked at the university and were also engaged in the development of the courses and learning material. The other 11 courses were supported by senior tutors who were trained by the university and supported the course on a voluntarily basis. In two courses a blended learning approach was chosen, in which the participants were supported face-to-face during a few meetings followed by a self-directed e-learning phase. Table 1 gives an overview of these sample characteristics.

Table 1: Overview of percentages of sample characteristics for learners of the basic course and the advanced course

	Basic course (*n*=105)	**Advanced course (*n*=52)**	**Sig (chi²; df)**
Gender			
Male	40.0 %	30.8 %	$X^2 = 1.27$, df=1, p= .259
Female	60.0 %	69.2 %	
Age			
<60 years	12.4 %	3.8 %	$X^2 = 5.88$, df=3, p = .118
60-69 years	46.7 %	48.1 %	
70-79 years	40.0 %	42.3 %	
>79	1.0 %	5.8 %	
Type of support			
By university	21.0 %	50.0 %	$X^2 = 14.69$, df=2, p = .001
By senior tutor (e-learning)	66.7 %	46.2 %	
By senior tutor (face-to-face)	12.4 %	3.8 %	

Measures

The measures are based on a final course questionnaire (summative approach), developed by the Innovation in Learning Institute at the University of Erlangen-Nuremberg aiming at evaluating the existing e-learning courses for seniors. The questionnaire consists out of 24 questions about the satisfaction with the course, the utility, the usability and support during the course, the learning time and approach participants used during the course. In total 5 open questions and 19 multiple choice questions were presented to the course participants. Also demographic measures (age, gender) and the experience with e-learning were collected. For this paper only multiple choice measures concerning the satisfaction and usability with the course are evaluated and differences regarding these measures between the different ways of supporting participants are analyzed. The questions analyzed in this paper had answering options with a 4 point-Likert scale, except for the question about the design of the learning platform, which was a 3 point scale. For all questions, a low rating means a very good rating for a question, a high rate (4 or 3) indicates an insufficient rating.

Procedure

After completing a basic or an advanced course, all participants were asked in the communication forum of the course to fill in a questionnaire to rate their satisfaction with the course. The tutors emphasized the importance of evaluating the courses by highlighting the necessity to continuously improve the courses according to the feedback of the learners. They also plead for sincere answers to the questionnaire. The

questionnaire could be filled in right on the learning platform and was submitted anonymously. Filling in the questionnaire took round about 10 minutes. Filled in questionnaires were downloaded from the platform in an excel sheet and analyzed with PAWS Statistics.

Results

Differences in satisfaction, utility and usability

In a first analysis all questions regarding satisfaction with the course, the platform and the support were analyzed and differences between the basic and the advanced course as well as gender differences were tested. As a general satisfaction rating, a total measure out of the questions about satisfaction with the answering of questions and the speed of answering, the satisfaction with the support in general and the support by the tutor was set up. This overall satisfaction rate is also displayed here. See Table 2 for all means and standard deviations for both advanced and basic course and for both genders.

Table 2: Satisfaction, utility and usability rating for basic and advanced courses and for man and women (N=143)

	Basic course (*n*=93)		**Advanced course (*n*=50)**		**Male (*n*=53)**		**Female (*n*=90)**	
	M	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**
Quality of answering questions	1.46	.58	1.42	.54	1.36	.48	1.50	.60
Speed of answering questions	1.67	.61	1.54	.65	1.53	.50	1.68	.70
Quality of support in general	1.46	.58	1.22	.41	1.32	.47	1.41	.47
Quality of support by tutor	1.42	.58	1.20	.40	1.26	.45	1.39	.58
Utility of course	1.63	.76	1.32	.62	1.47	.61	1.56	.80
Quality of design of platform	1.34	.48	1.28	.50	1.26	.45	1.36	.50
Usability of platform	1.78	.59	1.50	.54	1.68	.51	1.69	.63
Overall satisfaction with the course	1.50	.53	1.35	.43	1.37	.38	1.49	.55

Note: For some participants not all questions were filled in, which explains the *N* of 143 for this analysis.

For all measures, no significant differences between female and male course participants were found; males and females were equally satisfied with the courses. Participants of the advanced course rated the course on some dimensions a little better than users of the basic course. Advanced users were more content with the support in general (t = 2.61, df= 141, p = .010) and with the support by their tutor (t = 2.39, df= 141, p = .018). Also the usability of the advanced course was rated higher (t = 2.50, df= 141, p = .014) and the usability of the platform (t = 2.84, df= 141, p = .005). In a second

step, it was analyzed if the courses were significantly rated better than average. As the mean for the questions was 2.50 (on a four point scale) and 2.0 (on a three point scale) for the question about the design of the platform, one-sample *t*-tests were performed. All questions differed significantly from the mean with $p < .001$, which means that the satisfaction with the course was on all domains better than average. Also age differences on satisfaction, utility and usability were tested with using a MANOVA to find out if the courses were rated better for one age group and might be more suitable for one of the groups. Due to the small *n* of the age group >79, the four persons in this group were analyzed together with the age group 70-79, which creates a new age group of participants older than 70. Means and standard deviations can be found in Table 3.

No differences between the age groups were found, which means that participants in all age groups are equally content with the e-learning courses.

Table 3: Satisfaction, utility and usability rating for different age groups (*N*=143)

	< 60 years (*n*=12)		**60-69 years (*n*=69)**		**> 70 years (*n*=62)**	
	M	**SD**	**M**	**SD**	**M**	**SD**
Quality of answering questions	1.25	.45	1.54	.53	1.39	.61
Speed of answering questions	1.50	.52	1.67	.61	1.60	.69
Quality of support in general	1.33	.49	1.42	.50	1.34	.60
Quality of support by tutor	1.33	.49	1.38	.49	1.31	.59
Utility of course	1.58	.67	1.52	.70	1.52	.78
Quality of design of platform	1.58	.52	1.26	.44	1.34	.51
Usability of platform	1.75	.75	1.67	.56	1.69	.59
Overall satisfaction with the course	1.35	.45	1.50	.46	1.41	.55

Note: For some participants not all questions were filled in, which explains the N of 143 for this analysis

Differences between different support forms

As a last hypothesis, it is tested if the offered support (by tutors of the university, senior tutors or senior tutors in face-to-face meetings) is differently rated by the participants. We suppose and previous experiences prove (Hetzner & Held, 2009) that it is important to give the participants continuous support and feedback as well as promote online communication between the participants for developing a sense of group and integrating social learning aspects. As the senior tutors supervised their courses on a voluntarily basis, the level of time invested in providing support was different and in some cases possibly the necessary (push) and pro-active support (pull) could not be offered. Therefore we expected that the courses supervised by university members – well trained in tutoring activities and with a strong commitment to the tutoring task – were rated a little better than the other course. A MANOVA was used

to test the differences between the support forms. Descriptive statistics are listed in Table 4.

Table 4: Satisfaction, utility and usability rating for different support forms (N=143)

	Support by university (n=46)		Support by senior tutors e-learning (n=83)		Support by senior tutors face-to-face (n=14)	
	M	**SD**	**M**	**SD**	**M**	**SD**
Quality of answering questions	1.35	.53	1.51	.59	1.43	.51
Speed of answering questions	1.52	.62	1.67	.65	1.64	.63
Quality of support in general	1.22	.42	1.46	.59	1.43	.51
Quality of support by tutor	1.17	.38	1.46	.59	1.36	.50
Utility of course	1.37	.61	1.63	.79	1.43	.65
Quality of design of platform	1.15	.36	1.42	.52	1.32	.47
Usability of platform	1.59	.54	1.76	.62	1.57	.51
Overall satisfaction with the course	1.32	.41	1.52	.54	1.46	.45

Note: For some participants not all questions were filled in, which explains the *N* of 143 for this analysis

Between the support forms, three significant effects were found. The overall support provided in the university courses was rated better as the support in courses managed by senior organizations with $F_{(2,140)}$= 3.07, p=.049. The support by the tutor in charge was rated better for university tutors than for senior e-learning tutors with $F_{(2,140)}$ = 3.67, p=.028. Also the design of the platform was rated better by the participants of courses with university tutors than by participants of courses with a senior e-learning tutor ($F_{(2,140)}$ = 4.90, p=.009.) Although not all ratings reached significant levels, the hypothesis that the courses with university tutors were rated a little better can be accepted for some questions. These outcomes go in-line with the previous analysis by Hetzner and Held (2009) that mentioned effective and professional support as one essential key factor for successful e-learning. And above all the quality of support is highly perceived by the participants and can be well stated.

Discussion

In general the eLSe basic and advance courses are rated very positively by all participants independently from gender or previous experiences. Also no differences between the age groups were found, which means that participants in all age groups are equally satisfied with the e-learning courses. This is especially astonishing if we recall that senior citizens build an extremely heterogeneous group regarding their life and learning experience, socio-economic background, learning needs, age related-handicaps or available time slots for learning. Therefore our initial hypothesis that the high level of possible personalization within an e-learning course compensates possible

age-and gender-related as well as pre-knowledge differences in the learning experience can be partially confirmed. However, some dimensions were rated better by advanced course user, which indicates that pre-knowledge might help participants to work with the course on some dimensions. This also goes in-line with the study of Held et al (2007) presented in the first part of this paper.

The second hypothesis regarding the differences due to quality differences of the tutoring can be also partially confirmed. We can clearly state that if we assume- and we have clear evidences for it – that the tutor support provided by university staff members is more intensive and of higher quality regarding continuity, amount of pro-active feedback and quality of the feedback in general, we can again confirm the key role that supports has within an e-learning environment and most particularly in case of a very heterogeneous target group. These outcomes go in-line with the previous analysis by Hetzner and Held (2009) that mentioned effective and professional support as one essential key factor for successful e-learning.

However, these findings are only preliminary. To confirm these results, bigger samples for all age groups are needed. As the eLSe courses are still offered in Germany, new data will be constantly available to evaluate the courses more thoroughly. As also a ceiling effect on some ratings might be possible, we will in the future enlarge the questionnaire scale to diminish these effects and to get a more differentiated picture of satisfaction ratings.
In sum, it can be said that e-learning with its high level of independency levels with a very high personalization of the learning experience is a very suitable form of teaching older adults. A high level of personalization makes it possible to overcome gender and age-related

To reach high personalization and learner satisfaction basic design principles like a clear structure and organization, feedback and self-tests (Baltes & Poole, 2003; Stolz-Loike et al., 2007) have to be followed. Additionally the role of communication opportunities via different channels for promoting social learning is crucial (Held & Hetzner, 2009). But, and above all this the key factor for successful e-learning courses is tutoring. The quality of the tutoring influences very significantly the quality of the e-learning experience and consequently its success. A very pro-active support of a tutor is influences positively the learning experience. This is especially true for highly heterogeneous peer groups as older adults built.

These findings along with previous ones will further be used for the development of recommendations for the conceptualization, design and implementation of e-learning courses for older adults.

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Generational Distinctiveness in the Time Use of Working Distance Learners

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Abstract

Profiling student characteristics is a necessary task in designing programmes of education and one that is more necessary but more complex for distance study involving mature students. Various ways have been used to group individuals based on their demographic but, although these have provided useful tags, it can be questioned whether these have value when considering the needs and expectations of mixed age students studying the same course.

This paper examines the generational distinctiveness of working students commencing a postgraduate course drawing upon research conducted into their use of time. It reports the main findings in respect of three generations of student - Generation W (baby boomers), Generation X and Generation Y. It examines their lifestyle, work, technology and study; and contrasts the weekly time use of Generation X and Generation Y students.

It concludes that whilst generational differences are evident these are not so significant as to require a bias toward one age group over another. The critical factor is the formative experience of each person that shapes their approach to work, life and study. It is this shift in the student characteristic and their attendant lifestyle which is significant, but often unrecognised by course designers.

Keywords: Diversity, Generational Profiling, Working Students, Work-Life Balance, Time Use, Study Design.

Generational context

The conventional definition of a generation is accepted as being the number of years between the birth of an individual and the birth of their own children. Within the context of a family line this is understandable but within a wider societal context it has minimal relevance. The start and end of any generation will change between families and vary year by year depending on life expectancy and socio-economic circumstances. In the latter respect the average length of a conventional generation varied between twenty and thirty years during the last century. This inability to designate a standard time to generations of society has lead to a much looser set of soubriquets based on shared experiences. The last century saw generations referred to as lost, silent, boomer, millennial and net amongst others.

Although these tags are useful as shorthand to place individuals within a historical context, it is less clear that they are beneficial for designing courses of study. Where value may be gained is when individuals share similar ages, backgrounds and experience. This is the case when students pass through an education system as a successive linear sequence but this standard progression is generally not found within groups of mature distance learners. Their ages may transcend across generations and within an international context the events that characterise a generation in Europe or North America may be very different those that define a generation in China, Asia or Africa.

Consequently this paper examines the three generations currently within the workforce. For this purpose Generation W refers to students of the baby boomer generation born in the years 1946 – 1964; Generation X to those born 1965 – 1979 and Generation Y to those born 1980 – 1994.

The research

The data referred to in this paper was collected from an intake of 705 working students commencing a postgraduate conversion course in 2008 (McNeill, 2010). The primary research focused on their time use established from a 24 hour diary kept for one week during their first module. The diary specifically asked students to record their time under the ten codes shown in the appendix. Of these three were directed at course related activity; two at their employment; four were focused on non-work activity; and one covered time spent resting. 363 students completed and submitted a diary (51.5 %). Associated with this was a pre-course questionnaire that surveyed students to

provide background details and a profile of the group as a whole. 506 students (71.8 %) completed the questionnaire. Students were also invited to complete an end of module questionnaire to establish their feelings about their actual use of time and to provide them with an opportunity to give further feedback on their time use and/or to identify any specific problems they had experienced. 261 students completed the post-module survey (37.0 %).

The times given in the following are the total hours for the diary week unless otherwise stated.

Student profile

The average age of students joining the course was 28.6 ranging from 21.4 to 61.5. This placed the average age on the cusp between Generation X and Generation Y with 3 % falling within Generation W; 39 % in Generation X and 58 % in Generation Y. Similar proportions completed the diary and two questionnaires. The majority of Generation W students were male and from locations outside the UK. For both Generations X and Y over 80 % were from the UK and divided 2 to 1 between male and female.

One question on the pre-course survey asked about method of learning and Generation W students mostly classed themselves as activists and reflectors. In contrast both Generation X and Y classed themselves as mainly theorists followed by pragmatists but with Generation X showing least preference for activist whereas Generation Y were least inclined to choose reflector.

All generations indicated equal use of Internet surfing to discover new knowledge. Generation W demonstrate a greater inclination to use a library or reference books whereas they were less inclined to use knowledgeable friends and family. Across the generations this is reversed with Generation Y most likely to approach friends or family and least inclined to use reference materials. This suggests that formative habits stay with students and that technology shapes the way in which Generation Y approach discovery.

Lifestyle

The domestic circumstances of the generations broadly follow what might be expected for their respective ages. The majority of students live with a spouse or partner but the proportion of Generation W is considerably higher than Generation X who in turn are higher than Generation Y. More Generation X indicate they live alone with over a third of Generation Y indicating they live at home with parents. This translates into the time given to domestic duties with diaries indicating Generation Y averaging the least at 13.3 hours, Generation X at 17.5 hours and Generation W at 22.6 hours. On balance Generation W are more domestically oriented than Generation Y.

This diversity is also exhibited in respect of the intensity of social activity. Almost two-thirds of Generation Y indicates regular social activity and this proportion reduces to one half for Generation X and one third for Generation W. In contrast Generation W indicate a significantly higher proportion of students engaged in infrequent activity whereas the proportion of Generation Y engaging in non-stop activity is substantially greater than either Generation W or X. Overall though Generation X and Y recorded similar diary times for social activity (10.5 and 11.6 hours respectively) compared with 5.6 hours for Generation W. Generation Y are more social that Generation W, but in contrast Generation W recorded slightly more diary time against leisure activity (15.1 hours) than Generations X and Y who were similar at 12.5 and 13.1 hours respectively. There was no significant difference between the generations in respect of rest (average 58.5 hours) although there was variation in when this time was taken.

Work

All students were employed within the real estate or construction sectors and their work frequently required travel during the working day to attend meetings, site visits etc. In respect of their normal working week there was little significant difference between the generations who collectively averaged a diary time of 38.6 hours. Generation Y recorded the higher average working time with Generation X and W recording the least although these generations indicated the higher overtime hours.

In respect of travel both Generation X and Y recorded similar weekly travel times at 8.5 and 8.4 hours respectively. In contrast Generation W recorded an average of 6.1 hours suggesting a more established presence closer to the workplace coupled with reduced work related non-commuting travel.

Technology

Very few of the students surveyed did not have a computer at home. Over 70 % of Generations W and X had their own computer but 20 % had to share a family computer. In contrast over 80 % of Generation Y had their own computer and did not have to share. In the workplace over 85 % had their own computer with only some Generation W students having to share. This latter point resulted from 20 % of Generation W only using a computer for less than 20 % of their work compared to 7 % or less of Generations X and Y although these generations did include individuals who made zero use. Generally all generations used a computer for 60-80 % of their work.

In respect of access to internet / email all students could connect either at home or at work. In fact the majority could access from both locations although this was significantly higher for Generations X and Y at around 85 % contrasted with Generation W at 60 %. It was notable that a quarter of Generation W could only get connected at work. The data revealed that generally all generations were spending 1-10 hours per week online from home but that this ranged up to 15+ hours for Generations X and Y. A similar set of results were also seen for online time at work. From both locations the commonest type of online activities for all generations was to send or receive emails, look up information / references or to engage in online banking. Generations X and Y made marginally greater use for online shopping but the most visible difference was in social networking.

60 % of Generation Y engaged in social networking activities contrasted with 37 % of Generation X and 3 % of Generation W. Two-thirds of Generation W recorded no social networking activity compared with half of Generation X. In contrast just 17 % of Generation Y made no use of social networks at all. Of the sites used Facebook was most accessed by Generations X and Y and U-Tube by Generation Y. Chat rooms were most popular with Generation W.

The mobile phone is ubiquitous but even so 28 % of Generation X indicated they did not use one or did not make use of one every day. This compared with 38 % of Generation W and 9 % of Generation Y that used a phone but not every day. Overall all three generations stated they mostly used their phone for 30-60 minutes each day. However, 82.4 % of Generation Y used their phone for between 20 and 120 minutes in contrast to 62 % of Generations W and X who used theirs for a similar length of time. In respect of text messages Generation Y sent and received the most averaging 7.3 and 7.5 respectively. This contrasted with 4.2 / 4.5 for Generation X and 2.3 / 2.9 for Generation W.

In relation to other devices few students of any generation owned a Personal Digital Assistant with 30 % of Generation W indicating ownership in contrast to 8 % and 5 % of Generations X and Y respectively. The situation in respect of MP3 player / iPod reversed this with 60 % of Generation W indicating they did not own a player compared with 52 % of Generation X and just 31 % of Generation Y. 40 % of Generations W and Y and 34 % of Generation X did not use theirs every day but of those that did 26 % of Generation Y indicated use of up to 2 hours per day compared with 13 % of Generation X.

Although Generation W was less inclined to use technology for social purposes they recorded greater time on the course Virtual Learning Environment (VLE) at 4.4 hours per week in contrast to Generation X who averaged 3.6 hours and Generation Y who averaged 3.2 hours. It is interesting that despite their lower average times both Generation X and Y considered they had mostly participated in full. This may be interpreted as the younger generations displaying a faster cognitive ability than the older generation.

The barrier for Generation W's participation in the VLE was mainly falling behind schedule (50 %) whereas this was only a problem for 25 % of Generation X and 17 % of Generation Y. Counter to this almost 30 % of Generation Y did not participate in online discussions if they considered everything necessary had already been said, whereas this was only the case for 17 % of Generation X and none of Generation W.

In terms of their specific participation all generations showed similarity with around 50 % indicating they had fully engaged by posting, reading and replying to messages. Around 20 % stated they had read and posted replies and a further 20 % indicated they had posted and read messages but made no replies. Very few of any generation were prepared to admit to not reading or posting at all.

