Editorial for the Special ECEL Issue of EJEL
M. Ciussi

The papers in this special issue have been selected from those presented at the 12th European Conference on E-learning, held in October 2013 at Skema Business School in Nice, France.

The idea behind this collection is to present current trends in e-learning from the wide range of research topics presented at the conference. The main emphasis is on social and mobile digital learning and the growing role of MOOCs in online Education.

The first paper by Barber et al. explores the use of “digital moment” produced by students to create a genuine online community of learners and carry out authentic assessment. This article highlights how the use of narrative, a method of educational qualitative inquiry, fits the 21st century learner, focusing on the human element while remaining embedded in the technology.

The second paper by Blom et al. looks at knowledge sharing from a different angle: ePortfolios in Art. The study focuses on the impact of e-Portfolios on both the institutional policy-makers who control curricula and the academics who teach. Blom’s paper discusses four e-portfolio experiences in different universities.

Katzlinger’s paper deals with online collaborative learning using wikis; it looks specifically at collaboration between inter country teams – a vital skill for future managers in a globalized world. Katzlinger presents the virtual learning scenario that is based on a shared case study; the author then discusses the benefits of this type of course design in terms of learning impact, social skills and teaching efforts.

King et al have tackled the issue of MOOCs in the public health sector. Their paper describes the initial design process, as well as the MOOC learning style: the aim being to encourage participants to assume the role of reflective practitioners.

The paper by Kostolányová and Šarmanová presents a model for automatic adaptive learning where students can adapt their activities to their preferences and learning style. They ask the question « What kind of study material can fit
such personalised learning? » and examines answers such as building blocks for adaptive learning.

Makri et al. present an interesting paper that explores ‘learning through design. They look at an interesting project to blend a community of learners in face to face sessions based on a webquest which the students themselves are to construct.

Another view of Moocs is presented in Nkuyubwatsi’s paper. This time it is not from a course design perspective, but rather from the learner’s viewpoint. Relating his own story, the author shows how MOOCs open up access to education, favour cross-cultural educational development and allow learners to obtain education in underprivileged settings (like in Africa).

The paper by Nortvig looks at how to develop the « embodied » human-technology relationship in diverse course settings, particularly in hybrid synchronous classrooms (eg. live videoconference teaching and recorded videoconference teaching). The paper explores the effects of the non-presence of the teacher in the hybrid synchronous classroom: how does this impact student interaction, their perception of what makes a classroom and the variety of learning locations (home and/or school).

The final paper in this issue by Lærke Weitze and Ørngreen offers a very different perspective on simultaneous videoconferencing. It provides an insight into the transition towards the « Global Classroom Model » implemented in Denmark for adult learning, where students learn both from home and school, on a « hybrid campus ».

This collection thus offers a panorama of some of the important issues in eLearning today. Papers on social learning, Moocs, hybrid campuses, videoconferencing, authentic assessment, adaptive learning and communities of learners have been selected in order to help practitioners, teachers and researchers. I hope they will prove helpful both for practical use and to inspire further discussion.

Mélanie Ciussi
Empowering Knowledge-Building Pedagogy in Online Environments: Creating Digital Moments to Transform Practice:

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Abstract: The purpose of this paper is to examine a specific online pedagogical tool, “Digital Moments” that can be an effective strategy for building online communities in a knowledge building environment. While the paper will examine the specific techniques and teaching methodologies that enabled the authors to create authentic online learning experiences in undergraduate and graduate courses, it also analyses how and why this strategy moves beyond simple constructivist thinking to the complexities of teaching in the digital world. Knowledge building in online environments requires students to take risks, try new digital tools, and find the modalities that work best to express the new knowledge they are creating. This pedagogical approach views students as more than consumers of technology, but creators of new and innovative digital means of expressing concepts. Using both synchronous and asynchronous methodologies, the authors examined the highs and lows of translating meaningful face to face practice to the online environment. The paper examines teaching strategies used in a six week online graduate course using Adobe connect, Blackboard LMS and synchronous weekly meetings. Through the use of unique strategies such as “digital moments” and embracing creative thought, an authentic, constructivist community was created. The authors’ journey to developing this authenticity, their online pedagogical style and an innovative, safe learning community has been chronicled using narrative qualitative inquiry in this paper. The writers’ use of digital moments empowers students to create and have ownership of their own online community. This paper articulates their journey into the abyss of digitizing themselves as teachers; it examines the specific techniques used for best practice in online learning, while simultaneously celebrating the splash of colour that is essential to brighten digital learning environments.

Keywords: Online pedagogy; empowerment; knowledge-building communities, authentic practice

1. Introduction

In recent years the popularity of online education has increased significantly. This is in part due to its accommodation for anywhere, anytime learning, but it is also owing to a greater selection of high quality courses, as well as the emergence of more engaging learning management applications. With online education becoming an integral part of academic institutions and corporations worldwide, support for such endeavors can be critical to the growth and development of an organization, thus making educators who are well versed in the complexities of e-learning a valuable commodity. Although the growth of online learning is quite substantial, there are still many who believe that electronic courses are inferior to those that offer face to face contact. This endemic belief can stem from an appalling experience with online learning or simply because it is a non-traditional format that for some may invoke fear, anxiety or even complete disdain for that which is different.