Study

At the outset of the course, and before any study had been attempted, most students anticipated they would give 7-10 hours per week to their studies. This, however, varied between the generations with 64 % of Generation W anticipating 4-14 hours compared with 87 % of Generation Y and 80 % of Generation X. More of Generation W (28 %) anticipated spending longer than 14 hours per week in comparison with Generation X (14 %) or Generation Y (4 %). This general trend was also evident within the diaries with Generation W averaging the higher study time at 15.1 hours per week compared

with Generations X and Y who were similar at 12.5 and 13.1 hours respectively. When re-questioned after the module Generation W still indicated the intention of giving the greater number of hours to their studies with 100 % indicating 7-18 hours. 91 % of Generation X indicated giving 4-18 hours with 88 % of Generation Y indicating a lower range of 4-14 hours.

Time pressures existed for all generations with demands from work greatest for 37 % of both Generations X and Y and study demands greatest for Generation W (23 %). Demand from study reduced for Generation X (17 %) and further still for Generation Y (12 %). A similar reduction across the generations was seen for domestic time pressures with 23 % of Generation W citing this but only 18 % of Generation X and 12 % of Generation Y recording this as a pressure. This trend, however, reversed for social demands with Generation W experiencing the least pressure (0 %) compared with Generation X (14 %) and Generation Y (18 %). Recognition of these as pressures on their study time was confirmed with 19 % of Generation Y acknowledging that they needed to reduce their social activity and 25 % of Generation W identifying a need to reduce their domestic time. All generations identified a need to make better use of gaps in work to complete study although this was greatest amongst Generations X and Y. All generations made a similar plea for mobile learning opportunities to make better use of travelling dead time.

One final contrast can be made in the time that students spent on administrative activities associated with their studies. Overall students averaged 2.8 hours per week but Generation W was marginally higher at 3.2 hours in contrast to Generations X and Y who were similar at 2.8 and 2.7 hours respectively.

Generational time use

The average times across the students in this research suggest that each spends 47.6 hours per week working or travelling; 42.4 hours engaged in domestic, social, leisure or Internet activity; 19.3 hours studying and 58.7 hours resting. As a general statement of the broad division of time it is perfectly acceptable but not all students are the same and in practice the time that each can commit to work, social and domestic activity will vary. Some students do not work five days per week. Some students have hectic social lives whereas others do not and the same applies to domestic duties. Students indicate varying sizes of social circle and weekly tasks such as shopping, childcare etc.

The message is that mature students cannot be reduced to one single stereotypical person as it is the blend of their life activities that determines their available study time. The students considered here are working and the critical factor for them is how their job impacts on when and where they are able to study. In this regard employment is a significant barrier and one that is immoveable as, for the majority, career development and a sustained income are their priority and main motivation. This is reflected in the results above and it is of interest to see whether there are differences between the generations in when they are committing time to different activities.

Figure 1 shows the ebb and flow of time given to each of the diary codes for weekdays and weekends. These are charted for Generations X and Y but omit Generation W due to the relatively low number of diaries returned for this group. Overall the differences between Generation X and Generation Y are minimal with each chart bearing substantial similarity.

During the week Generation X are more inclined to study during the day, although this may be due to part-time employment that enables this. Evening study is the norm with both generations completing this between 7pm and midnight. Due to their relatively less demanding domestic situation Generation Y spend more of their evenings in social activity than Generation X.

The similarities are equally pronounced for the weekend charts with very little to differentiate between the two generations. Perhaps to compensate for their weekday socialising Generation Y may be perceived to give marginally more time to study at weekends which for both generations is accomplished during the 5-6 hours either side of 4pm.

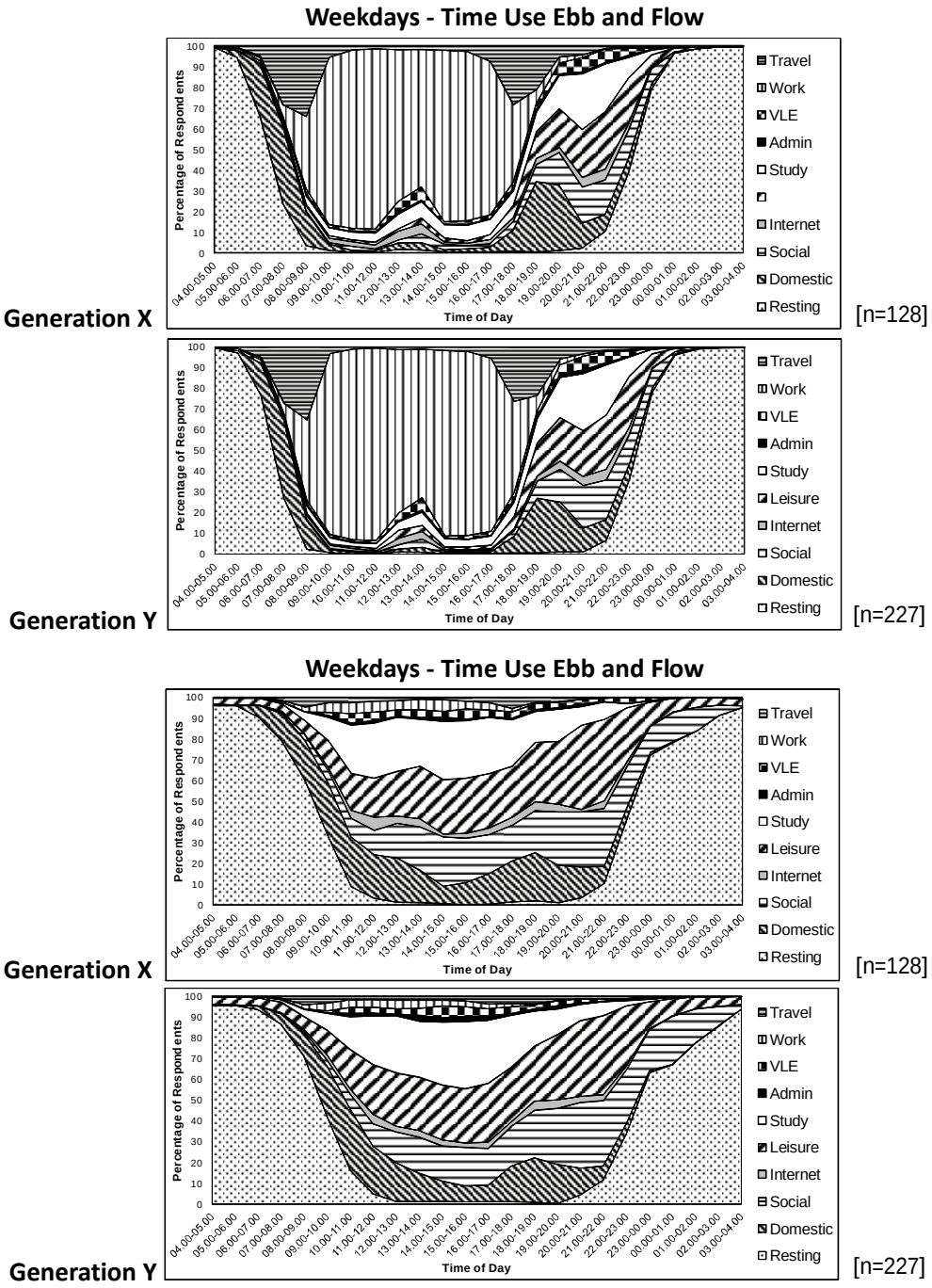

Figure 1. Time Use Patterns of Generations X and Y

Conclusion

This paper provides only a brief insight into the time use of distance learning students, but what is evident is that there are more similarities than divergences between generations. There is certainly evidence that Generation Y does favour social networks and mobile technology but this is only to be expected due to their more recent life experience. It would not, however, be sensible to focus exclusively on their learning needs to the exclusion of the other generations. There has to be incremental change in the style and provision of study that accommodates the needs and expectations of all students. If this means maintaining low tech solutions to suit the older student then so be it as technology is only part of the mix and should not be the overriding consideration.

The issues identified here emphasise that it is only natural for the younger generations to be involved in a gradual progression through the lifecycle. Many of the older Generation W students have grown up in the 1960s, completed their first degree in the 1970s, had their families in the 1980s, developed their career in the 1990s and are now looking towards retirement. In contrast most Generation X students are at least one stage behind and many Generation Y students may only just be completing their initial education and first degree. The younger students, and Generation Y in particular, are in a period of rapid transition as they move from dependent to independent living. Within the students considered here it is clear that many enjoy a relatively care-free existence within the parental environment whereas others have moved into partnerships that require increased responsibility, and still more have made the full transition to autonomous family units. These shifts may be presumed to be linked to Generations W, X and Y but the evidence from this study is that this is not necessarily so. There are Generation W students that are extremely youthful in their outlook and embrace high-tech solutions, and at the same time there are Generation Y students who resist technology and exhibit attitudes more mature than their age would suggest.

The critical factor is the formative experience of each person that shapes their approach to work, life and study. It is this shift in the student characteristic and their attendant lifestyle which is significant, but often unrecognised, and requires greater attention by designers of distance studies. Similarly, if there is a decline in the cognitive abilities of students from the older generations this need to be acknowledged but blended with drawing out their greater life experience. It is not sufficient to assume that older students are incapable as it is equally likely that they simply do not have the time to familiarise themselves to the same extent as their younger counterparts.

Overall, the results presented in this paper highlight that there is little value in using averages to identify the characteristics of students from any particular generation. In consequence it is not unreasonable to anticipate that a similar debate in 15 years time comparing Generations X and Y with Generation Z will, as now, identify as much convergence as divergence.

Reference

1. McNeill, W.N. (2010). The Time-Use of Distance Learners: A Study of International Postgraduate Students Engaged in Professional Career Development. Doctoral Thesis, University of London, UK: Institute of Education.

Acknowledgment

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Appendix – Time Codes

Study	Time engaged in studies at home or at work including all productive time such as thinking, reading reference papers / textbooks, answering quizzes etc - but excluding time spent on the VLE.
VLE	Time engaged in reading and posting messages to the VLE, accessing and reading study materials, researching on the Internet for learning activities, emailing etc - but excluding answering quizzes.
Admin	Time engaged in organising and managing studies including all non-productive time such as printing materials, filing information, sorting out IT problems, sorting out admin matters etc.
Work	Time engaged in paid employment between arriving for work and leaving at the end of the day – including meal breaks and overtime.
Travel	Time spent travelling before, during and after work but excluding time spent travelling for other purposes such as socialising or leisure.
Domestic	Time engaged in normal domestic activity within the home – personal ablutions, childcare, cooking, eating meals, washing up, shopping, washing, ironing, cleaning, DIY, decorating, maintenance etc.
Social	Time engaged in social activity with family and friends outside the home – eating meals, going to the pub, club or cinema, voluntary work, youth clubs, councils, professional meetings, weddings etc.
Leisure	Time engaged in specific sports, hobbies or interests – playing or watching sports, model making, gardening, walking, watching TV etc, as well as time taken for holidays.
Internet	Time spent on the Internet – emailing, online banking, online shopping, general surfing the net, social networking, multimedia sites, audio downloading etc.
Resting	Time spent asleep at night or resting during the day.

Motives for Lifelong Learners to Choose Web-based Courses

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Abstract

Due to societal changes there is a growing need for distant and adult learning. The reason to participate in education and the choices that students make may differ. In this study the factors age, gender, rate of studies and parenthood have been analysed in order to see how these relate to different motivational factors for choosing a web-based course. The data has been based on a questionnaire, covering 1270 beginner students in the spring semester of 2011 and contains their background characteristics and items focusing on their motives. These could be categorized into four different motives: (1) Format, (2) Content, (3) Economic, and (4) Curiosity. The results showed that Format was regarded as the most important factor for choosing an Internet-based course, followed by Content, Curiosity and the Economic factor. Furthermore, group differences were investigated with respect to age, gender, parenthood and rate of study. The findings show that distant education fulfils an important function for mature students, women and students with children. These groups presumably consider the flexibility that web-based courses provide advantageous. Family situations or working-life obligations may contribute to this. Changes in people's working lives are likely to continue, which presumably increases the demand for flexible learning situations.

Keywords: Lifelong learning; distant education; web-based courses; student motivations; choice.

Introduction

Our globally connected world is characterized by growing social mobility and diversification of life trajectories. In the light of recent societal and economic developments people more often change careers. Individuals even have multiple career paths and they are expected to engage in lifelong learning. Ongoing transformations of the labour market, for example, have increased demands for new forms of competence. In the future people will have more professions during their working career. Career change often requires re-education or training in order to gain more knowledge, to develop new skills, or to meet the requirements in new positions. Education and the employability of individuals have come into focus and competence development and learning are now often related to lifelong career development (Graff, 2008; McLoughlin & Lee, 2008; Uskov, 2003). University students have to deal with many career-related tasks as they, according to Creed, Fallon and Hood (2009):

> *"[They] have to adjust to a much less structured educational experience than high school, monitor and resolve issues regarding their career direction, and manage educational and life demands as they develop as young adults. Further, they have to manage these career-related tasks in the context of family, peer, and educational institution expectations." (p.220).*

This need for career adaptability is not restricted to young adults only; it is following us through life. Mid-career changers have become an object of study and new approaches are developed (Barclay et al. 2011; Brown et al., 2012). The Swedish Prime Minister Fredrik Reinfeldt recently declared that working-life can be stretched to the age of 75 as the traditional pension age of 65 is problematic. This implies that people should be prepared to change careers in the middle of their working lives. Moreover, the Swedish student aid system currently ends when people reach the age of 54, and the Swedish PM argued that this support system must be altered allowing mature students to receive financial support in order to be able to participate in courses at university (Stendberg, 2012). It not only relates to career development. With an aging population, the median age of population in many countries is moving upwards, learning has become important for older adults (Davey, 2002) and, as Boulton-Lewis, Buys and Lovie-Kitchin (2006) exclaim, it is an important aspect for people aging active and productively.

Growing unemployment, early retirement as well as skill and labour shortages in specific professions have led to the creation of active aging and lifelong learning policies. During the last decade European policies, not at least those concerning lifelong learning, also indicated the need to make higher education more democratic, effective and open in space and time. Universities are even called upon to make students more employable and to enhance their flexibility in the labour market (Prokou, 2008), while Web-based learning also may open access and widen potential markets for the universities, motivating a larger and diverse group of students to participate in higher education (Hoskins & Van Hooff, 2005).

Due to these changes there is a growing need for flexible deliverance of education. Distant learning and adult learning take an important part in this. Even though distant learning had been popular long before the introduction of the internet, technological development has enabled ICT to become a more important tool for alternative forms of learning. In education, the web (World-Wide-Web) has generally been used as a source of information or even as a learning tool. This especially goes for different forms of distant learning and adult learning in which web-based courses now increasingly become an alternative option for students. Most of the barriers that are described in earlier studies were often related to technological problems. However, poor access or slow internet connections increasingly belong to the past and technological improvements have led to considerable quantitative and qualitative changes. Nevertheless, Enoch and Soker (2006) show that structural factors such as age, gender and ethnicity still play a significant role in the existence of the so-called usage gap. Their study among Israeli students shows a gender-based digital divide when it comes to the use of web-based technologies.

During the last twenty years Web-based learning (WBL, also known as e-learning) has indeed gained a larger share of the total supply of courses, as well as it brings about significant shifts in the patterns of communication and learning (McLoughlin & Lee, 2008). This is also the case at Umeå University in Sweden. Many courses at the Department of Education are offered as web-based courses, and their number is increasing (Söderström et al., 2011). At the same time, strategies for instructional design and curriculum development for online education have become more sophisticated (Söderström et al., 2012). As WBL has become a realistic alternative to regular campus-based courses, more students could choose that option. In a lifelong career perspective the need for people to participate in education may differ, as well as the educational choices that students make. This variety makes it necessary to study what factors are important for the educational choices of students.

During the late 1990s issues of accessibility and participation were in focus. Also the motives behind choice of internet-based courses and the preference of distance learning in relation to campus-based courses were examined. Findings show that control over pace and timing of learning were important for those students who chose Internet-based courses (Roblyer, 1999). In their study, Miller, Smith and Tilstone (1998) assess distance education as a means to professional development. Their study shows that a majority of students preferred to study by distance rather than more traditional courses. For reasons related to geography or family, distance learning sometimes is the only option for further education and professional development. Bergviken Rensfeldt (2010) shows how distance education policy in Sweden has been shaped by spatial politics. This situation is influenced by the idea of an equality of opportunity for women and men to have access to higher education. Traditional female and male positions are re-produced when it comes to flexible distance education. Therefore, the flexibility of distance education intended for female population can thus be questioned. The notion of distance education has become more the notion of flexible learning (Bergviken Rensfeldt, 2010). Even though there are advantages and disadvantages with WBL, online courses also create advantages for the students that participate, especially when they obviously prefer WBL above other educational methods. When technological hinders seemingly no longer is an issue (broadband connections and computers are widely spread), it can be questioned what motivates the students to choose an online-course and participate in WBL. Which students choose WBL, and what motivates students to choose these on-line courses?

International studies show that attitudes towards WBL and the motivation to choose courses can be divided in so-called intrinsic factors (enjoyment) and extrinsic (usefulness) motivational factors (Lee et al., 2005). Adults participate in tertiary education for complex reasons. Several different typologies have been constructed to identify the motivation of students. Students can consider the process of learning itself to be important, while other students are interested in knowledge for its own sake. These can be labelled intrinsic factors. Motivation for study can also be driven by socio-economic incentives, for example finding employment or to improve the quality of life (Scanlon, 2008). The last examples would be sorted under the heading of extrinsic factors. In their study on student motivation Loeber and Higson (2009) compared data from Germany and Great Britain. Their model describes the most important reasons for school students to go to university and contains of three groups of components: “Job related reasons”, “Reasons referring to the person itself”, and “Continuative education or insecurity about job”. For German – as well as British

students "Reasons referring to the person itself" was the most important reason to study at university. Another of their conclusions is that social class affiliation does not seem an influencing factor in their model. One of the explanations is that independent ways of financing studies are available (Loeber & Higson, 2009).

With respect to internet use, the factors age and gender generally have received attention, as well as motivation and ability (Reay et al., 2002). However, recent social and economic changes in society may indeed also influence students and their motivation to participate in WBL, which makes further monitoring necessary in order to gain insight in possible changes in motivation. Changing demands in society will influence the deliverance of Web-based courses, quantitatively as well as qualitatively. Simpson (2008) discusses several methods to enhance student motivation, but argues that the creation of new models for student learning support demands further studies in the motivation of students. This especially involves knowledge about how student motivation can be changed, as well as further insights on the effects of their motivation for their retention in the courses. In this article we aim to study different factors, such as age, gender, rate of studies and parenthood in order to analyse how these relate to different motivational factors. Our research focuses on the questions: Which students choose web-based courses and what are their (intrinsic/extrinsic) motivations to do so? As our data for analysis covers a wide-range of students (from generation "Y" to mature lifelong learners) it will allow studying possible variations among the motivations of students that participate in Web-based courses and gain us insight in changing preferences; Knowledge that is not only important for the development and design of web-based learning methods, but also for the improvement of our web-based questionnaire as a tool for assessment.

Method

Participants and procedure

Since the autumn of 2010, all students that register at a course at the department of education, Umeå University are subject to a web-based questionnaire. The questions cover background characteristics and a number of items focusing on the motives for choosing the course. In these items respondents were asked to rate, on a five-point scale, from 1 (very important) to 5 (not important), the importance of different motives when choosing a specific course.

The sample used in the present study consisted of the student during the spring semester 2011. 1,270 students completed the questionnaire. Of 1,270 participants, 319 were males (25.1 %) and 951 females (74.9). The participants' age ranged between 19 and 68 years (M=32.02, SD=9.27). 38.4 percent of the students indicated that they had children or lived with children. 44.3 percent of the students entered a course as full-time students, while the other students entered the course as half-time students.

In Table 1, the courses given during the spring semester 2011 is described. As can be seen there is a number of courses that leads to a bachelor and master degree in education. There are a number of courses within the subject field of Sports Education. Finally, there are also a number of courses within the subject field of Human Resource Management. As can be seen, some courses are delivered both as 50 per cent and 100 per cent study-rate. The courses also vary with respect to number of credits (from 7.5 credits to 30 credits).