It is clear that the world of 21C learners has become an information age where digital skills are considered essential. ‘Back to basics’ now means empowering students with the confidence, competence and skills to manage, analyse, and filter information, but also to create, develop and connect new information that solves social problems. It is essential in this powerful new learning world that we make our pedagogy two fold; we must teach the digital skills to cope and manoeuvre in this world, but we are also bound to teach the ethical parameters within which students live and work digitally. Creators of new knowledge must do so with the awareness that they are still part of a community, responsible to, and members of, that community. Thus, the pedagogical strategy of “Digital Moments” allows students and teachers to connect on a human level, while also embedding their learning in the technology that surrounds them.

Scardamalia and Bereiter (2006) state that we need pedagogical strategies that aim to

refashion education in a fundamental way, so that it becomes a coherent effort to initiate students into a knowledge creating culture. In this context, the Internet becomes more than a desktop library and a rapid mail-delivery system. It becomes the first realistic means for students to connect with civilization-wide knowledge building and to make their classroom part of it. (p, 98)
By continuing to prioritize the relationship-building aspect of online learning, sharing digital moments creates a safe online environment for students to use imagination and creativity to express new knowledge. Placing high value in the learning community on the notion that students and instructors develop creative authentic work is a key part of empowering them to learn; it also allows them to take these strategies forward to their own professional environments and social contexts.

**Knowledge building pedagogy is based on the premise that authentic creative knowledge work can take place in school classrooms, knowledge work that does not merely emulate the work of mature scholars or designers but that substantively advances the state of knowledge in the classroom community and situates it within the larger societal knowledge building effort.** (Scardamalia & Bereiter, 2006, p. 99)

What follows is a narrative exploration of the writers’ journey through teaching an online course, and the queries, struggles and victories that ensued along the way. Far from being separate from the digital environment, this paper reveals that our humanity remains front and centre amidst the online world. We are neither married to the technology nor divorced from it, but we emerge from it changed as teachers and learners. This story demonstrates also, that when teacher becomes learner, students find the courage to express themselves in a myriad of ways, including the powerful use of “digital moments”. Authentic practice emerges; students immerse themselves in the digital tools and become the actors who choose which tools are best to guide the learning process.

2. **Rationale of the study**

In a digital world, technophiles often crave precision and logical rational answers. But our humanity can be both inconvenient and messy; unlike computers we are not often fixed with re-booting. This human – machine interface requires us to acknowledge that human stories tell a broader picture of how the digital journey affects and changes us. While this method does not generate precise, reproducible results, social scientists can accept that narrative accounts of individual case studies are valuable sources of data (Merriam, 1998). Story-telling casts the learner as the heroic protagonist who creates and re-creates the meaning of learning as he/she goes. Teaching and learning do not exist in a vacuum or in a sterile digital environment devoid of human emotion. Thus, the sharing of these stories through digital moments, along with their raw feelings and sentiments, may be the best measure of the narrators’ evolution as digital learners.

Qualitative research approaches based on narrative methodology and story-telling are effective means through which theoretical constructs such as digital learning environments and adult education can be observed. Several authors, (Schon, 1987; Kilbourn, 1999; Eisner, 1998; Hunt 1987) discuss various facets of using these qualitative research methods to assess learning from the perspective of stories told by the self. A common thread among these authors is the knowledge of self as a professional practitioner through reflection on learning.

Literature on narrative study reveals that this kind of writing is an appropriate method to make connections that transform our knowledge as teachers. It is by examining the stories of individual teachers in the context of their environments, digital or otherwise, that we can gain insight into the professional expertise of teachers. Connelly and Clandinin (1990) state that “the central value of narrative inquiry is its quality as subject matter. Narrative and life go together and so the principal attraction of narrative as a method is its capacity to render life experiences, both personal and social, in relevant and meaningful ways” (p. 10). Bullough & Pinnegar (2001) state that “writing about teacher education practice may be best expressed in story form, where linearity gives way to a different sense of time, where emotion drives action” (p. 18). As such, the teaching strategy of digital moments allows the emotion to drive the learning and puts the students squarely at the centre of the process. Ultimately, the critical question of how pedagogy is transformed to an online learning environment is an evolving story which can be brought forward into a public discourse through sharing of digital moments.

Learning that occurs in digital contexts occurs in a world where information is rapidly evolving, where change is a constant, and the skill of analysing new data is essential. Recent work indicates that online learning, online communities and factors affecting participation are under constant review. (Cacciamari, Cesarini, Martini, Ferrini, & Fujita, 2013; Wegener & Leimeister, 2012; Griffin, McGaw & Care, 2012; Wang, 2012) This parallels what Schon (1987) historically refers to as learning to design in new contexts. Students in 21C digital environments must learn to parallel the process of what artists, designers, and professionals do when
approaching new and uncertain situations. Teaching students to think more artistically and creatively in a digital environment can help to prepare them and increase their expertise regardless of the professional environment they return to once completing the online graduate course. “Inherent in the practice of the professionals we recognize as unusually competent is a core of artistry” (Schon, 1987, p. 13). Thus, the rationale for using digital moments in online pedagogy is well grounded in the work of several authors who study the development of expertise (Bereiter & Scardamalia, 1993, Schon, 1987, Peters & Waterman, 2004).