Table 1: Courses given during spring semester 2011 (and rate of study)

Courses	**50 %**	**100 %**
Bachelor course in education (30 credits*)	X	X
Master course in education and sport education (30 credits)	X	X
Leadership and leader development (7.5 credits)	X	X
Social education (7.5 credits)	X	X
Education as a science (7.5 credits)		X
Building scientific knowledge on education (7.5 credits)		X
Learning and teaching (7.5 credits)		X
Adult learning (7.5 credits)	X	
Learning and information technology (7.5 credits)	X	
Sport, upbringing and socialization (7.5 credits)	X	
Leadership in sport (7.5 credits)	X	
Leadership and learning in outdoor education (15 credits)	X	
Vocational education in a changing society	X	
Human resource management in theory and practice II (15 credits)	X	

* 30 credits equals one semester

Statistical analysis

In order to examine the underlying dimensions of the motivational items, Exploratory Factor Analysis with principal component analysis as extraction method was used. Factor retention criteria were: Kaiser-Guttman rule (Eigen values > 1) and examination of scree-plot. As factors were assumed to be uncorrelated, Varimax rotation was used. The rotated component matrix was reported. As variables with pattern coefficients of .32 or larger are generally considered acceptable for item inclusion (Tabachnick & Fidell, 2007) this recommendation was followed in the

present study. The internal consistency of the subscales was assessed through Cronbach's alpha coefficient. In order to examine if there were differences in motivation for males and females, students with or without children, full-time and half time students, these groups were compared with respect to the total scores on the sub-scales using t-test.

Results

The factor analysis indicated that there were four factors to retain. This was supported by the Kaiser-Guttman criterion and examination of the scree plot. The four factor solution represented motivational factors related to Format, Economic, Content and Curiosity for choosing an Internet-based course. Table 2 displays rotated factor coefficients for the four-factor solution. In general, all items showed large factor coefficients and According to Tabachnick and Fidell (2007) items 1-2 loaded on one factor (Content). Items 3-5 loaded in a second factor (Curiosity). Items 6-8 loaded in a third factor (Economic). Items 9-11 loaded in the fourth factor (Format).

The composite mean score, standard deviation and reliability coefficients are presented in Table 3. The items about Format had the highest mean ratings, followed by Content, Curiosity and Economic. This means that Format is regarded as the most important motivational factor for choosing an Internet-based course. The second most important motivational factor is Content. The least important motivational factor is Economic. The internal consistency of the four subscales was in general good (Format, $\alpha = .77$, Content, $\alpha = .89$, Curiosity, $\alpha = .46$, Economic, $\alpha = .72$).

Table 2: Exploratory factor analysis derived from Varimax rotation for 11 items

		Format	Economic	Content	Curiosity
1	Contents of the course appealed to me	.150	-.097	.928	.001
2	Interested in the topic	.164	-.133	.915	-.005
3	As an introduction to other studies	.043	.029	.096	.651
4	Was recommended to read the course	-.040	.029	-.167	.696
5	Want to change careers and try something new	.115	.140	.049	.722
6	Taking this course until something else pops up	.003	.852	-.051	.104
7	I am currently seeking employment	-.008	.837	.016	.115
8	In order to receive student aid	.014	.685	-.201	.001
9	Studying online appeals to me	.846	.078	.113	.031
10	Web-based learning allows me to combine studies with other	.786	-.012	.131	-.009
11	Web-based learning is a geographical condition for me to study	.824	-.053	.074	.114

Table 3: Mean scores, standard deviation and alpha coefficients for composite scores

	Mean	Std. dev	Alpha
Format	9.10	2.46	.77
Content	6.61	1.23	.89
Curiosity	4.51	2.24	.46
Economic	3.59	2.14	.72

Group differences

The total scores of the motivational sub-scales were tested for group differences. In this paper group differences were investigated with respect to age, gender, parenthood and rate of study. There were significant differences between mature and younger students with respect to the sub-scale Format. Mature students had significantly higher ratings on Format motivational sub-scale (M=9.61, SD=2.24) than younger students (M=8.65, SD=2.58), t=-7.07, df=1,263, p<.05. However, for the Economic motivational sub-scale younger students had significantly higher ratings (M=3.96, SD=2.40) than mature students (M=3.16, SD=1.68), t=6.99, df=1,263, p<.05. There were no significant age differences with respect to the Content and Curiosity motivational sub-scale.

Table 4: Significant group differences on motivational –sub scales

	Age	Gender	Parenthood	Rate of studies
Format	Mature students had higher ratings than younger students*	Females had higher ratings than males*	Students with children had higher ratings than students without children*	No differences
Content	No differences	Females had higher ratings than males*	Students with children had higher ratings than students without children*	No differences
Curiosity	No differences	No differences	No differences	Full-time students had higher ratings than half-time students*
Economic	Younger students had higher ratings than mature students*	Males had higher ratings than females*	Students with children had higher ratings than students without children*	Full-time students had higher ratings than half-time students*

*= p<.05

There were significant differences between males and females with respect to the sub-scale Format. Females had significantly higher ratings on Format motivational sub-scale (M=9.24, SD=2.45) than males (M=3.84, SD=2.45), t=3.80, df=1268, p<.05. Similarly, females had also higher ratings on the Content motivational sub-scale (M=6.72, SD=1.15) than males (M=6.28, SD=1.41), t=4.98, df=1,268, p<.05. However, for the Economic motivational sub-scale males had significantly higher ratings (M=3.84, SD=2.42) than females (M=3.51, SD=2.01), t=-2.21, df=1,268, p<.05. There were no significant gender differences with respect to the Curiosity motivational sub-scale. Moreover, we examined whether there were differences in motivational ratings between students with and without children. Students with children had significantly higher ratings on the Format motivational sub-scale (M=9.54, SD=2.37) than students without children (M=8.81, SD=2.48), t=-5.26, df=1,268, p<.05. Similarly, students with children had also higher ratings on the Content motivational sub-scale (M=6.73, SD=1.12) than students without children (M=6.54, SD=1.30), t=-2.79, df=1,268, p<.05. However, for the Economic motivational sub-scale, students without children had significantly higher ratings (M=3.84, SD=2.31) than students without children (M=3.19, SD=2.31), t=5.75, df=1,268, p<.05. There were no significant differences between students with or without children on the Curiosity motivational sub-scale.

Finally, we examined whether there were differences in motivational ratings between students admitted to half-time or full time studies. Students on full time studies had significantly higher ratings on the Economic motivational sub-scale (M=3.76, SD=2.22) than students on half time studies (M=3.46, SD=2.06), t=-2.48, df=1,268, p<.05. Similarly, full time students had also higher ratings on the Curiosity motivational sub-scale (M=4.83, SD=2.31) than half time students (M=4.25, SD=2.16), t=-4.51, df=1,268, p<.05. There were no significant differences between full-time and half-time students with respect to the Format and Content motivational sub-scale.

Discussion

This study gathered data on the factors that motivate university students to choose internet-based courses. The data contains a wide range of students (from generation "Y" to mature lifelong learners). The items measuring the students´ motives were then grouped in four different clusters; Format, Content, Curiosity and Economic. The factors were then tested for group differences. In the used model, group differences were investigated with respect to age, gender, parenthood and rate of study.

Do students choose courses for reasons that are related to their competence development and possible career development? Job promotion or the alternation of job tasks can increase the need for competence development and therefore further education. The reasons for adults to participate in education can be linked to situations in their lives that relate to, for example, career, family, or citizenship changes. Even though our data material does not directly reveal aspects that are related to the individual's lifelong learning situation, the choices they make might be caused by their aspirations for degree completion, retraining or second-career preparation. All of which, indeed, are related to lifelong career development as mentioned by Graff (2008) and McLoughlin and Lee (2008).

When it comes to gender, our findings indicate that differences exist between the motivations of men and women to participate in Web-based education. The data shows that the factor Format is most important for women, followed by Content, Curiosity and the Economic factor. The vast majority of participants in these Web-based courses are women (75 %) and the factor Format may be more important for them of various reasons (e.g. family situation). For men the factor Content ranked highest, tailed by Curiosity, Format and Economic related issues. Even though our results show that the factor Content was important for both sexes, women had higher ratings than men. There were no substantial differences between men and women in the case of Curiosity, i.e. male and female students value this factor of motivation equally. Issues related to the Economic factor were generally considered to be the least important. However, in this study men had significantly higher rates than women.

Does this confirm the "men earn, women learn" thesis, suggesting a gender divide? This leaves certainly space for discussion and it needs further analysis, but the items "searching a job" or the possibility to "receive student aid" indicate that the motivation for men (especially the younger ones) to participate in Web-based courses are to a certain extend also driven by financial incentives. Just like the conclusions in the Loeber and Higson (2009) study, our study shows that the lack of finances is not really an argument to refrain from studies, as Sweden has a well-functioning student aid system. On the contrary, as student aid is available it enables students to secure their financial situation. Especially for younger male students the student aid system seems to be an alternative to unemployment. Participating in Web-based courses guarantees them income. Somewhat provocatively one can then launch the question: Do younger men learn in order to earn? With respect to the initial discussion on career changes and the rise of pension age in our discussion above, the need for competence development and career advancement may indeed support the idea that people

generally learn in order to earn, either voluntarily or compulsory. The need to do so will presumably increase with age, in concordance with the rise of pension age and higher life expectancies.

The factors Format and Content were also most important for students with children. The obvious explanation is the fact that the family situation needs a more flexible learning situation. In this case, the factor Format (Internet-based courses can provide a good solution for students with parenting responsibilities) was appreciated higher by mature students and women. For younger students the factor Economic had a more significant importance. This might be explained by the fact that younger students, in contrast to their more mature counterparts, may be less goal-oriented. They take part in a Web-based course "until something else turns up". Reading at university guarantees them to receive student-aid, which at least makes them financially less vulnerable, as discussed above. Another item that also correlates with the Economic factor is rate of studies, which might indicate that students who were reading fulltime, valued economic security to a higher degree. This could be interpreted as an extrinsic motivational factor. Moreover, our analysis indicates that students that were reading fulltime also valued items that related to the factor Curiosity. The motivations to be "recommended a course" and to "want to change careers and try something new" clearly have an extrinsic character.

Additionally, our findings show that distant education fulfils an important function for mature students, women and students with children. These groups presumably consider the flexibility that web-based courses provide advantageous, which confirms the arguments in earlier studies (Roblyer, 1999; Bergviken Rensfeldt, 2010). The fact that these students read part-time enhances their need for flexibility. Family situations or working-life obligations may contribute to this. This group of students especially values the factors Format and Content. Younger students on the contrary, read fulltime to a higher degree which may also depend on their financial vulnerability, as indicated earlier. This latter argument adds a somewhat randomly motivation to read a specific course; As long as they are registered as fulltime students, it does not matter what course they participate in. This needs further study, though, more specifically in relation to the career planning and ambitions of younger students.

What will the future provide? The developments within ICT technology have shown large changes that have improved the possibilities for communication and social networking. Changes in people's working lives are likely to continue, which presumably increases the demand for flexible learning situations. It would be of

interest to collect and analyse more data that relates to the lifelong career development of students, covering a wide range of ages. The methodology could be extended so that different students, with different courses and study directions are sampled, or that more data is gained at the individual level. Further studies may therefore also incorporate data that extensively shows what choices students make by adding more socio-economic factors for analysis. This data could also contain factors that capture other events in the students' lives that influenced their aspirations to attend Web-based courses, their motivation to choose the subject or course, their career aspirations or need to upgrade competences, as well as their experiences of other academic subjects and courses.

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Students' Attitude towards ICT Learning Uses: A Comparison between Digital Learners in Blended and Virtual Universities

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Best Research Paper Award Winner

Abstract

In this paper we examine students' digital culture relative to different dimensions of ICT use to support different teaching and learning processes – social, cognitive and didactic. Our study aims to gain a deeper understanding of the role that ICT plays in learning processes associated with academic tasks. In this sense this paper focuses on the influence of the university model – virtual or blended – in students' uses and attitude towards technology for learning purposes.

The research methodology consists of a questionnaire based on a Likert scale applied to a sample of 1042 students from five universities with different models –virtual and blended– and also from diverse areas of knowledge.

Our study presents some evidence about differences between students from blended and virtual environments. Students from the virtual university tend to assign a higher value to ICT uses with respect to social, cognitive and teaching dimensions of support, although this trend seems to be lower regarding the role that ICT plays in supporting the development of knowledge and skills in the courses. These results seem to highlight the importance of certain factors, such as the model of university, when determining the uses of technology associated with learning by students. Somehow, greater use of technology in academic settings seems to condition the students' informal use and not just the reverse.

Keywords: University students, virtual universities, blended learning, ICT uses, digital natives, students' perceptions, digital competence.

Introduction

The introduction of information and communication technologies into university classrooms has been crucial to university teaching and learning. Various studies (Fraser, 2002; Johnson et al., 2011) highlight the possibilities offered by ICT and the turning point they represent for traditional learning environments, giving rise to virtual learning and blended learning. In the case of virtual learning, we are referring to online teaching and learning environments fully delivered via technological platforms (Harasim, 1990; McIsaac & Gunawardena, 1996), while in the case of blended learning, we are referring to learning environments that combine face-to-face teaching with the use of ICT (Bersin, 2004; Thorne, 2003; Ardizzone & Rivoltella, 2003).

Whether in one type of environment or other, it seems that technologies go hand-in-hand with students who, as digital natives, have developed new study and learning skills and have highlighted the need to open up classrooms to new sources of knowledge and new ways of learning. The main argument that supports the 'net generation' discourse is that through frequent use of technologies students become competent users and this makes them capable of transferring their digital skills to learning with the support of technology. However, most studies suggest that although today's students come to university with some digital skills, the use of digital media for studying might be quite different from their usual practice, more leisure oriented. Furthermore, the transfer of these skills from one context to another may not be automatic (Bullen et al., 2008; Romero et al., 2011; Kennedy et al., 2008; Kirkwood & Price, 2005). On the other hand, it has been said that some characteristics of youth, such as their ability to simultaneously process multiple channels of information, may even have negative effects.

Some research studies suggest that age differences concerning perceptions and experiences of technology-mediated learning are important, but other demographic characteristics, such as gender (Selwyn, 2008) and academic discipline (Kennedy et al., 2008) may also be important. To account for this broader aspect, an emerging discussion in the literature has been to distinguish between "learning" and "living" technologies (Kennedy et al., 2008).

Helsper and Eynon (2009) analysed the different aspects of what a digital native is by exploring whether acting like a digital native is determined by age, experience or breadth of use, independently of their age or experience. Their conclusion is that the

degree of digital expertise is related to the confidence in the use of technologies, the use of the Internet as a first port of call for information and the use of the Internet for learning as well as other activities.

Taking into account that the use of technology to support learning in higher education is becoming more and more relevant, the debate must be based on real evidence about students' attitude towards ICT uses for learning purposes. This means looking at whether there is a continuum between "living and learning technologies". In this sense, our study focuses on the analysis of ICT learning uses and perceptions by students in academic contexts comparing two groups: students attending to an online university versus those at traditional universities that provide access to a virtual campus and offer some blended courses.

This paper aims to clarify issues relating to the types of activities that technologies support in everyday and academic life for both groups of students. The initial hypothesis is that the use and perception of technology to support learning is related with the type of actions and tasks being carried out on a daily basis and therefore it is also influenced by the academic learning context, in this case the university model (online or face-to-face/blended).

Methodology

The main research questions of the study are as follows:

1. What kinds of activities are supported by technologies in everyday life and academic life among university students?
2. In which way does the university model (blended or online) affect academic ICT use and preferences of students?
3. How the university model (blended or online) shapes students' perceptions about ICT learning uses?

To respond to these questions we have elaborated and applied a questionnaire to a sample of students from five universities with different characteristics (one of them

offers online education and four offers face-to-face with LMS teaching-support environments)[1].

The analyzed population is the total number of students enrolled during the 2010-2011 academic year along their first and fourth years of study at Catalan universities. The final sample of participating students was a total of 1042 people (error 5 %, confidence interval 95.5 %) and the selection was random.

The independent variables considered in this analysis are: age, gender, university institution of origin (model: virtual or face-to-face), and area of knowledge. The dependent variables considered are:

- Informal use of ICT: type and perception of competence.
- Academic use of ICT (teacher-led): type, frequency of use and perception of usefulness.
- Academic use of ICT (decided by the students).
- Perception on ICT use for learning purposes.

The questionnaire, based on the research of Kennedy et al. (2008), is divided into two parts. The first is designed to characterize university students' uses of technologies (both in formal and non-formal learning contexts) and the second – based on a Likert-type scale (1-5 values of agreement) – aims to analyze the students' perceptions of the use of ICT in different learning situations. To create the second part of the questionnaire, we elaborated a set of indicators of ICT use, from the perspective of its perceived utility for students in different domains. In doing so, we tried to represent each of the dimensions or presences proposed by Garrison, Anderson and Archer (2000) in the Community of Inquiry Framework: cognitive, social and teaching. This framework articulates the processes required for knowledge construction through various forms of "presence", which are teaching, social, and cognitive. However, it is important to take into account that although the same terminology is used and the three dimensions are considered, the CoI model was not directly applied in this study. In the formulation of those items we emphasized the role of technology as a mediator of different processes related with teaching and learning in a broad sense; that is to say, either in virtual or blended environments, with different methodological approaches

[1] The online university is the Universitat Oberta de Catalunya (UOC) and the traditional/face-to-face universities are the University of Barcelona, the Polytechnic University of Catalonia, the Vic University, and the University of Lleida.

and both led by teachers and decided by students. This resulted in a scale formed of 30 items shown in Table 1.

To analyze the reliability of the scale, Cronbach's Alpha coefficient was applied and the result was 0.944, which shows high reliability. In order to corroborate the proposed scale an exploratory factor analysis (principal component) was performed. The results show 5 different components that account for 61.9 % of the variability found in the data (Table 1).

Table 1: Perception of ICT uses in academic tasks. Factor analysis.

Component	Initial Eigen values			Sum of saturations extraction of square		
	Total	Variance %	Accumulated %	Total	Variance %	Accumulated %
1	11.745	39.149	39.149	11.745	39.149	39.149
2	2.999	9.998	49.147	2.999	9.998	49.147
3	1.523	5.076	54.223	1.523	5.076	54.223
4	1.210	4.035	58.258	1.210	4.035	58.258
5	1.100	3.668	61.926	1.100	3.668	61.926

Perception on ICT use	Component				
	1	2	3	4	5
30. ICT help to show me the way I am	.785				
26. ICT help to generate a pleasant atmosphere in the classroom	.778				
28. ICT facilitate the social relationship with the group	.757				
25. ICT help me to explain my problems to the teacher	.717				
27. ICT help me to ask others questions	.702				
23. ICT allow me to express my emotions more freely	.690				
29. ICT allow me to publicly show what I do for the subjects	.671				
24. ICT enable the teacher to pay more attention to us	.636				.406
13. ICT help the teacher to guide the working methodology		.736			
14. ICT allow me to plan my work		.717		.316	
15. ICT allow me to better evaluate my progress in the subject		.626		.513	
17. ICT facilitate the presentation of content		.594	.413		
12. I like teachers to use ICT in the subjects		.540	.428		
16. ICT enhance the pace of work		.538		.399	
20. ICT facilitate knowledge integration from different sources		.528			.438
1. ICT help me to gain knowledge related to the subject			.679	.319	
5. I use ICT when I want to know more about a topic			.679		.308
3. ICT help me to do my academic homework faster			.653		
4. ICT help me to do my academic homework better			.622		
2. ICT help me to develop skills related to the subject			.613	.419	
7. ICT allow me to exchange ideas with my colleagues			.494		.464
10. ICT allow me to apply the acquired knowledge				.644	

8. ICT make it easier for me to pass the course				.634	
11. ICT facilitate my self-assessment processes		.310		.623	
9. ICT help me to follow the course			.437	.496	
18. ICT facilitate the diagnosis of my learning mistakes	.362	.431		.476	
22. ICT allow me to better communicate with my teacher	.313				.725
19. ICT help me to receive assistance from the teacher		.350			.668
6. ICT allow me to exchange ideas with my teacher				.436	.628
21. ICT help me to resolve my doubts		.379	.305		.513

The clusters of items that conform each emerging factor can be characterised with the next types of processes:

1. Social support 1: Communication, expression of emotions and working climate.
2. Didactic support: Introduction and monitoring of content and activities.
3. Cognitive support 1: Development of knowledge and skills.
4. Cognitive support 2: Learning awareness and self-regulation.
5. Social support 2: Teacher and peer support through interaction.

In the following section we present the results obtained from different types of analysis. Firstly, we detail the main characteristics of the sample of students participating in the study. Secondly, using a segmentation analysis, we present the most characteristic and differentiating features of the two groups of students (one comprised of students from an online university and the other from various traditional face-to-face/blended universities) taking both the independent and dependent mentioned variables into account. Finally, the analysis focuses on the students' attitudes and perceptions of the use of ICT in the university, in the two groups. To do this, a Student's t-test analysis is applied.

Analysis of the results

Characterization of the sample

Of the total 1042 participants in the study, 36.9 % are male and 63.1 % are female. The knowledge areas they are carrying out their studies in are Social Sciences (43.9 %), Technical (25.6 %), Humanities (25.7 %) and Natural Sciences (4.8 %). Of the total number of participants, 74 % are in their first two years of study and 26 % between the third and fifth year. Almost half of them, 45 %, also work.

In general, the level of access to technologies is high. The majority of the students typically connect to the Internet in their usual place of residence (77.7 %), followed by the family home (47.3 %), the workplace (36.9 %) and the university (30.9 %). The frequency of connection to the Internet is more than once a day in 82.9 % of cases and 13.5 % connect just once a day. Only 3.6 % connect to the Internet less frequently.

Emerging differences between virtual and face-to-face/blended universities

By using a segmentation analysis (*spat, descriptive analysis, chi-square*) we present the most characteristic and differentiating features of the two groups of students, taking both the dependent and independent variables previously mentioned into account. Treating the information in this way allows us to detect the most characteristic and distinctive features of each group. We should highlight that what appears most associated with one group are not the characteristics presented by all of its members, nor are the only ones, instead they are *the characteristics that emerge as differentiating features of one group compared with the other in a statistically significant way* (in this case, $p < .001$).

With regards the profile of students at the online university, a feature that stands out is that many are studying social sciences, are over the age of 23, have computer equipment, connect to the Internet regularly and work. The students in face-to-face/blended environments are studying natural sciences and technical subjects, are under the age of 22 and do not work.

The informal use of ICT (Table 2), not connected to their academic work, identified by each group shows that the distinctive uses among students at the virtual university are mainly informative and educational, while among the students in face-to-face/blended environments the distinguishing use of technologies is for leisure and communication purposes.

Table 2: Informal use of ICT

Students in face-to-face/blended environments	Students in online environments
Daily - Use Internet to chat	Daily - Use Internet to send and receive email
Daily - Use Internet to participate in a social network	Daily - Use Internet to access the virtual campus
Daily - Use Internet to download software/films	Daily - Use Internet to search for information for academic purposes
Daily - Use Internet to listen to music	Daily - Use Internet to search for general information
Daily - Use Internet to stay in contact with friends	Daily - Use Internet to access communication media
Daily - Use Internet to make friends	Daily - Use Internet to read content/ syndicated news
Daily - Use Internet to share mp3 files	Daily - Use Internet to translate texts
Daily - Use a mobile telephone to listen to mp3 files	
Daily - Use a mobile telephone to take photographs or video	
Daily - Use a mobile telephone to play games	
Daily - Use a mobile telephone to make video-calls	
Daily - Use a computer to listen to music	
Daily - Use a computer to play games	

With regards the autonomous ICT use (not teacher-led) in their academic activities (Table 3), what stands out among the online students are uses confined to the tools found in a virtual campus, while among the students in face-to-face/blended environments we see greater diversity in their distinctive use of technologies. This may be due to the great dispersion and diversity among the students' profile and approaches used by the four face-to-face/blended universities that we are considering as part of the same group, in front of only one online university. It could also be interpreted that the use of virtual campus in online education may have a greater impact on the autonomous use of technology by students (than in f2f/blended models), in terms of choice of work tools for the development of academic tasks.

Table 3: ICT use in academic tasks

Students in face-to-face/blended environments	Students in online environments
I use social networks in my academic work	I use forums in my academic work
I use information repositories in my academic work	I use blogs in my academic work
I use a mobile telephone in my academic work	
I use YouTube in my academic work	
I use online documents (Google Docs) in my academic work	

With regards the students' use of ICT at their teachers' suggestion (Table 4), we see that the online students make frequent use of a greater number of technologies, with a more clearly educational use and one associated with Web 2.0 than in the case of students in face-to-face/blended environments. Again, it seems to be more dispersion among the type of uses proposed in the face-to-face/blended environments. An

interesting observation is that there is a certain parallelism between uses featured as autonomous and those teacher-led for both groups.

Table 4: Teachers' led ICT use

Students in face-to-face/blended environments	Students in online environments
Frequently - Use of virtual campus Always - Use of mobile telephone Always – Social networks Always - MP3/MP4 Always – YouTube	Always - Use of virtual campus Always - Use of repositories Always - Use of forums Always - Use of Google Docs Always - Use of Internet searches Always - Use of wikis Always - Use of blogs

Finally, the most characteristic perception of competence in informal use of ICT for each group is also very different (Table 5). What stands out for the group of the students in the virtual environment is a high perceived competence in the use of most technologies, although most of the mentioned uses are common, that is they don't require specific training. On the other hand, among the students in face-to-face/blended environments there distinctive feature is a perception of having an average level of competence for a variety of uses, many of which are leisure and social oriented.

Table 5: Perception of competence in ICT informal use

Students in face-to-face/blended environments	Students in online environments
Average degree of competence in using the Internet for: • translating texts • sending sms • publishing photographs • creating a social network • participating in a social network • downloading software • reading content • reading blogs • sharing mp3/mp4 • sharing photos • chatting • listening to music • buying and selling • doing videoconferences • making phone calls • making friends Average degree of competence in mobile phone use to:	High level of competence in using the Internet for: • accessing the virtual campus • receiving and send mail • seeking information • checking media • translating texts • buying and selling • reading content • making phone calls • making video High level of competence in mobile phone use to: • taking pictures • sending pictures • calling someone • reading blogs • sending sms • personal organizer • listening to music

• listening to music • calling someone • taking pictures • sending sms • playing • personal organizer • making videos Average degree of competence in computer use to: • playing online • creating digital images Average degree of competence in using personal organizer PDA	High level of competence in using social bookmarking High level of competence in using PDA as a personal organizer

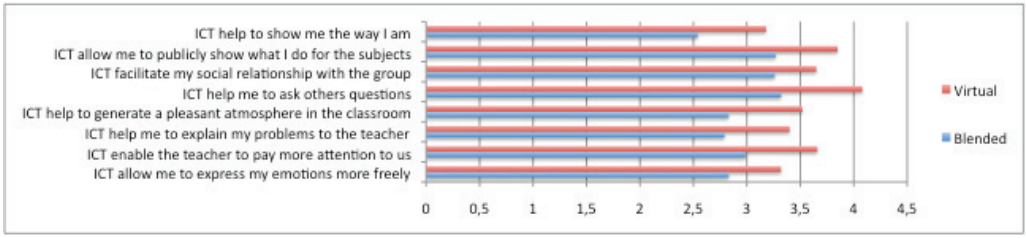
Students' perception of ICT use regarding different dimensions of teaching and learning

In this section we present the results about the students' perception of the use of technologies by comparing both groups with regards to each one of the components previously obtained in the factor analysis.

1. Social support 1: Communication, expression of emotions and working climate.
2. Didactic support: Introduction and monitoring of content and activities.
3. Cognitive support 1: Development of knowledge and skills.
4. Cognitive support 2: Learning awareness and self-regulation.
5. Social support 2: Teacher and peer support through interaction.

The next charts show the comparison between the mean values for the level of agreement (from 1 to 5: totally disagree, disagree, neither agree nor disagree, agree, totally agree) expressed by the students regarding ICT usefulness. Each chart corresponds to one component.

For uses included in component 1 (social support 1) the Figure 1 shows that agreement with the assertions is higher between students in the online university, especially regarding communication with peers and social outreach. It's important to take into account that face-to-face/blended students are close to disagreeing with the assertions.



Figue 1. Perception of ICT uses in virtual and face-to-face/blended contexts. Social support 1

The perception of usefulness of ICT regarding the component 2 (didactic support) is quite high in both groups although it is notably higher among the students at the online university in a quite homogeneous way (Figure 2).

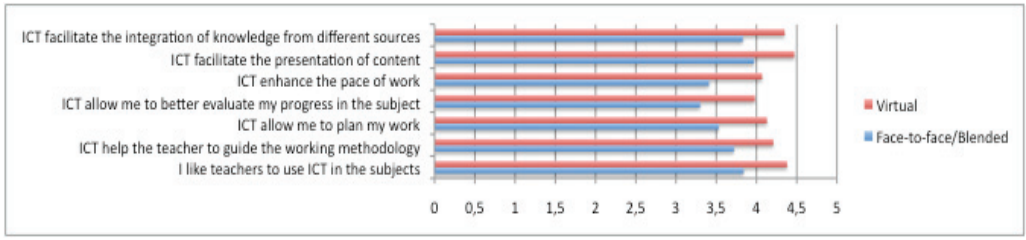


Figure 2. Perception of ICT uses in virtual and f2f/blended contexts. Didactic support

In the case of the component 3 (cognitive support 1) the level of agreement is very high in both groups except for the assertion "ICT help me to do my homework better", where the level of agreement of online students is quite lower than in the other group (Figure 3).

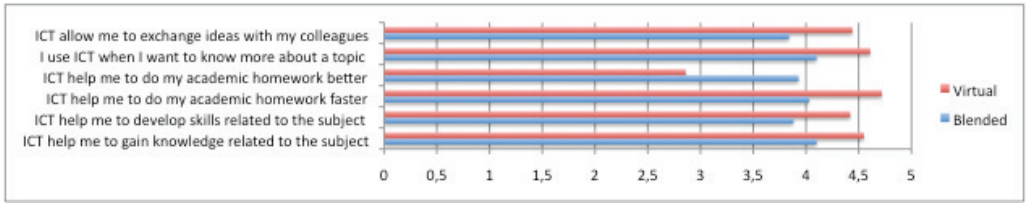


Figure 3. Perception of ICT uses in virtual and f2f/blended contexts. Cognitive support1

Component 4 (cognitive support 2), related to students' perception of learning and self-regulation issues, registers very high levels of agreement in both groups and especially in the case of students in the online model.

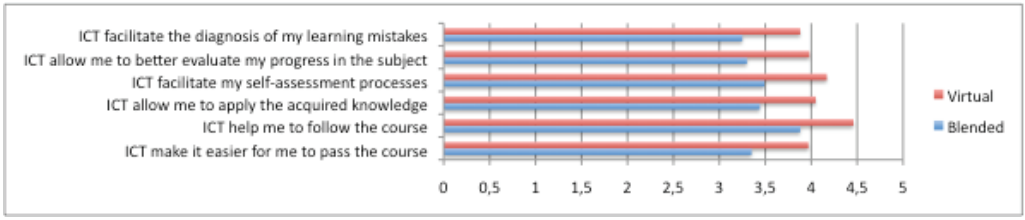


Figure 4. Perception of ICT uses in virtual and f2f/blended contexts. Cognitive support 2

With regards to social support 2, considering interaction with the teacher or with peers, we can see the same situation again. All ratings are quite high in general, but the students at the online university express a higher level of agreement than the other group.

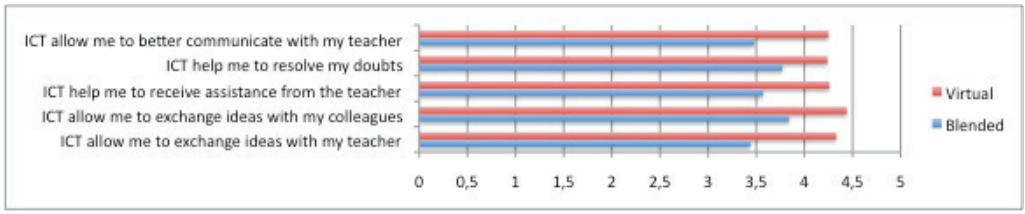


Figure 5. Perception of ICT uses in virtual and f2f/blended contexts. Social support 2

Finally, in order to confirm the statistical significance of these differences, a Student's t-test has been applied in order to compare the perception of ICT use between both groups of students regarding the university model (face-to-face/blended and online) for each of the 5 emergent components. The results (in Table 6) show significant differences between both groups in all components except for the third one (marked in red), corresponding with cognitive support 1 (efficiency in the development of knowledge and skills). The mean values allow us to confirm that the differences point to higher values in the responses by students at the virtual university.

Table 6: Students' perception of ICT uses in virtual and f2f/blended universities. Student t-test results.

Components	T-Student	Virtual univ. Mean	Blended univ. Mean
1. Social support 1	(t (1040) =4.942; p<0.001)	0.329	-0.070
2. Didactic support	(t (1040) =4.641; p<0.001)	0.309	-0.065
3. Cognitive support 1	(t (1040) =-0.653; p>0.001)	-0.044	0.009
4. Cognitive support 2	(t (1040) =8.654; p<0.001)	0.563	-0.119
5. Social support 2	(t (1040) =9.476; p<0.001)	0.613	-0.130

Discussion and conclusions

This research confirms many of the general points found in studies outside of Spain in relation to the level of technology access and use. Students use mainly the Internet to search for information and their universities' virtual campuses as a gateway to the learning material for their courses (Kvavik & Caruso, 2005; Jones et al., 2010). They perceive themselves as fairly competent in most areas (communication, creation, etc.) although the data do not indicate that these competences are necessarily reflected in their regular performance of academic tasks, which is much more restricted. This is evidenced by the small repertoire of tools used by students in their academic tasks, either when they are chosen at their discretion or when prompted by the teacher, which in fact tend to be quite similar.

Out of the academic context, general types of technology (computers, mobile telephones and the Internet) are used for rapid communication and convenient access to services and information. However, if we look beyond these technologies and well-established tools, we find considerable variation in patterns of access, use and preference for a wide range of different technologies (Kennedy et al., 2008). This evidence seems to suggest that although most university students have a basic set of technological abilities ("leaving technologies"), these do not necessarily translate into sophisticated skills in the use of other technologies or information literacy in general ("learning technologies").

Although access to and use of ICT is widespread, the influence of university model seems to be an important factor to take into account. For academic purposes, students seem to respond to the requirements of their courses, programmes and universities. Students do not seem to transfer to the academic field their most common uses in the personal and social domains. The two domains of ICT use (personal and academic) thus remain separated so that students do not really seem to have the chance to apply, practice and consolidate their digital skills for learning or intellectual purposes.

In fact, in all cases, there is a clear relationship between the students' perception of usefulness regarding certain ICT resources and the teachers' suggested uses of technologies. The most highly rated technologies correspond with those proposed by teachers. Here we concur with the study by Margaryan and Littlejohn (2008), which argues that there is little variety in the use of ICT for learning and that these uses are conditioned by teachers' suggestions and not the other way round.

On the other hand, there are differences between students at face-to-face/blended universities and at online universities, both in terms of technology use, levels of perceived competence and utility regarding these uses. While the students in virtual environments seem to show an ICT use oriented towards informative and educational purposes, in the face-to-face/blended group students' ICT uses are more associated to leisure and communication. Furthermore, the results obtained demonstrate significant differences between the online students and those at face-to-face and blended universities. The perception of ICT support from the cognitive, social and didactic perspective is generally more positive among the students at the virtual university. It could be argued that the results are connected to the fact that online students are heavily dependent on ICT in order to do their courses, however it is interesting to note that differences are not significant regarding the perception of effectiveness in ICT support in developing knowledge and skills. On the other hand, it would seem logical to think that regular use of technology provides a more balanced and realistic perception of its actual role as a support of certain processes related to teaching and learning. Similarly, students of the digital generation f2f/blended model, having fewer opportunities to use technology in the academic context, may have excessively high expectations when it comes to the possibilities of learning technologies. However, the results show the opposite. Moreover, another interesting hint is that greater use of technology in academic settings seems to influence the students' informal use, although it is not that clear that informal uses of technology are applied or transferred in some way to the academic domain.

It is also interesting to remark that social dimension in component 2 (related to general communication, expression of emotions and working climate) is valued lower than the other dimensions by both groups of students. It remains to be found out if the reason is their minor interest in this kind of ICT support during learning processes or the lack of adequacy of university virtual environments to bring support to these social aspects. It would be useful to complement these results with qualitative evidence on the pedagogical model applied in the different academic settings, in order to interpret more accurately the context and the purpose of use of technologies.

On the other hand this paper presents an incipient model for analyzing students' perception regarding ICT usefulness in a wide range of technology enhanced learning situations. We believe that the further characterization of these dimensions with theoretical support could be an interesting object of analysis.

The results obtained cannot favour the idea of online learning environments being superior to blended learning environments in terms of development of students' digital competence, as more research should be carried out into the learning model used in the different universities and specific academic settings. However they do lead us to suggest the need to consider that technology-rich learning environments foster students' digital competencies (and not the other way round). Namely, it seems that we shouldn't rely on students' digital competences to foster ICT supported learning practices at the university.

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Why Do Learners Cooperate? Hints from Network Sciences on Motivation for Collaborative Learning

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Abstract

The present paper starts from the consideration that, being collaborative learning the cornerstone for learners to take an active role along their lifelong learning process, educational research and practice should aim at improving the understanding of what lies behind learner's cooperative attitudes. To do this, educational research and practice should take into account some findings coming from networks science, and we propose two conceptualisations. First, starting from the work of Novak, we describe some mechanisms that foster the adoption of cooperative behaviours within networks: direct reciprocity, indirect reciprocity, kin influence, spatial influence, multilevel influence; understanding these dynamics is key to sustainably foster cooperation within learning communities. Second, we propose some conditions that should be taken into account when planning collaborative learning support strategies; issues like confidence, commitment, divergence and decentralisation are briefly commented from an educational point of view. Finally, we briefly explore the concept of collaboration leadership within networks. The success of any collaboration learning venture depends on the capacity of the parties to work towards a common objective, sharing concerns and working out common solutions: the paper hints to some findings on collaboration motivations and conditions that can foster meaningful network-thinking within education.

Keywords: collaborative learning, network sciences, collaboration leadership, motivation, networking.

Instilling more "network thinking" within education

The concept of network is gaining ground as a keyword – and buzzword – of our times. Concepts such as information society and knowledge society are increasingly used by sociology, economics and other disciplines as a way to describe and understand our world and its dynamics built on connections, nodes, and communication fluxes. In particular, the term *network society* describes a social endeavour where the internet is becoming a critical technical and social infrastructure of everyday life, crucially enabling individuals to communicate in new ways that reconfigure and enhance their interaction capacity (Castells, 1996). Of course, collaboration among individuals and institutions has always existed, "what is different is the density, extension and complexity of contemporary global networks and their propensity to channel increasingly diverse flows" (Bebbington & Kothari, 2006, p.863).

The centrality of the concept of network is facilitating the emergence of a diffused *network thinking*, both in science and in society at large, through which we are starting to understand the characteristics of our world by focussing on the relations among the elements of the systems and not only on their characteristics: "network thinking is poised to invade all domains of human activity and most field of human inquiry" (Barabási, 2002, p.222). Even if it is probably early to say if we are witnessing the beginning of a knowledge revolution that will urge us to radically change our social paradigms, it is clear that, to properly understand an increasingly network-based societies, we need to get equipped with tools and approaches able to professionally look into the networks we are increasingly immersed in[1]. In other words, we need to get equipped with the capacity to *network-think,* that is to grasp the increasingly networked nature of virtually any human and social phenomena, if we want to take advantage of the benefits that networks can bring to many areas of society, including education.

The level of *network thinking* within education varies considerably depending on the sector we look at. As noted by the Learnovation Report (Dondi et al., 2009), learners and professionals from corporate education and informal learners are used to work and learn in collaborative fashions, by adopting peer learning practices and by constantly adapting their teaching and learning methods to the growing availability of

[1] Literature on networks is multidisciplinary, with contributions from physics, management, political and social sciences, computer sciences, innovation studies, telecommunication studies, and communication sciences. See for example Newman et al., 2006.

(social) networking tools. On the other hand, embracing networking and collaborative tools and methods in learning setting such as school, university or vocational training is made more difficult, even in the few cases when the need is expressed by learners and accepted by teachers and trainers, by the slow adaptation dynamics of these systems to innovation processes.

In addition, when networking practices are adopted to facilitate teaching and learning, for example by using social media such as Facebook or Twitter or by applying peer learning and peer assessment practices, this is done starting from the incontestable belief that working in collaboration, typically with the support of ICT, will have a positive impact on the motivation of students and will increase their attainments. Nevertheless, most of the time this reasoning is not grounded on a sound understanding of the dynamics that govern cooperation among the components of a given network – the pupils of a class or the members of a learning team – and it only rarely takes into account the available research findings on networks behaviour coming from network sciences. In other words, in most cases educators and educational researchers are looking at learning networks without the appropriate "networking lenses". On the other hand, we believe that increasing the level of *network thinking* within education practices is fundamental if we want to understand the motivation factors which lay behind the different cooperation attitudes of learners, and ultimately if we want to take the maximum benefit from any collaborative learning experience.

Why do learners collaborate, at the end of the story?

We believe that a necessary condition to be met, if we want learners to "sit in the driving seat" of the learning process, is to foster their motivation to be active learners. For this to happen, apart from the important changes that need to take place at the system level which are being tackled by a number of studies and research projects and apart from the necessary support in terms of digital literacy[2], it is fundamental to take action to improve the capacity of learners to work in a collaborative fashion, at all education levels. In other words, we need to work on the motivation of learners to meaningfully collaborate through their lifelong learning path. This, we consider, is an area where educational sciences can learn a lot from network sciences, by adapting

[2] See for example the work of IPTS at http://ipts.jrc.ec.europa.eu/activities/information-society/e-applications.cfm or the VISIR project at http://www.visir-network.eu.

important findings on how networks work, evolve and flourish to the specific case of education.

An interesting conceptualisation of the motivational reasons behind cooperation dynamics is provided by evolutionary biologist Martin Novak, who claims (2011) that collaboration has been an important mechanism for life evolution – along with natural selection and mutation – and that the extent to which the members of a network are able to collaborate can tell us how the network will be able to prosper and to reach its aims. If applied to learning, this means that – for example – the *cooperation capacity* of a classroom is a fundamental component to reach the aim of the classroom itself, which is not only to educate its pupils in the best possible way by using the limited available resources but also to sustainably develop transversal and lifelong learning skills.

Novak starts from the assumption that adopting a cooperative approach has a cost, which can be for example the time needed for discussion in a learning community or the effort needed to help a fellow learner. This cost is sometimes forgotten by educational researchers, who tend to consider collaboration as a "natural" attitude of individuals. We believe on the other hand that every collaboration process is based on a specific decision by the individual, and that this decision is based on whether the motivation to cooperate is able to overtake the cost of collaboration. By using the "prisoner dilemma"[3], Novak demonstrates that the natural tendency of humans, when faced with a repetitive number of cooperation decisions, is to adopt a "win stay, lose shift" approach, meaning that, as long as a cooperative behaviour of an actor is rewarded by corresponding cooperative behaviours of others, the actor keeps on being cooperative, but when the counterparts are not behaving in a cooperative way, he or she tends to adopt a non-cooperative behaviour. In theory, this attitude should result in a dynamic where non-co-operators would tend to outnumber co-operators and where the network would lose its cooperation chances. On the other hand, some "motivational" mechanisms exist that push people to collaborate within networks to achieve their goals: we believe that understanding these mechanisms is important to grasp what lies behind collaborative learning decisions, and ultimately to increase the level of *network thinking* within education.

[3] The prisoner dilemma is a classic example utilised by game theory to show different results in case of cooperative and non-cooperative behaviours of individuals. See Novak, 2011.

A first mechanism is *direct reciprocity*, and is based on the repetition of a cooperative behaviour along the logic "I scratch your back and you scratch mine": an actor will adopt a cooperative behaviour towards another actor in all cases when he has received a cooperative behaviour from the counterpart. Within learning settings, this is the case for example of a student who decides to help a fellow because this fellow has been supporting him in a previous occasion. This simple dynamic, which is possibly the first step towards cooperation that humans have taken in their history, does raise an important concern, since, as we have seen, adopting a cooperative behaviour has a cost, and therefore "cooperation always comes with the threat of exploitation" (Novak, 2011, p.26). That is why, for direct reciprocity to work in complex systems such as schools or universities, two conditions must be in place. First, a flexible attitude towards non-cooperative behaviours must be adopted, where the reward mechanisms towards cooperative attitudes are mirrored by tailored recovery (and not punishment) mechanisms for non-cooperative attitudes; second, it is necessary that the actors are repeatedly in contact and that they are provided with subsequent and comparable occasions to cooperate.

The mechanism of *indirect reciprocity*, which goes along the logic "I scratch your back and someone will scratch mine", is based on the reputation that an actor is able to build within a network, and is easily observable within online communities such as eBay or Couch Surfing. In these communities, cooperative or non-cooperative behaviours are made public to the community; on the base of this, actors are rewarded or punished by the community members, who decide to adopt a more or less cooperative behaviour towards them depending on their reputation. "If, thanks to endless chat and intrigue, the world knows that you are a good, charitable guy, then you boost your chance of being helped by someone else at future dates" (Novak, 2011, p.54). Reputation is a key driver for cooperation in learning settings, and it influences both cognitive and affective learning (Russo & Koesten, 2007) as well as group cohesion (Refaffy & Chanier, 2003). Nevertheless, for reputation to guide cooperative attitudes within a learning community, mechanisms must be in place to allow "enough transfer of information about who did what to whom" (Novak, 2011, p.60) within the network. If this is easy in web-based communities where collaborative behaviours are recorded over time, within offline learning settings this is not always the case: to take advantage of reputation dynamics, a communication effort must be made to make sure that information on best cooperation behaviours flows within the network reaching all the involved actors.

Spatial influence and *kin influence* are mechanisms that affect the cooperative behaviour of an actor depending on the proximity of the actors they could collaborate with. Typically, the choice is made to collaborate with actors that are close to us within the network, for example with actors with a similar background or a closer geographic origin with respect to ours. These mechanisms, which are at the basis of the creation of *clusters* and *hubs* within networks, are based on very simple assumptions but are not easy to be measured and fostered. Spatial and kin influences are important motivational drivers in learning settings, especially in the case of cooperation within small collaborative groups which are part of larger communities: a recent research on the eTwinning schools network[4] has shown that pupils tend to cooperate more easily with others which are close to them, for example in the same school or in the same country, or with students with similar social and scholastic background, but that cooperation beyond these circles is more sporadic and less continuous (Breuer et al., 2009).

A last mechanism is *multilevel influence*, and has to do with how much a network is able to build a common cooperation strategy that goes beyond the behaviour of the single group components. This mechanism typically deals with issues such as self-regulation and self-discipline of networks, and is very important in learning contexts. We must take into account that networks are composed of humans and are therefore imperfect, since for different reasons – a mistake or a bad day for example – an actor can decide not to respond to a cooperative behaviour with a positive attitude. Novak (2011) defines this problem as "the noise of cooperation" and notes that even a minor behavioural change by an actor within a community can have a devastating impact on the network general attitude. This is the case for example of a student which does not adopt a cooperative behaviour where he would be expected to, and initiates a cascade effect of non-cooperative actions by his peers, decreasing the cooperation wealth of the whole learning community.

Supporting meaningful collaborative learning

These motivational mechanisms are very important to understand the way a network works and therefore to increase the capacity of the network managers to support the

[4] eTwinning is a European initiative aiming at allowing staff (teachers, head teachers, librarians, etc.), working in a school in one of the European countries involved to communicate, collaborate, develop projects, share with counterparts in other countries. More at http://www.etwinning.net.

activities of its members. Most of the times, collaborative learning strategies give these dynamics for granted and do not start from the inner reasons for cooperation in building support activities, with the well-known results of achieving poor cooperation results due to a low motivation of the participating learners: on the other hand, we should start from these basic dynamics and build on them from the very planning of any strategies for supporting collaborative.

Understanding the mechanisms behind cooperation is not enough, since supporting collaborative learning – as supporting collaboration in many other fields – is a difficult and demanding exercise, and must be based on some clear conditions and criteria. Starting from the work by Surowiecki (2005) and Van Zee and Engel (2004), we propose a few conditions that should be taken into account when planning collaborative learning support strategies.

A first condition is that network participants need to have *confidence* in their work and must *dare to share* it with others. An open atmosphere where mistakes are allowed and where the group can learn from these mistakes is the ultimate condition to build trust within the learners' own capacities. A second condition is that learners must be *committed* to the collaboration activities and must consider them as priorities within their learning activities, and not as ancillary, and they must recognise a clear added value in their collaborative work. Third, *divergence* must be allowed within the learning community. Any divergent opinion should moreover be used as a starting point for discussion, where each learner must have the right to defend his opinion and the facilitator must make sure that, even when the objective is to reach a consensus around a specific issue, learners' opinions aren't determined only by the opinions of those around them. A good collaboration facilitator should be able to move along the line from full consensus – typical in communities with strong kin influence for example – to full disagreement, but should always make sure that the collaborative learning experience is not merely an adaptation process where the ideas and beliefs of the groups adapt along a mainstream solution. Finally, *decentralization* is important, since the strength of a learning community with respect to its learners taken individually stands in its capacity to valorise the content produced locally by the learners, as demonstrated by the eTwinning analysis (Breuer et al., 2009).

All these criteria are strictly connected to the motivational mechanisms previously presented, and with the basic fact that within any collaborative learning community different attitudes will appear, with learners who tend to build a higher number of collaboration relations than others. Some "collaboration dynamisers" will typically

emerge, who "engage in networking tasks and employ methods of coordination and task integration across organizational and personal boundaries" (Alter & Jerald, 1993, p.46). The characteristics of these collaboration leaders are, coherently with what stated by social network scientists, "a learning mind-set, the ability to be flexible, adaptive, and to simultaneously consider other people's points of view" (Lynn & MacAvoy, 1995, p.130) complemented by "skilful social entrepreneurship, flexibility and imagination, and the ability to learn on the fly" (Reinicke et al., 2000, p.xi). Identifying these collaboration dynamisers is very important if we want to support a learning community development. Starting from the fact that every member of the community has a given capacity and interest in actively participating in the proposed collaborative activities and that some actions can be taken to foster the participation of specific actors within the network, in general two ways exist to foster fruitful collaboration within the community. The choice is to either focus our support on the actors which show a strong starting collaboration capacity, facilitating the emergence of community leaders with a strong collaboration reputation and with the capacity of "amplifying collaboration" (Novak, 2011), or on the other hand to target the actors that appear more hesitant to engage in collaboration activities, aiming at reaching a more balanced growth of the community. It is not only a matter of finding the best way to activate existing collaboration capacities, but a choice which normally gives an imprinting to the community evolution. Focusing on the collaboration leaders has the benefit of working with a few hubs relying on their capacity to engage the other nodes, but at the same time is a risky solution since, in case a collaboration hub would stop behaving collaboratively, the whole community connectedness is put in danger, with the effect of disengaging the learners which were relying on that particular leader. Focusing on the collaboration followers has the advantage of being able to directly reach all the actors of the community and can facilitate the discovery of hidden collaboration energies, but it is more effort-consuming and risks uncovering existing resistances to collaboration, with a negative effect on the community development.

Conclusions

The success of any networking venture depends on the capacity of the involved parties to successfully negotiate the aspects of the cooperation from their point of view, and on how much the parties are able to work towards a common objective, openly sharing concerns and problems and working out solutions in a collaborative way. This is a fundamental condition to be met, we believe, if we want learners to comfortably "sit in the driving seat" of their lifelong learning process, and if we want them to take

advantage of the collaboration and possibilities offered by ICT. At the same time, the fact that all networking activities depend on negotiation and consensus building among human beings increases the creativity potential of the network but also its unpredictability, and therefore a sound understanding of the mechanisms and of the conditions which lay behind a successful collaboration experience must guide any collaboration support activity.

The scientific community is paying increasing attention to the study of networks (Newman et al., 2006). "Very few people realize, however, that the rapidly unfolding science of networks is uncovering phenomena that are far more exciting and revealing than the casual use of the word network could ever convey" (Barabási, 2002, p.7). Network-based approaches, and especially Social Network Analysis (SNA), can be used to understand networks from a different point of view, since they "inquiry into the patterning of relations among social actors, as well as the patterning of relationships among actors at different levels of analysis, such as persons and groups" (Breiger, 2004, p.1). In the education field, network science can help uncovering the patterning of learners' interactions. The application of SNA to education, especially in the case of distance learning, can allow understanding the patterns of interactions between learners systematically (De Laat et al., 2007). For example, in their study on collaborative interactions in an online classroom, Russo and Koesten conclude that SNA offers an opportunity to understand how communication among members in an online learning environment influences specific learning outcomes (Russo & Koesten, 2005). In addition, SNA and network sciences can offer to education studies new approaches to understand learners' collaboration, as demonstrated by the work of Reffay and Chanier (2003) who adopted from SNA a measurable definition of group cohesion that did not exist in education science.

We believe that the findings coming from network sciences that we have briefly presented in this paper can be extremely useful for educational researchers and practitioners when it comes to supporting meaningful collaborative learning. These issues would deserve further exploration and adaptation to real life cases within education. Specifically, it would be important to substantially apply Social Network Analysis techniques to learning networks, as suggested by Breuer et al. (2009), hence looking at collaborative learning with the appropriate level of *network thinking*.

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Inclusive Open Educational Practices: How the Use and Reuse of OER can Support Virtual Higher Education for All

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Abstract

Following the recommendation of the 2012 Paris OER Declaration, promotion and use of OER should aim at widening access to education at all levels, both formal and non-formal, in a perspective of lifelong learning, thus contributing to social inclusion, gender equity and special needs education. Given the different kinds of special needs of students with disabilities (physical, sensitive, cognitive), this aim implies a holistic approach to the design, use and reuse of OER. However, this hasn't been the case so far. Standards and guidelines developed so far tend to consider accessibility only in relation to the design of resources. In this paper we discuss how critical it is to ensure OER use and reuse follows guidelines which consider the different types of disabilities and educational aspects involved in an integrated way. In order to assure "equal opportunities" in education, accessibility should have an educational component related to the level of understanding the users may have of the OER content. We submit a proposal for classification which addresses the educational objectives of OER, the difficulty level of understanding of the content of the resource, and the user profile determined by the type of disability in an integrated form.

Keywords: Access; Open Educational Resources (OER); Standards Open Educational Practices (OEP), WCAG 2.0.

From Open Educational Resources (OER) to Inclusive Open Educational Practices (IOEP)

One of the most important trends in education in recent years has been the creation of a vast integrated network of experts and institutions which are generating high quality validated content for use and reuse by everyone in the world. Open Educational Resources (OER) are digital resources with potential educational value for educators, students and self learners which have been published on the web with an open license or are in the public domain (White & Manton, 2011). By clearly describing all permissions and restrictions of OER, open licensing made easier, legal and safe its use, re-use, edition, adaptation and repurpose to different contexts. In fact, evidence demonstrates OER can be of very different types and sizes, ranging from simple educational resources, readings, images, open textbooks, videos, links, up to complete courses called OpenCourseWare (Downes, 2007). See Figure 1.

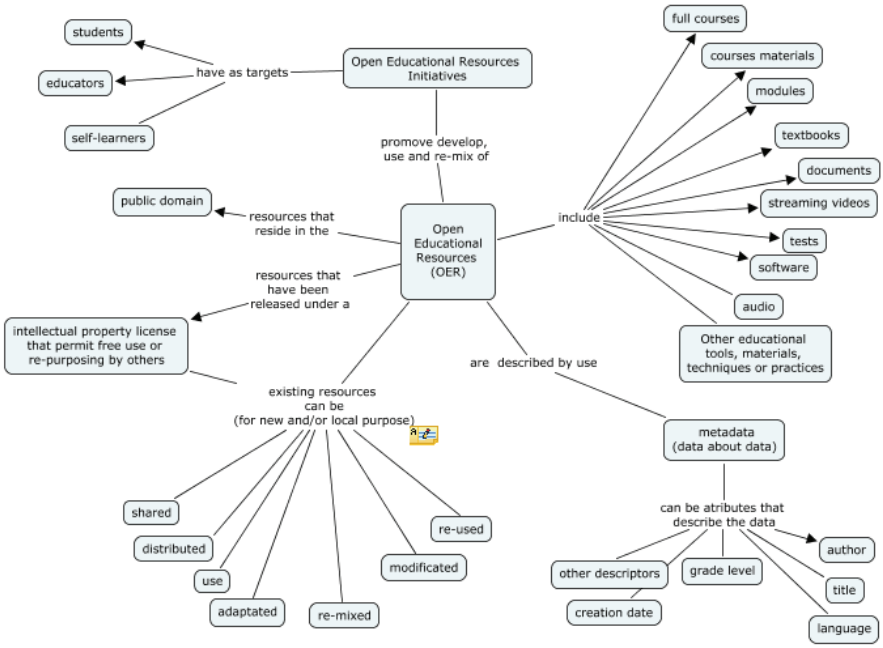

Figure 1. Ontology Concept map on OER / OCW (Piedra et al., 2010)

Although OER were seen at first as informal instruments to widen participation in Higher Education through the facilitation of access to quality content, throughout the years have been increasingly used in educational formal practices as well. In fact, from an academic perspective, OER hold an educational value and pedagogical structure.

Educational resources developed in open environments can be continuously improved and adapted for use by a wider community of educators. Thus, the use of OER enhances educational innovations by rapidly disseminating new ways of teaching and learning. Indeed educational resources that can be reused promote collaboration and participation by all. Therefore, OER call for the notion of open educational practices which relates to any educational activity involving the creation, use, or dissemination of an adaptive open learning resource.

However, even if OER are increasingly available across the globe, evidence shows their use is not proportional. This is due to the fact that the production of free access digital resources alone is a necessary but not sufficient condition to widen participation in Higher Education. In order to achieve this goal we need to develop strategies that effectively integrate the use of these materials in the daily practice of teachers and students, as well as improve the visibility of existing resources. This new emerging concept of open educational practices (OEP) can be best defined as practices which support the (re) use and production of OER in the framework of educational policies that promote innovative pedagogical models, and respect and empower learners as co-producers on their lifelong learning process. In fact, we believe OEP implies a dramatic change in educational cultures which extends the sole free universal access to content. By using the term «practices», we are no longer referring to repositories alone, but also to how they are and can be used by educators and learners. OEP brings indeed a need for the full review of the design and implementation of learning experiences. Access by all has to come as a result of inclusive educational practices and not only by assuring resources is accessible by all.

After concentrating on building infrastructure and tools, researchers and practitioners have realized how critical for success it is to move now to the design of improved learning experiences for all and to innovate in educational settings, particularly formal ones. Beyond access to open learning architectures, the focus of open education is now on learning as a process that can be built and shared in an inclusive way. In this paper we submit the idea that online open education needs also to fully integrate a third pillar apart from technology and pedagogy, which is ethics. In order to be fully open, virtual education needs to be inclusive. And, to assure this objective, it needs to articulate learning tools and methods with values.

The 2012 Paris OER Declaration paves the way for IOEP

Since the 2003 World Summit on the Information Society Declaration of Principles, the online education community has assumed the commitment to build a people-centred, inclusive and development-oriented Information Society. One where everyone can create, access, utilizes and share information and knowledge. The recent 2012 Paris OER Declaration follows the same path by explicitly recommending all national states to "promote and use OER to widen access to education at all levels, both formal and non-formal, in a perspective of lifelong learning, thus contributing to social inclusion, gender equity and special needs education" (UNESCO, 2012).

Indeed every human being has equally the right to learn. However, this universal right calls for a differentiated realization. In fact, opposite to common belief, widening participation in Higher Education is not achieved by simply providing mass-access to quality content. On the contrary, the universal validation of that generic right critically depends on the possibility of each and everyone access content according to his/her own differentiated needs. When considering learners with disabilities, the issue of accessibility becomes more complex indeed. Different kinds of special needs may be involved (physical, sensitive, cognitive). This notion of different kinds of accessibility makes it imperative therefore to use a holistic approach to the design, use and reuse of OER. It is an approach which promotes inclusive open educational practices.

Given the international regulatory framework on the rights of learners with disabilities, each country has established special laws for securing these rights. These regulations seek to ensure equal opportunity, non-discrimination and universal accessibility for people with disabilities. In the context of technology and distance education a number of standards and guidelines have been developed to help ensure that digital resources produced/used in the field of education are accessible for all. In general these studies consider the accessibility only in relation to the design of resources. However, as discussed in this paper, at the time of measuring the accessibility of resources it is critical to ensure guidelines for OER use and reuse which consider the different types of disabilities and educational aspects involved in an integrated way.

Accessibility standards for OER

The concept of OER is commonly associated with sharing open content in public repositories. This concept of OER is independent of the format used for files, which can be PDF, HTML, etc.. One way to classify these OER would be based on whether or not they meet accessibility standards. For example, in the case of web-based resources OER could be classified according to web accessibility standard WCAG 2.0. WCAG is the acronym for Web Content Accessibility Guidelines, developed by the WAI (Web Accessibility Initiative), a branch of the W3C (World Wide Web Consortium) which monitors the web accessibility.

Whereas "equal opportunity" not only refers to the accessibility of the resource but also covers the conceptual content accessibility of the resource, it is proposed to extend the principles of perception and understanding of the WCAG (W3C, 2008) to the content of the resource (pedagogical / cognitive accessibility), and classify the resources from evaluations by users, experts and end users, considering the different types of disabilities and educational resource pedagogical purpose.

The WCAG (W3C, 2008) standard specifies guidelines in the production of web resources in order to assure they are robust, understandable, operable and perceptible to people with disabilities. These patterns guide the web design, and each pattern contains a set of checkpoints with different priorities (priority 1, 2 or 3). Compliance with all priority points 1 states that the design of the web resource will have a level of accessibility, i.e. complies with all that HAS to be accessible. If the application meets all checkpoints of priority 1 and 2 then the resource achieves an AA accessibility level, i.e. complies with all that **has** and **needs** to. And finally fulfilling all priority points 1, 2 and 3 AAA accessibility level is reached indicating that the resource meets all checkpoints that **has** to, **needs** to and **should** comply with. In short, WCAG 2.0 accessibility focuses on web design resources, and accessibility levels (A, AA and AAA) are established based on the fulfilment of all checkpoints of priority 1, 2 and / or 3. Such guidelines for accessibility of OER design are not limited to web resources, but extend to other formats of educational resources, such as PDF, and Macromedia Flash (Adobe, n.d.).

In recent years several evaluation projects and proposals of metrics assessing the accessibility of web resources have been developed. Some of these works focus on the measurement / assessment of online learning environments considering education as an integrated, interrelated and dynamic process where technical aspects (platforms,

resources) and pedagogical ones (such as educational processes, cognitive styles) interact. Other works focus on the measurement of web resources, many of which based on the WCAG standard (Vigo et al., 2007; Brajnik & Lomuscio, 2007; Freire et al., 2008). In these last two works in particular two considerations appear repeatedly:

1. it is not enough to simply measure WCAG 2.0 checkpoints compliance, and
2. the importance of complying or not with the checkpoints is related to the educational purpose of the resource and the type of disability which affects the user.

Vigo et al. (2007) describe some problems in accessibility metrics for failing to consider the impact of error, its nature and manual expert assessments that can take into account accessibility aspects which sole empirical solutions cannot cover. The suggested solution includes these aspects classifying the errors has: errors, warnings and generic problems. In addition, it takes into consideration aspects as the frequency of errors and human judgment when assigning the importance level to errors.

Brajnik and Lomuscio (2007), present a very interesting problem that can be related directly with our case. It is whether the metrics describe if a website is more accessible for certain user groups than others. The authors propose a methodology for measuring accessibility that combines automatic evaluations based on WCAG, with the expert reviews which should consider the types of disabilities and objectives. They advocate a mapping between WCAG checkpoints and types of barriers related to the types of disabilities.

Brajnik identifies 36 different types of barriers (video without titles, movement of the content, ambiguous links, opaque objects, etc.) with metadata which describe the mapping with verification points, WCAG principles and also to which kind of handicap it affects. For example, the barrier "Image maps with no text" is mapped with verification points 1.1 and 1.1.1 of WCAG 2.0 and linked with the handicap "blind" affecting the principle "Perception".

Most research has considered the pedagogical aspects related to learning objects, the user's profile and the context of use, using metadata for describing educational aspects of the object or resource, and assessments or judgments made by the community (experts, end users, and others). Different styles of assessment range from very simple mechanisms as an indication by the user if the resource was helpful to more sophisticated forms as LORI used by the project eLera (Nesbit et al., 2003) filled by experts. Therefore, a possible way to classify OER may be considering the level of

understanding of the content of the resource perceived by different user profiles, determined by the type of disability, while taking into account the pedagogical objective of the resource.

The WCAG 2.0

WCAG was first published in 1999 in its version 1.0. A second version (WCAG 2.0) was published in 2008. In the first version the standard established general principles of accessible design. It is divided into 14 guidelines that provide design solutions and using as an example common situations in which the design of a page may cause problems of access to information. The guidelines also contain a series of checkpoints (65 in total) that help detect errors.

Each checkpoint is assigned to one of three priority levels set by the guidelines:

- Priority 1: are those aspects which a web designer has to comply with because, otherwise, certain groups of users could not access the website information.
- Priority 2: are those aspects which a web designer needs to comply with because, if it were not so, it would be very difficult to access information to certain groups of users.
- Priority 3: are those things that a web designer should comply because, otherwise, some users may experience some difficulties in accessing information.

According to these checkpoints pursuant levels are set:

- Conformance Level "A": all checkpoints of priority 1 are satisfied.
- Conformance Level "Double-A": all checkpoints of priority 1 and 2 are satisfied.
- Conformance Level "Triple-A": all checkpoints of priority 1, 2 and 3 are satisfied.

As for WCAG 2.0, it is an official W3C recommendation which is based on the1.0 version. It bases on four fundamental principles: **Perceivable**, **Operable**, **Understandable** and **Robust** (in reference to the features of an accessible Web document).

- Perceptible: The information components and the user interface should be presented to users in a way that can be perceived.

- Operable: The components of the user interface and navigation must be operable.
- Understandable: Information and the management of the user interface must be understandable.
- Robust: Content must be robust enough to work with current and future technologies.

Each of these principles is divided into various patterns to a total of 12. Each of these patterns in turn is atomized into "success criteria" (Success Criteria) that form validation and which total 61 (in concept, equivalent to the 65 checkpoints of the WCAG 1.0). W3C recommends that new and updated content apply WCAG 2.0 instead of 1.0.

A proposal for accessibility classification

In light of the principle of "equality of opportunity" in education, one may wish accessibility should have an educational component related to the level of understanding the users may have of the OER content. We therefore propose a classification based on the references described in the previous section which addresses in an integrated way the educational objectives of OER, the difficulty level of understanding of the content of the resource, and the user profile determined by the type of disability.

On one hand it is proposed to classify the level of OER according to the WCAG 2.0 accessibility level achieved, by the pedagogical objective of the resource and the types of contexts of use (user profile and / or characteristics of the environment) determined by the types of disabilities. For this, we will use the method proposed by Brajnik and Lomuscio (2007), presented in the previous section, according to which a mapping between the checkpoints of the WCAG 2.0 and the types of barriers is used (Brajnik, 2009). Experts determine how to classify the resource according to the type of disability and educational purpose. In our case we suggest to ask experts to indicate the degree of importance (high, medium, low) of each barrier. In this sense a resource will have a:

- level of "pedagogical accessibility A" if it meets all checkpoints listed as "highly" important by experts;
- level of "pedagogical accessibility AA" if it meets all checkpoints listed as of "high" and "medium" importance;

- level of "pedagogical accessibility AAA" if it meets all checkpoints, that is the ones listed as of "high", "medium" and "low" importance.

We note that a resource not meeting WCAG AA level, could nevertheless be classified with level "educational accessibility AA" according to this classification if the non complied checkpoints affect only aspects which are irrelevant to the pedagogical objective of the object or to the context of use. This is because in both cases these aspects are of low importance.

In addition we propose to classify OER regarding the understanding of content achieved by the different user profiles. We call this "pedagogical content accessibility" of OER for different types of disabilities. Basic assessments of "the information contained in the application" (very easy to understand, was understood, difficult to understand) made by end users grouped according to their disability profile will make possible to classify OER by level of content understanding in each type of disability. This type of evaluation allows that classification of OER in what regards understanding of content for different disabilities is determined by users themselves using the resource and will be increasingly accurate.

Table 1: Classification according to "Pedagogical Accessibility to Content"

	Very Easy to Understand	**Easy to Understand**	**Difficult to Understand**
Problems of Sight			
Problems of Earring			
Problems of Moving			
Cognitive Difficulties			
…			

Classifications proposed here follow a similar direction to the concept managed by the IMS (IMS, 2002) when linking OER with comparability. Because it is possible for different OER to share a same pedagogical objective although having been developed using different technologies each offering features by type of disability (video, text, etc.). In short, they may have been designed for specific user profiles or contexts of use.

Being the relation between OER features and each user's potential limitations a critical aspect regarding accessibility, user profile is basically determined by the type of handicap. For instance, when facing visual limitations, the use of features such as colour, contrast, picture size, etc., influence the degree of accessibility each user can expect to have. In the cases of sound limitations, the features as the quality, volume

and the spectrum of the sounds used determine the level of access users with hearing problems can aspire to.

In short, the interfaces or the content structure of an OER may be designed to better reach user needs. If we consider his/her type of handicap and the cognitive aspects associated with each specific limitation, we can use the best tools to design OERs.

By producing OERs in such a way, we may reach the end user with greater quality. Although, in general this may lead to a less wide public diversity. Therefore, following the IMS suggestion to manage OER packages, we argue OERs which share the same pedagogic objective, but differentiate in structure and/or specific interface for the various user profile types should be packaged. This way, the 'OER Package' could reach each different user profile in the most efficient manner possible and at the same time reaching all of them. That is why the accessibility level should be measured as an 'OER Package'.

As shown in the discussion, pedagogical aspects are critical to determine OER accessibility. In light of this, we have presented a set of procedures that make possible to include them in the evaluation and classifications of OER. The proposal presented in this paper combines important elements in the evaluation of resources or learning objects. These include automatic assessments, community assessments (end users, experts), WCAG, types of disability and educational objectives. We must determine the level of detail of the types of disabilities that will be used in the project. It could disaggregate large groups as 'hearing problems' into more specific groups such as "deafness", "hard of hearing", etc.. This type of classification manages to bridge the points of view of design and pedagogy, articulating them in an ethical framework. In the cases of complex OER that include activities, task, communications tools, etc., which can be performed individually or in groups, the educational methodology used in the OER is a very interesting element to considerer when measuring the level of the student's success in understanding the content. Furthermore, it is expected that this element will be important in the treatment of cognitive limitations. At this first stage, the effect of the educational methodology used in relation to the pedagogical accessibility beyond the scope of this proposal, but it is something to consider in future work

Conclusions

It is critical for every author and web designer of OER to be aware of the ethical and legal aspects which justify delivering accessible academic content. In fact, the educational value of OER use depends on how these resources allow access to quality learning experiences for all. This is why OER authors and web designers should be trained in the technical aspects needed to provide educational content in an accessible format. Keeping in mind however that in order to adapt or create material that is accessible to people with special educational needs (ex: physical disabilities) may require in several cases the assistance of qualified personnel, whether related professionals or specialized institutions.

Creating accessible OER is as important as measuring the degree of accessibility achieved; not only from a technological point of view but pedagogical as well. Therefore, it is necessary to have evaluation processes which take into account standards, pedagogical goals, users' profiles and contexts of use. These kinds of evaluations require the participations of authors, experts, reviewers, and end users, who provide feedback that can be used in the evaluation processes.

There are formats and technical platforms which are more accessible than others, allowing more easily changing the language or parts of the document. Thus, the realization of the universal right to access quality content by all individuals, including the ones with special needs, is basically an ethical responsibility of all content providers of open education resources.

Finally, a note should also be presented regarding the critical aspects of searching and finding OER, as well as accessibility of content for all. The later also constitutes a part of the ethical responsibility of open education providers. In fact, all open digital resources must be described using metadata and should be interchangeable. However, even in the cases this feature is met, differences in the programs may make it difficult to search through different education systems. This is another ethical challenge of the global OEP community.

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University Students' Attitudes toward Cell-Phone Based Learning

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Abstract

Three groups of first year university students who studied Jewish concepts in a 15 week long (semester) course were exposed to three different modes of concept delivery. The first group of students received weekly lists of Jewish concepts sent via SMS messages to their cell-phones, the second group received weekly lists of identical Jewish concepts sent via email messages to their inboxes, and the third group of students received weekly snail mail lists of Jewish concepts. At the end of the semester the students in the three groups were tested on a standardized Jewish concepts achievement test and responded to a questionnaire that examined their levels of learner curiosity, learner self-efficacy and learner technological self-confidence.

Results of the study indicate no significant differences on the achievement test between students in the cell-phone delivery group, the email delivery group and the snail mail delivery group. However students in the cell-phone delivery group attained a significantly higher level of learner curiosity than their counterparts in the email delivery group who in turn exhibited a significantly higher perception of learner curiosity than students in the snail mail group. Students in the cell-phone group also had a significantly higher level of learner self-efficacy than their counterparts in the email and snail mail groups. No significant differences were found between students in the email group and those in the snail mail group on the learner self-efficacy factor. Lastly there were no significant differences in the perceptions of students in the cell-phone and email groups on the learner technological self-confidence factor. However, students in both cell-phone and email groups were significantly higher than students in the snail mail group on this factor.

Keywords: cell-phone delivery; achievement; learner curiosity; learner self-efficacy; learner technological self-confidence

Introduction

Distance learning has developed over the years to overcome the limitations of traditional face-to-face learning which necessitates the presence of the student in a formal classroom setting. Since its inception when distance learning was confined to the delivery of learning material via snail mail, landline telephone and radio broadcasts, it has progressed through delivery systems such as television broadcasts, videoconferencing and email, and at present focuses on digital delivery systems such as internet and mobile learning platforms. It should be noted that almost all of the above distance learning delivery platforms are still in use in different educational systems throughout the world (Katz & Yablon, 2003).

After the development of sophisticated third generation technology-based distance learning systems which include interactive video, internet, and mobile learning technologies, learning activity through the medium of these distance learning has been redefined to include and focus on the enhancement of student self-learning (Trentin, 1997). Technology-based distance learning offers tuition that is especially characterized by flexibility. In addition technology-based distance learning allow tutors to modify, reinforce and even model educational processes, thereby fulfilling the cognitive as well as affective needs and requirements of students (Wilson & Whitelock, 1997).

Some research studies (Katz & Yablon, 2009; 2011; 2012) have indicated that the development of mobile learning within third generation distance learning is especially suited to higher education mainly because of increased flexibility in the learning process, mainly due to the mobile learning systems that are increasingly used at present. Other studies have emphasized the importance of student activity provided for by current mobile learning systems and have indicated that the student activity variable contributes significantly to improved student achievement (Harris, 2012).

Mobile learning in general and SMS based learning in particular have advanced steadily over recent years and have become potential learning platforms at the university level. In certain areas, such as the learning of vocabulary (Katz & Yablon, 2009; 2011; 2012) and concept learning (Katz & Katz, 2011; Katz, 2013) SMS-based learning has advanced rapidly and is becoming an integral part of the learning process in many universities throughout the world. Research studies have indicated that the use of SMS as a delivery system for university learning is suitable for both cognitive and affective aims (Divitini et al., 2002; Garner et al., 2002; Prensky, 2005).

Many universities increasingly implement a variety of technology-based distance learning methodologies as viable alternatives to traditional classroom instruction. Distance learning via internet, email and cell-phones are increasingly penetrating the domain of academic learning and provide students with dramatically increased access to sources and subject matter relevant to their studies. Current technology-based distance learning is, inter alia, based on materials provided through methodologies such as internet, email and cell-phones and an ever increasing number of research studies are being conducted in order to verify the educational value of such technology-based distance learning methodologies at the university level (Harris, 2012).

Technology-based distance learning

Distance learning has developed over the years to overcome the limitations of traditional face-to-face learning which necessitates the presence of the student in a formal classroom setting. From its inception when distance learning was confined to the delivery of learning material via snail mail, landline telephone and radio broadcasts, it has progressed through delivery systems such as television broadcasts and videoconferencing and at present focuses on digital delivery systems such as internet, email and mobile learning platforms (Katz & Yablon, 2003).

Research studies have indicated that distance learning systems are perceived by students as being convenient, flexible, time saving and cost saving (Valenta et al., 2001). Interactive internet, email and mobile learning offer tuition that is especially characterized by flexibility offered to the learner. In addition the above methodologies are designed to provide platforms that enhance modification, reinforcement and even modelling of learning processes, thereby fulfilling the cognitive as well as affective needs and requirements of students (Wilson & Whitelock, 1997).

Ismail et al. (2010) confronted the implications of university learning and instruction using technology-based distance learning courses. They contended that technology-based distance learning has moved formal instruction in these courses from the on-site setting of the university campus to the home of the student. Learning has become significantly more flexible and content sources more accessible. Creating, sharing and knowledge capitalization are all facilitated by distance learning. Wider sources of learning are provided in technology-based distance learning courses and worldwide expertise can systematically be brought to the student's desktop.

With the rapid development of distance learning courses for use in university level education, increasingly more research studies have been conducted in an attempt to evaluate different issues related to technology-based distance learning. For example Chandra and Watters (2012) indicated that learning physics through the medium of technology-based distance learning not only enhanced students' learning outcomes, but also had a positive impact on their attitudes toward the study of physics. Ituma (2011) confirmed that a large percentage of university students who were enrolled in distance learning university courses had positive perceptions of the technology- based learning methodology and were in favour of joining additional distance learning courses that supplemented traditional face-to-face classroom instruction.

Valaitis et al. (2005) found that students who participated in technology-based distance learning courses perceived that the methodology increased their learning flexibility and enhanced their ability to process content, and provided access to valuable learning resources. Abdallah (2009) found that technology-based distance learning courses contributed to improved quality of students' learning experiences. Students reported positive attitudes toward their technology-based learning and felt that such learning should be part and parcel of standard learning practice. Delfino et al. (2010) confirmed that student teachers who participated in technology-based distance learning teacher training courses developed self-regulation of learning which provided them with the opportunity to flexibly cope with their academic assignments.

Cell-phone based delivery of learning content

One of the emerging learning strategies that has developed in technology-based distance learning in recent years and is receiving growing attention from both students and teachers is in the domain of mobile learning, and more specifically, focuses on cell-phone learning technology (Prensky, 2005). It should be noted that the use of cell-phones is multi-dimensional and cell-phone technology now provides technological possibilities including voice, text, still-camera, video, paging and geo-positioning capabilities. These tools provide a rich variety of platforms that enhance the learning process. Moreover, learning is not bound by space or time and students can choose to engage in learning without almost any limitations (Dieterle & Dede, 2006).

In many universities and other educational institutions in Europe, China, Japan and the Philippines, students already use cell-phones as learning tools. Thornton and Houser (2002, 2003) described several innovative projects using cell-phones to teach English at a Japanese university and the BBC World Service's Learning English section

offers English lessons via SMS in Francophone West Africa and China (Godwin-Jones, 2005). Cell-phone based learning projects managed by several universities worldwide have indicated the positive outcomes of such learning methods (Divitini et al., 2002; Garner et al., 2002; Seppala, 2002; Stone & Briggs, 2002). Additional studies have described language learning based on cell-phone technology (Kiernan & Aizawa, 2004; Katz & Yablon, 2009; 2011; 2012). These studies describe how vocabulary transmitted by SMS in a spaced and scheduled pattern of delivery contributed to student proficiency in English or other languages.

Research studies have been conducted to investigate students' attitudes toward the cell-phone based learning delivery process. Learner motivation, learner autonomy, learner control of the learning process, learning flexibility, learner curiosity, learner self-efficacy, learner self-confidence, and user friendliness of the cell-phone based delivery strategy are some of the major factors that have been found to contribute to the enhancement of technology-based distance learning. Mainemelis et al. (2002), Zurita and Bruce (2005), Cavus and Ibrahim (2009) as well as Katz and Yablon (2009, 2011; 2012) confirmed the association of some of the above affective variables with effective cell-phone based delivery of learning content. Studies that investigated the relationship between cell-phone based delivery of learning content learning and academic achievement (Katz & Yablon, 2009; 2011; 2012) indicated no significant differences between academic achievement attained by university students who received their learning content via cell-phone delivery and that attained by their counterparts who studied with other technology-based or traditional content delivery strategies.

In summary it may be noted that recent research studies have indicated that academic achievement (Perveen, 2010; Weng et al., 2010), learner creativity (McWilliam & Dawson, 2008; Tillander, 2011), learner flexibility (Greener, 2010; Mainemelis et al. 2002) and learner self-image (Offir & Aflalo, 2008; Renes & Strange, 2011) are issues, traits and attitudes that appear to be important in the learning process. In addition, Katz & Yablon (2009, 2011; 2012) have indicated the centrality of students' attitudes including learner motivation, learner autonomy, learning flexibility and user friendliness of the technology strategy toward cell-phone delivered learning content at the university level in Israel. Thus the current study, pays particular attention to the relationship between cell-phone learning and students' attitudes toward three additional major factors, namely learner curiosity, learner self-efficacy and learner technological self-confidence as well as to the issue of academic achievement attained by students when receiving their learning content via cell-phone based delivery.

Method

Sample

The research sample consisted of 79 first year students enrolled in a 15 week semester-long elective Jewish concepts foundation course offered at one of the seven chartered universities in Israel. The students were randomly assigned to the three different research groups that were provided with lists of definitions of Jewish concepts as follows:

1. 28 students received their Jewish concepts lists via cell-phone based SMS messages.
2. 26 were sent their Jewish concepts lists via email messages to their email inboxes.
3. 25 students were sent their Jewish concepts lists by snail mail delivery.

Instruments

Two research instruments were administered to the students in this research study. A standardized 100 item Jewish concepts test was administered to the participants in order to assess students' mastery of definitions of basic Jewish concepts. The test scale ranged from 0-100, the higher grades indicating higher levels of achievement on the Jewish concepts test. The second instrument administered was a 21 item Likert scale type response questionnaire (students responded to a five point scale with 1=totally disagree and 5=totally agree) designed to examine the students' perceptions of the attitudinal research factors as follows: The first factor, learner curiosity, contained seven items (Cronbach α= 0.82), the second factor, learner self-efficacy, consisted of eight items (Cronbach α=0:86) and the third factor, learner technological self-confidence, was made up of six items (Cronbach α=0.88).

Procedure

Students who were graduates of the Israeli state secular school system and who were enrolled in the elective Jewish concepts foundations course and possessed personal cell-phones with texting capacity were eligible for participation in this study. Following the selection of the students who met the above criteria, they were randomly assigned to the three delivery platform groups. Students in the first group received Jewish concepts via cell-phone based SMS messages; those in the second group

received Jewish concepts via email messages; and those placed in the third group received Jewish concepts via snail mail.

The students in the three groups were sent weekly lists that contained concise definitions of the Jewish concepts studied in the course, each list containing definitions of 20 new Jewish concepts delivered via the respective learning strategies. Thus each of the students received definitions of 300 Jewish concepts during the 15 week long course. On completion of the course the students in the three groups were administered a standardized Jewish concepts achievement test in order to asses their level of knowledge of the 300 Jewish concepts taught in the course. In addition they were administered the attitudinal questionnaire which examined their scores on the three attitudinal research factors, namely learner curiosity, learner self-efficacy and learner technological self-confidence.

Results

The main aim of this study was to examine the efficiency and effectiveness of three different learning delivery platforms of which two were digital. Two research questions were posed: the first examined the acquisition by students of knowledge concerning Jewish concepts and the second investigated students' perceptions of attitudes connected with the three learning strategies. The mean scores of each of the attitudinal factors were standardized in order to allow for a comparison between the factor scores. Standardized means and standard deviations of students' scores on the achievement test and on the attitudinal factors are presented in Table 1.

Table 1: Standardized Mean Scores and Standard Deviations of SMS, Email and Snail Mail Groups for Achievement, Learner Curiosity, Learner Self-Efficacy and Learner Technological Self-Confidence

Group	**Learner Curiosity Factor**		**Learner Self-Efficacy Factor**		**Learner Technological Self-Confidence Factor**		**Achievement**	
	M	**S.D.**	**M**	**S.D.**	**M**	**S.D.**	**M**	**S.D.**
SMS Delivery N=28	3.55	0.24	2.85	0.42	3.84	0.46	82.62	10.71
Email Delivery N=26	3.13	0.52	2.55	0.43	3.79	0.49	82.53	11.39
Snail Mail Delivery N=25	2.93	0.51	2.50	0.41	3.48	0.41	81.97	10.32

Four one-way ANOVA tests were conducted in order to compare students' achievement and attitudes as related to the three learning delivery platforms. While there were no significant differences between students in the three groups regarding achievement scores, with students from the three groups achieving similar grades on knowledge of Jewish concepts, significant differences were found for learner curiosity [$F(2,76)=14.30$, $p<0:001$, $\eta^2=0.27$], for learner self-efficacy [$F(2,76)=5.18$, $p<0:01$, $\eta^2=0.12$] and for learner technological self-confidence [$F(2,76)=4.93$, $p<0:001$, $\eta^2=0.16$]. Post-hoc Scheffe tests were then computed to establish the level of intra-group differences. The first Scheffe test revealed that students who received concepts via SMS messages to their cell-phones attained significantly higher scores on the learner curiosity factor than students who received concepts via email messages who in turn achieved significantly higher scores than students who received their list of concepts by snail mail. The second Scheffe test indicated that students who received concepts through the medium of SMS messages to their cell-phones attained significantly higher scores on the learner self-efficacy factor than either students who received concepts via email messages or those who received their concepts by snail mail. There was no significant difference between the scores attained on this factor by students in the email and snail mail groups. The third Scheffe test confirmed that while students in the cell-phone and email delivery groups achieved significantly higher scores on the learner technological self-confidence factor than students in the snail mail group, there was no significant difference between the scores of students in the cell-phone and email delivery groups on this factor.

Discussion

Results of the statistical analyses of the data collected in this study indicate that none of the three delivery platforms, namely delivery of the lists of Jewish concepts throughout the semester long course via SMS messages to students' cell-phones, delivery to students' email inboxes and delivery to students via snail mail, had any significant advantage regarding academic achievement of students on the standardized Jewish concepts test. Students who studied via all three strategies attained similar grades on the test. Thus it appears that achievement is a factor that does not distinguish between delivery strategies with measured achievement outcomes. This result confirms those indicated in a number of research studies that confirmed that, on the whole, different delivery platforms do not significantly contribute to differential academic achievement (Katz & Yablon, 2009; 2011; 2012).

However, the findings of the study indicate that the different delivery strategies employed in the present study to provide weekly lists of Jewish concepts to the students are associated with significantly differential levels of learner curiosity, learner self-efficacy and learner technological self-confidence. Scores attained by students on the attitudinal research factors, after receiving lists of Jewish concepts delivered via the three delivery strategies, confirm that SMS messaging to cell-phones is associated more significantly to students' learner curiosity and learner self-efficacy that either email message or snail mail delivery. The contribution of email messages, although less significant than that of the SMS to cell-phones strategy, also contributed more significantly to students' learner curiosity and learner self-efficacy than lists received by snail mail. In addition, the SMS messages of lists of Jewish concepts sent to students' cell-phones as well as lists sent to students' email inboxes made a significantly higher impact on students' attitudes toward learner technological self-confidence than lists of concepts sent to students via snail mail. Although there is no statistically significant difference between students' attitudinal levels associated with learner technological self-confidence after receiving lists of Jewish concepts via cell-phone or email delivery systems, the students' mean perception of their learner technological self-confidence is higher than the mean perception of students who experienced the email delivery system. However, it appears that because SMS messages to students' cell-phones as well as lists sent to students' email inboxes may be identified as technologically oriented delivery strategies, they have a more significant impact on learner technological self-confidence than lists of concepts sent to students via snail mail.

It appears that learner curiosity is the most potent of the research factors and most significantly distinguishes between students who studied by way of the three learning strategies. Cell-phone based SMS strategy appears to be most significantly related to the learner curiosity of students toward the learning process, followed by the more moderate level of learner curiosity of those who used email learning delivery, who in turn have a comparatively higher level of learner curiosity than students who studied by the snail mail learning strategy.

The results of the present study indicate the potential of SMS messaging to cell-phones of relevant subject matter as a positive delivery platform as it relates to learner curiosity, learner self-efficacy and learner technological self-confidence. It should be noted that the significant attitudinal findings do not correlate with higher academic achievement when the three delivery platforms are compared. Further studies need to be conducted so as to further explore the possible relationship between academic

achievements on the one hand and students' attitudes toward learner curiosity, learner self-efficacy and learner technological self-confidence on the other.

From a pedagogical point of view it appears that, in general terms, cell-phone-based delivery of learning content leads to more significantly positive attitudes of students than email or snail mail delivery with learner curiosity perceived as the central factor that best distinguishes between the three delivery strategies studied in the present research.

Conclusion

In conclusion it may be stated that the results of the present study indicate that, while the three delivery platforms used in the study to provide students with weekly lists of Jewish concepts were no different from each other in promoting students' academic achievement, the relative advantages of cell-phone based SMS messages most positively enhanced learner curiosity, learner self-efficacy and learner technological self-confidence of students. The results of the present study regarding the relationship between the delivery of subject matter at the university level via SMS messages sent to students' cell-phones and students' levels of learner curiosity, learner self-efficacy' learner technological self-confidence add to the findings of other research studies that indicated the significance of the cell-phone delivery platform of learning content for students' levels of learner motivation, learner autonomy, learner control of the learning process, learning flexibility and user friendliness of the technology strategy (following Divitini et al., 2002; Garner et al., 2002; Seppala, 2002; Stone & Briggs, 2002; Thornton & Houser, 2002; 2003; Katz & Yablon, 2009; 2011; 2012) These studies indicated that cell-phone based delivery systems can be offered as a positive alternate technology-based delivery system of relevant subject matter when compared to other technology-based learning strategies that utilize expensive and sophisticated infrastructures. University educational systems in all societies, whatever their technological infrastructure, can profit immeasurably from the use of SMS to cell-phone learning content delivery in relevant university subjects and courses.

More accessible technology and improved pedagogy need to be developed in order to enhance the use of cell-phones in routine learning at the university level but it seems clear that the mass incorporation of cell-phones in institutions of higher education is a distinct possibility in the foreseeable future.

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Emotional Presence and Mobile Learning: Learner-driven Responses in a Wireless World

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Abstract

This study examines the use of mobile devices among online graduate students, and what effect, if any, this use has on emotional presence. We suggest that emotion exists as part of the online experience, just as it does in all human experience. The intensity of graduate study and the benefit of increased interaction through online communities may be a catalyst for both increased use of mobile communication devices to support learning and a stimulus for emotion. Results demonstrate that half the online graduate students in this study use mobile devices in support of their learning. Emotional presence does exist for online graduate students but it is not influenced by mobile device use. There is a significant gender difference in the measurement of emotional presence.

Introduction

Citizens around the world are increasingly using mobile technology to learn and to complete everyday tasks. In some countries, citizens do not have computers but they have tablets and mobile phones. The number of mobile subscriptions will reach the seven billion mark in 2013 which will be higher that the human population [31]. As smart phones and tablets become more use-friendly and powerful, they will replace the desktop and notebook computers. At the same time, mobile communication devices are used by students in higher education (Ally & Stauffer, 2008; Kim et al., 2006; Goh & Kinshuk, 2006), and particularly graduate students studying online. Highly portable mobile devices, such as smart phones and mobile phones, provide students with the opportunity to access online learning sites at any place and any time, greatly expanding the boundaries of when and where learning can take place. However, there has been little systematic inquiry into the role of mobile communication technology as learning tools in online delivery (Dearnley et al., 2009). Insight into the current use of mobile devices as tools for online learning allows educators to better understand how users of mobile devices can engage within an online learning community. Additionally, this contribute to current understanding of how the use of mobile devices fits into online learning as conceptualized in the online Community of Inquiry model. This research examines:

1. the extent of mobile device use to support learning in a sample of online graduate students and
2. the relationship between mobile device use on the emergence of a fourth type of online presence for learning: emotional presence (Garrison et al., 2000; Cleveland-Innes & Campbell, 2012).

Literature review

There is limited research on emotional presence in online and mobile learning. Cleveland-Innes and Campbell (Cleveland-Innes & Campbell, 2012) reported that emotional presence may exist as a fundamental element in an online community of inquiry and suggested that emotional presence may co-exist with social presence. Angelaki and Mavroidis (2013) investigated the role of communication and social presence in distance learning environments and how they impact the emotions of learners. Results indicated that when communicated with tutors, positive emotions increase while negative emotions decreases. The majority of students reported that social presence improves communication which resulted in positive emotions. Based

on these results, it appears that communication and social presence resulted in increased emotional presence.

Few studies have focused on the use of mobile communication devices as learning tools. A recent systematic review of literature found just 44 studies directly concerned with the use of such devices in an educational setting (Cheung & Hew, 2009). There is very little known about the use of mobile internet devices in place-based or virtual graduate-level programs; "one consequence of rapid technological development is that (a) theoretical framework for mobile learning has not yet been established" (Peng et al., 2009, p.172). Sound research adds knowledge onto the edges of current theories, models and premises in light of changing contexts and new technologies for learning.

The Community of Inquiry (CoI) model has been well-researched in reference to online learning, but is only now being applied to the extensions of online learning, such as mobile learning. The CoI framework provides a process-oriented, comprehensive theoretical model that can inform both research in online learning and the practice of online instruction. It assumes that effective online learning requires the development of a community (Rovai, 2002; Thompson & MacDonald, 2005; Shea, 2006) supporting meaningful inquiry and deep learning.

The model views community as something that emerges in support of online learning. It emerges in the relationship between three elements: social presence, teaching presence, and cognitive presence. Social presence is defined as the degree to which learners feel socially and emotionally connected with others in an online environment; cognitive presence describes the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse. The central organizing element is teaching presence: the design, facilitation, and, most importantly the direction of cognitive and social processes for the realization of personally meaningful and educationally worthwhile learning outcomes. The CoI framework has been under scrutiny for almost a decade and has seen many published works from its original presentation by Garrison, Anderson and Archer (2001), to more recent validations of its premises (Bangert, 2009; Shea & Bidjerano, 2009; Akyol & Garrison, 2008), suggesting that it provides a process- oriented, comprehensive theoretical model that can inform both research in online learning and the practice of online instruction. It is this model that guides our work to understand the place of mobile communication devices in support of a formal online learning experience. From this point of departure, we consider how this model can support our understanding of online

graduate study, the added use of mobile devices and the emotional presence that may exist in the combination of all three experiences.

According to O'Reagan (2003) the transition to online learning, and so too mobile learning, provides the opportunity to test assumptions about emotion embedded in our practice, building on the strands of research regarding emotion and the human experience (Barbalet, 2002; Plutchick, 2003), emotion and cognition (Damasio, 2003; Dirkx, 2008) and, more recently, emotion and learning. "In recent years, there has been a growing interest in the role of emotions in academic settings, especially in how emotions shape student engagement and learning" (Linnenbrink-Garcia & Pekrun, 2011, p. 1). Educational psychology has long considered achievement motivation and education performance to be related to emotion (Weiner, 1985; Artino, 2009; Artino & Stephens, 2006). Callahan called for educators who espouse critical theory to "manage the emotions in their classrooms actively" (Callahan, 2004, p.82). He pointed out that "the very praxis of critical theory relies on emotion as its catalyst" (p.75).

Lipman (2003) explicitly wrote about emotion while describing learning through a community of inquiry. For Lipman, a community of inquiry is "thoroughly social and communal; a method for integrating emotive experience, mental acts, thinking skills, and informal fallacies into a concerted approach to the improvement of reasoning and judgment" (p.18). The application of this same model in online learning by Garrison, Anderson and Archer (2000) identifies emotional expression as part of being socially present online. The possibility of an expanded role for emotional presence in online graduate learning is central to this research.

In an inquiry-based, graduate-level online learning environment, student self-managed exploration is more prevalent than direct instruction. Graduate study itself implies the development of self-managed learning and knowledge development. Rather than expecting to be spoon-fed knowledge and provided with answers to challenging questions, we expect that graduate students studying online are i) more likely to use mobile devices to self-manage and enhance their learning and ii) that the intensity of self-management and advanced level study at the graduate level may intensify emotional presence. Based on this assessment of the characteristics of online graduate study, we anticipate that:

1. Students in this sample will use mobile devices in support of their learning and
2. Those using mobile devices will experience greater emotional presence.

Research method and data collection

These predictions were tested as part of a larger cross-sectional mixed-methods research study of online learning and the use of mobile communication devices. The research reported in this article employed a quantitative survey design, using a validated instrument measuring the four presences of a community of inquiry, controlling for the use of mobile devices, the use of mobile devices for learning, and the demographic variables age and gender. The unit of analysis was the individual student and the time-frame was a single snap-shot assessment.

Self-administered online questionnaires were received from a purposeful sample of online graduate students studying in multiple programs at a uni-modal distance and online university. Respondents were recruited via email invitation, with a follow-up reminder and final invitation sent in seven to ten day intervals to non-responders. This sampling yielded an N of 406 students from 30 courses over three consecutive semesters. The response rate averages to 29 % over all semesters.

Data analysis

Initial statistical analysis using SPSS version 20 provided frequency and descriptive data to allow for data overview and cleaning. Principal components analysis was performed on survey responses received from 406 students. Items not loading according to theoretical premises were deleted from the data set before further analysis was completed. T-tests for differences between means and regression analysis of the dependent variable emotional presence were employed for the independent variables of mobile device use, age and gender.

Findings

Table 1 indicates the number and percentage of students who used mobile devices, and those who used such devices for learning. Neither gender ($\chi^2(1)=3.347$, $p=.067$) nor age($\chi^2(10)=16.084$, $p=.097$) had a statistically significant impact on the use of mobile devices.

Table 1: Mobile device use

	Uses mobile device	Use mobile device for learning
User	309 (76.1 %)	206 (50.7 %)
Non-user	96 (23.6 %)	95 (23.4 %)
Not applicable		96 (23.6 %)
missing	1 (0.2 %)	9 (2.2 %)
Total	406 (100 %)	406 (100 %)

Graduate students in this sample used mobile devices generally and specifically for learning in the course in which they were enrolled at the time of the study. There was no effect of age ($\chi^2(9)=8.398$, p=.495) or gender ($\chi^2(1)=0.185$, p=.667) on use of mobile devices.

A four factor solution identified a theoretical structure in support of Teaching Presence, Social Presence, Cognitive Presence and Emotional Presence. Table 2 identifies item principal components results with Eigen values greater than 1.

Table 2: Four factor principal components analysis with varimax rotation

	1	2	3	4
The instructor helped to focus discussion on relevant issues in a way that helped me to learn.	.752			
Instructor actions reinforced the development of a sense of community among course participants.	.749			
The instructor helped to keep course participants engaged and participating in productive dialogue	.747			
The instructor helped keep the course participants on task in a way that helped me to learn.	.746			
The instructor clearly communicated important course topics.	.741			
The instructor provided feedback in a timely fashion	.728			
The instructor helped to focus discussion on relevant issues in a way that helped me to learn.	.718			
The instructor clearly communicated important course goals.	.699			
The instructor provided feedback that helped me understand my strengths & weaknesses relative to the course's goals and objectives	.679			
The instructor was helpful in identifying areas of agreement and disagreement on course topics that helped me to learn.	.677			
The instructor provided clear instructions on how to participate in course learning activities.	.673			
The instructor clearly communicated important due dates/time frames for learning activities.	.587			
The instructor encouraged course participants to explore new concepts in this course.	.581			
Learning activities helped me construct explanations/solutions.		.629		
I felt motivated to explore content related questions.		.606		

I have developed solutions to course problems that can be applied in practice.		.569		
I can describe ways to test and apply the knowledge created in this course.		.547		
I can apply the knowledge created in this course to my work or other non-class related activities.		.541		
Combining new information helped me answer questions raised in course activities		.629		
Course activities piqued my curiosity.		.606		
Problems posed increased my interest in course issues		.569		
Reflection on course content and discussions helped me understand fundamental concepts in this class.		.547		
Brainstorming and finding relevant information helped me resolve content related questions.		.541		
I utilized a variety of information sources to explore problems posed in this course.		.483		
I felt comfortable interacting with other course participants.			.794	
I felt comfortable conversing through the online medium.			.775	
I felt comfortable participating in the course discussions.			.766	
I felt comfortable disagreeing with other course participants while still maintaining a sense of trust.			.728	
Online discussions help me to develop a sense of collaboration.			.535	
I felt that my point of view was acknowledged by other course participants.			.531	
Getting to know other course participants gave me a sense of belonging in the course.			.477	
I was able to form distinct impressions of some course participants.			.396	
Emotion was expressed when connecting with other students.				.776
I found myself responding emotionally about ideas or learning activities in this course.				.626
Expressing emotion in relation to expressing ideas was acceptable in this course.				.594
The instructor demonstrated emotion in online presentations and/or discussions.				.559

A four-factor principal components analysis with varimax rotation yielded a matrix well-aligned with the theoretical model proposed. The original three factors representing teaching, social and cognitive presence had a 94 % agreement with the original solution. Teaching presence included all items proposed to measure the underlying activities of teaching presence. Social presence was missing one item normally found in the solution identifying activities of social presence: *Online or web-based communication is an excellent medium for social interaction.* This item loaded with emotional presence. Cognitive presence was missing one item normally found in the solution identifying activities of cognitive presence: *Discussing course content with my classmates was valuable in helping me appreciate different perspectives.* This item loaded with social presence. The item: *The instructor acknowledged emotion expressed*

by students loaded with teaching presence, not emotional presence as proposed. The item: *I felt comfortable expressing emotion through the online medium* loaded with social presence, not emotional presence, as proposed. All other measurement items loaded as expected (Factor analysis table available on request and will be included in full article). Results indicated 90 % agreement with the theorized measures of four presences. Items that did not load as expected were removed from further analysis and are not represented in Table 2.

Hierarchical regression analysis identified a significant gender (female as the reference, β=-.101, p=.045) effect on emotional presence, when controlling for age (β=-.017, p=.739) and use of mobile device (β=.025, p=.625); females scored statistical significant higher on emotional presence than did males.

Discussion

Our first objective was to verify that this sample of online learners responded to elements of presence in similar ways to students in past research (Arbaugh et al., 2009; Cleveland-Innes & Campbell, 2012). Results of principal components analysis indicated 90 % agreement with the theorized measures of four presences. Items that did not load as expected were removed from further analysis.

It was interesting to note that two emotional presence items loaded with two other presences. The item: *The instructor acknowledged emotion expressed by students* loaded with teaching presence. This is not surprising, given the emphasis that the item places on actions of the instructor. The item: I felt comfortable expressing emotion through the online medium loaded with social presence, not emotional presence. It seems reasonable that, as there are overlaps among the other three presences, emotional presence will also overlap with the other presences. One item from social presence loaded with factor four and items designed to measure emotional presence. This item: *Online or web-based communication is an excellent medium for social interaction* is theoretically attributed to *Affective Expression,* one of the sub-scales in the Community of Inquiry model. This is worth noting, and warrants further consideration of the relationship between affective expression and emotional presence.

While the majority of students said they used mobile communication devices, only one-half of students in the total sample used these devices in support of their learning. There was no relationship between mobile device use and age, gender or emotional presence. There was, however, a significant relationship between gender and

emotional presence; females scored higher on emotional presence items than did males.

Conclusions

The majority of online graduate students, as represented by this sample, use mobile devices. Just over one-half use mobile devices in support of their formal learning. Emotional presence scores do not vary by mobile device use, whether the student was identified as a general user, or one who uses their device specifically for learning. However, the individual influence of gender on emotional presence is significant. This result is the same when controlling for mobile device use and age; gender has an impact on emotional presence scores regardless of age of student or type of mobile device use.

Results from the other three presences, in combination with emotional presence, show a change in scores based on the use of mobile devices for learning, but not for general mobile device use. These results are beyond the scope of this paper, but will be further explored and reported. Evidence from this preliminary exploration of emotional presence and use of mobile devices confirms the existence of emotional presence as a separate element in the online and mobile experience, with a significant gender effect on emotional presence.

Strategies to make use of the communication capabilities should be utilized to increase communication from anywhere so that learners can form community of learners. Designers of mobile learning materials should include strategies to allow learners to interact with each other and with the tutor so that there social presence has a high likelihood of emerging; this interaction effect may result in higher levels of emotional presence.

As communication with mobile technology shifts from text-based communication to verbal communication, research should be conducted on how text-based communication and verbal communication impact emotional presence. Research should also look at gender differences of text-based and verbal communication and emotional presence. The context in which students learn may affect the expression of emotional. With mobile technology, people can learn from any convenient location; this could impact their emotional and social presence. Research is need to determine how learning in different contexts (classroom, workplace, home) impact social and emotional presence.

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User Centred Design of Learning Spaces

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Abstract

Design of learning spaces has to correspond to users' needs and goals, how current and future practices evolve in them and users' appropriation of new technologies. Financial constraints, increased diversity among students, more and more students taking part-time and flexible learning options, etc. have created new challenges for the design of learning spaces in higher education. In this new context innovative technologies are also emerging and the ways people communicate, coordinate and collaborate are continuously transforming and changing, which affect learning space design.

Our empirical data consist of focus group interviews with students and directors of studies. Students preferred learning spaces that integrate formal learning activities with more informal and leisure activities. Directors favoured spaces that integrate their roles as teachers, researchers and administrators. Based on the results of the focus group interviews we designed three different learning spaces supporting classroom teaching as well as more informal learning, which allow students to perform both individual and group activities. The learning spaces described are not yet evaluated. We believe that the appropriation of a learning space is a complex process. Hence, when evaluating the use of learning spaces it is essential to understand users' practices, their needs and goals and their use of learning resources.

Keywords: Learning spaces, user centred design, information and communication technology (ICT), technology enhanced learning

Introduction

During the past two decades technology-enhanced learning has been one of the most prominent innovations of the educational arena. The promise of e-learning to deliver a design-rich, place-independent and fully customizable educational setting can be said to emanate from the marriage of new technologies with new theories of learning. Of course, ICT and learning has much longer history, but in the 1990's a renewed interest in how the rapidly developing information technology affects how, when and why people learn arose. Many also believe that the so-called Twenty-First Century Learning Skills (21CLS), especially the skills in information, media and technology, are important skills to learn for students (Warshauer & Matuchniak, 2010). Currently, with the rise of new technological innovations such as smartphones and tablets the development and exploration of how these artefacts can be used to enhance learning have increased even further (Brand & Kinash, 2010; Hoover & Valencia, 2011; Mulholland, 2011). At the same time as technology and learning theories have developed societal changes have occurred that have implications for learning spaces at universities. Today many universities struggle with financial constraints that have impact on the amount of time a teacher actually spends in the classroom. In Sweden a consequence of this is that the amount of teacher time in classrooms are decreasing to levels that are less than 5-6 hours/week (Markowski, 2009). For students this means that they to a larger extent than before have to act, and learn, in environments outside the formal classroom.

Given the developments, and others, described above it seems obvious to conclude that the educational context has become more complex the last decade. Therefore it is important to recognise that designing today's learning spaces is a quite intricate task, including considerations regarding technology, financial matters, learning theory and students' preferences. In other words, designing learning spaces require a holistic perspective rather than a narrow focus on specific activities in the educational context (Jones et al., 2005). Hence, the purpose of this paper is to investigate whether a user centred approach can help us to design learning spaces in a more holistic way.

Learning spaces

Many describe the current trends of higher education as involving a higher degree of enrolments, increased diversity between students, ubiquitous access to Internet, and an unbundling of faculty roles through employment of more non-tenure and part-time instructional staff. Because of these trends there are rising needs for more, and better, coordination between the various actors involved in the educational context (Levy & Murnane, 2004; Paulson, 2002; Schuster & Finkelstein, 2004; Greenhow & Belbas, 2007).

When students, technologies and learning settings are changing this will also have impacts on learning spaces in general. According to Temple (2007) the concept learning space has not attracted any greater attention from scholars or researchers. Within higher education space has mostly been related to space planning or architecture, rather than being perceived as a crucial resource in teaching and learning. In this paper we adopt Brown's (2005) definition of learning space: "Learning spaces encompass the full range of places in which learning occurs, from real to virtual, from classroom to chat room." Moreover, the developments in the blended learning area have led to a situation where more and more learning spaces comprise both virtual and physical elements.

However, the subject of learning space has received more attention during the recent years, see for instance (JISC, 2006; Oblinger, 2006; SMG, 2006; Scottish Funding Council, 2006). These authors present examples of how to design learning spaces that are more appropriate for students and teachers needs. Most of our current physical learning spaces are based on design models from the 1950s and 1960s, and contain lecture halls/rooms with rows of chairs/tables (Temple, 2007). In accordance with new pedagogical models there has been an increased interest to investigate whether space have impact on how we teach and learn, and Monahan (2002) have put forward the concept of built pedagogy in which the central idea is that spaces provide affordances and limitations that affect what is possible or not. Lomas and Oblinger (2006) stress the issue of student habits and practices and argues that they will have impact on future learning spaces. New student's practices that are adopted are for instance the extensive use of information and communication technologies. This creates new requirements for learning spaces. According to quite a few researchers characteristics such as digital, mobile, independent, social and participatory should be taken into account in the discussion of future learning spaces. In their investigation of space and pedagogy Jessop and Smith (2008) found that most of the layout and furniture at their

campus favoured a teacher-centred approach. Similar to JISC (2006) they also found that users where reluctant to change the current format of the learning space and hence adopted the learning signalled by the arrangement in the room.

The discussion above indicates that our learning spaces have become larger. Jones, Dirckinck-Holmfeld and Lindström (2008) emphasises this and argues that virtual learning spaces in higher education alone is complex settings that involve management, administration and ICT as well as teachers and learners. Organisational aspects as well as pedagogical aspects influence practices in these environments. However, we lack established methods for evaluating the interrelationships between all the different actors involved in the integration of technology, support, collaboration, teaching, learning, and administration of technology in learning spaces (Greenhow & Belbas, 2007).

To summarise, we argue that there exists no design method for learning spaces that cover the social and organisational habits developed in a larger context. Much has been done, i.e. organisational models and structures for designing virtual universities or solving interoperability problems with learning objects, but methods that analyse affordances of technologies and developmental processes of work practices that change the setting over time are very little explored. Also, the use and design of virtual learning spaces traditionally have had a product focus, that is, a focus on designing devices, artefacts, systems or services. Although there exists attempts to develop spaces that support "communities of practices", there have been little investigations into how such learning spaces should be designed. In general practices are difficult to design – they tend to evolve and develop dynamically over time. Design should therefore consider the appropriation of technologies and their integration into practices, rather than trying to optimize the product or tool with multiple features.

The usefulness of a user centred approach

From the discussion above we can conclude that learning spaces can be intrinsically complex. Regardless of whether the learning space is virtual, physical or blended we believe that it is important to take a student and teacher (as users of learning spaces) perspective into account. This must include users' habits and the communication patterns they have developed through the appropriation of technological artefacts. In order to investigate the importance of the user perspective we conducted a pilot project at our university. Our purpose was to inquiry if a user centred approach can be useful in the design of future learning spaces.

The pilot study was conducted in fall 2008 and involved 33 students and 12 directors of studies. The students came from different educational programmes (engineering, social work, business administration, etc.) and were both bachelors and master students. They represented both campus students and students from two of the university annexes. Both are located more than 100 kilometres from the university campus.

The method we used was focus group interviews in which the participants conducted two brainstorming sessions. Our approach was influenced by Stuart (2008) who used a similar method when redesigning the library at the Georgia Institute of Technology. The first session considered the physical part of the learning space, and the second the virtual part. Each focus group interview contained 5-7 persons and took approximate 45-60 minutes. We began all interviews with the physical part. The first thing to do was an individual task where the participants were asked to imagine entering a physical building and make notes of what they would like to find. They wrote their findings on post-it notes and there were no limitations in what they could write; it could be a feeling, things, a reflection, a sentence, etc. Thereafter they individually clustered their notes on a whiteboard. Finally, they worked in groups and clustered their notes and negotiated a common header on each cluster. The same procedure was then made for the virtual part of the learning space. In this session we began by asking the participants to reflect on what they wanted to see when entering their own virtual space at the university.

The data from the focus groups show a clear need for integration of private and public spheres. Neither directors of studies nor students seem to make a clear distinction between their work (directors) and their studies (students) and what they do outside these contexts.

The students described their ideal physical space using concepts as:

- Water: waterfalls, brooks, streams, fountains.
- Colour: warm colours, interesting wallpapers, colour themes in each classroom.
- Sound/Audio: a combination of silence and sound (people talking, music, birds, etc).
- Plants: flowers, green plants, plastic flowers.
- Tempting furniture: sofas, round tables, round rooms.

- Accessibility: computers and printers, wireless, information and service centre in the middle of campus.

The directors of studies had similar reflections on the physical space. They organised their expressions around the following themes:

- Pale and open spaces.
- Flexible spaces that is easy to rearrange according to teaching and more informal learning.
- Mobility and wireless communication.

Both directors of studies and students describe the virtual learning space as more complex than the physical learning space. Their descriptions most often involve an integration of private and public spheres outside the educational context with the virtual learning space. The students describe an integration of private and formal technologies and behaviours and communication patterns that probably have evolved through appropriation of personal technologies, for instance mobile phones, instant messaging and web 2.0 technologies such as Facebook, flickr, YouTube, blogs, etc. The students' description of the virtual space were organised around the following themes:

- Features: calendar, forums, chat, reservation systems, links to everything connected to my educational programme, history of my performance (e-portfolio), future courses, personal communication, course material, search engines, news, SMS and connections to Facebook, YouTube, etc.
- Design: "clean", fresh, nice colours, easy search, programme oriented rather than course oriented, personal, practical, structured.
- Services: buy and sell, contacts with other students, dinner proposals, cultural events, maps over free wireless connections, collaborations with companies and public authorities, translations, pod-casts, TV-guide, job advertisements, student union, time tables for bus and trains, dissertations, links to associations and other non-profit organisations.

The ideal virtual learning space for the directors of studies seems to be more complex than the students' ideal virtual space. The directors describe their ideal space as a space that is able to integrate much of the support they need in their roles as teachers, administrators and researchers. They describe the virtual space using the following themes:

- Teaching and learning environment; integrating all the resources related to a course.

- Information space; contacts with colleagues at the department, the faculty, the university as a whole, the vice chancellor, news and regulations from the government.
- Project space; common information space for different kinds of projects, "memory spaces", my own documents and resources.
- Research; links to my research field, networks, forums, library connections.

The concrete result of the focus group interviews – a new learning environment

Based on the focus group interviews our department invested in furniture and technology for the students during 2010 and 2011. The traditional computer lab with rows of tables and computers has almost disappeared in favour of more collaborative settings. Figure 1 shows a computer lab with a large table in the middle. The character of the table is inspired from an architecture setting with standing wheelchairs and a table surface, which allows students to write on the table with whiteboard pens. Each computer workspace allows students to sit in pairs and collaborate.

Figure 1. Collaborative space for digital media production

Our department have been using videoconference equipment in decentralised education since the 1990's, but always in special studios or large lecture halls. Today, our new videoconference systems are integrated in regular classrooms and permit the teacher to perform classroom teaching with students on campus and off campus at the

same time. Figure 2 shows part of one such classroom. It also includes furniture for collaborative activities (d).

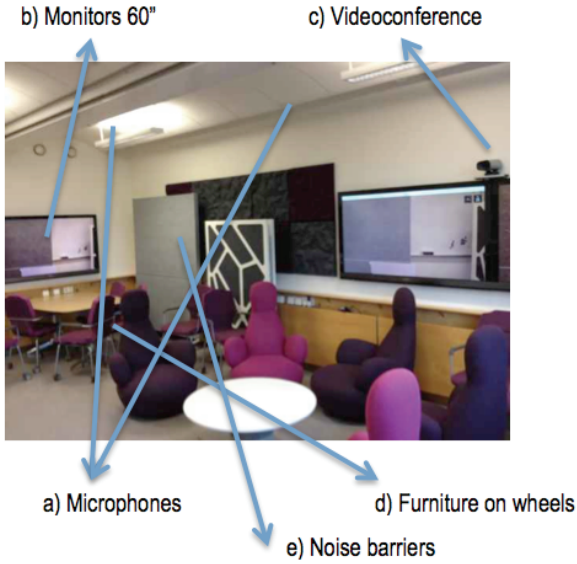

Figure 2. Configuration of a lecture room (former computer lab)

Each table and chair is on wheels and can easily be moved, and each workplace is connected to a wall mounted 60" monitor (b) (in total there are five monitors installed in the room). When the classroom is not used for teaching the students can use the room for individual or group activities by using the noise barriers to separate their workspace from the rest of the room. The teacher can use either all the monitors to perform classroom teaching showing e.g. slides on every screen, or allow students to collaboratively use each monitor for group tasks.[1] The room is also equipped with a videoconference system and microphones in the ceiling (a, c) to connect students from remote sites to the learning space. Currently, the department has two satellite groups approximate 140 km from campus, with a dozen students at each site. At those sites the rooms are equipped with only a 60" monitor, a web camera and a computer containing the client software to the videoconference system.

Outside the classroom the university have started to develop learning spaces according to the outcome from the focus group interviews. One example is the learning space in the University library (see Figure 3). This space is available for students 24-7. It is

[1] http://www.youtube.com/watch?v=_W19KV7veUs

designed to be very flexible. All furniture is on wheels and can be rearranged according to individual preferences.[2]

Figure 3. Learning space at University library

Concluding discussion

Our focus group interviews show that both students and directors have goals and interests that are not in accordance with current learning spaces. Students prefer spaces that integrate formal learning activities with more informal and leisure activities. Teachers, on the other hand, prefer spaces that provide flexible settings appropriated to their pedagogical approaches and their other roles as researchers and administrators. Similar results can be found in other investigations. At the University of Technology in Sydney, the students reported that the following activities was of importance in learning: i) Quiet spaces to study alone, ii) Spaces to socialise with other students and friends, iii) Spaces to study with others, and iv) On-campus shops. In the same study the participating teachers claimed that they had shortages of flexible spaces and breakout spaces (TLC, 2005). Chism, et al (2005) describes a similar picture in which the students valued comfort, colour and design.

The learning spaces described in the previous section are not yet evaluated. We believe that the appropriation of a learning space is a complex process. Therefore, we have to investigate what kind of interdependencies and dependencies that already exist or may

[2] http://www.youtube.com/watch?v=ZQ2dCwzSTvY

be created when users appropriate a certain learning space. When teachers and students enter a learning space they rely on earlier experiences and practices. Transformations of practices seem to be related to individuals' actual needs, motives, goals, and problems in the specific space. The learning space can therefore be affected in two ways. Firstly, the learning space can inform current practice among the users in such a way that it transforms to a new practice. Secondly, the current experience among the users of the space can influence the choice and use of artefacts, which then will affect the learning space. If users want to solve a problem or see an opportunity within a learning space they are motivated to transform their practice. If the current learning resources are insufficient for this transformation they search for other resources to fulfil their objectives. If the learning space does not correspond to users' needs and goals they enter other spaces that are more appropriate. Hence, when evaluating the use of learning spaces it is essential to understand users' practices, their needs and goals and their use of learning resources.

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