3. Methodology

This project occurred in four phases and was used to test the effectiveness of using “digital moments” as a teaching strategy to create authentic online communities. The challenge of creating an online community given a compressed timeline during a short spring term and the brief synchronous amount of time in class was daunting. Each week students and instructors submitted and shared a “digital moment” through pods in Adobe Connect. These digital moments could represent an emotion, a moment from their week, a quotation, YouTube clip or art work. While the technique was simple, it was an extremely effective way to create online community. Digital moments allowed the participants and the instructors to share their stories, to bring their humanity to the learning environment in a safe and respectful way. Each person sharing a digital moment was telling their narrative, a method of educational qualitative inquiry that has a long history in educational research.

Phase 1 was a pilot project to try this new digital teaching strategy and it occurred over one term of teaching a graduate online course entitled “Authentic Assessment”. Participants in the pilot phase were 21 graduate students and the instructor who was an Assistant Professor in the Faculty of Education. Classes met three times a week for three hours over a four week period in the summer term. Anecdotal reflections from students recorded in Blackboard chat rooms, audio recordings of Adobe classes, and journal notes from the professor were used to reframe and improve the strategy.

Phase 2 involved using the same digital moment teaching strategy in an undergraduate course entitled “Psychological Foundations and Digital Technology – Adult Education Focus”. Participants in phase 2 were 26 undergraduate students in a Bachelor of Adult Ed Digital Technology degree in their 3rd year, the instructor, and a tutorial assistant. Students viewed two hours of video podcasts created by the instructor each week, prior to meeting in Adobe connect for tutorial for one hour per week over a twelve week period. Anecdotal reflections from students recorded in Blackboard chat rooms, audio recordings of Adobe classes and journal notes from the professor and tutorial assistant were used to reframe and adjust the strategy.

Phase 3 involved re-visiting the use of the “digital moment” strategy in a second term of the graduate course “Authentic Assessment”. Participants in phase 3 were 23 graduate students and the professor. Classes met for three hours per session twice a week over a six week period in the spring term. Anecdotal reflections from students recorded in Blackboard chat rooms, audio recordings of Adobe classes, and journal notes from the professor were used to analyze the effectiveness of the strategy in developing a sense of online community. Student participants in the study gave informed consent and were given permission to withdraw from the project at any time. Digital moments were collected by a tutorial assistant and kept in an e-folder for future reference.

Phase 4 involved qualitative unstructured interviews of students in the grad class to find out how they had taken the strategy of “digital moments” forward in their own professional environments. The students’ interviews were recorded and transcribed, analysed and coded for themes and reviewed. Reports of how this pedagogical strategy affected their own professional practice, their ability to create new knowledge and to foster knowledge building professional environments were included in the findings.

This paper uses qualitative methods to chronicle the journey of 23 students in Phase 3 and Phase 4 of the project, the lead professor and tutorial assistant through their six week online graduate course.

4. Data collection

Data were collected via online chats and classes in Adobe Connect were recorded for review. Recordings were kept on a secure server located at the university. Audio and text data were used to analyze how well the strategy worked in terms of students’ perceptions of their online community. Students were asked to maintain
weekly comments in Blackboard chat rooms and use this as a journal format to record their observations about their online community. It is also worthwhile to note that after the experiment had completed, several of the graduate students, themselves employed as teachers, continued to journal with the professor and began to use the “digital moment” strategy in their own public school classes.

5. Sample comments

<table>
<thead>
<tr>
<th>Comment</th>
<th>Description</th>
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<tbody>
<tr>
<td>It's so emotional</td>
<td>At the beginning I was so nervous and kind of cynical, so I thought “ok here we go” but now I really look forward to finding my own digital moment for the week and seeing everyone else’s</td>
</tr>
<tr>
<td>I loved it!</td>
<td>I never thought I would get to know people online so easily</td>
</tr>
<tr>
<td>Doing this every week makes me actually ask myself how I am doing</td>
<td>I like guessing who puts what in their Digital Moment</td>
</tr>
<tr>
<td>I just started using this strategy with my own class and they loved it! Grades 5-6 students really opened up and I used it on the smart-board</td>
<td>This is a great way to get students to express how they feel without words</td>
</tr>
<tr>
<td>I think it helps to decrease the kind of stereotyping that you can get when you meet people face to face</td>
<td>It’s really weird finally meeting classmates face to face and feeling like you already know them super well</td>
</tr>
<tr>
<td>When I used it with my own class it really helped me as a teacher to track where the kids were at</td>
<td>It’s a safe way to express how you are feeling inside, sometimes I think technology is less personal but this was really personal</td>
</tr>
<tr>
<td>I actually shared with my peers, which I usually don’t do in face to face settings</td>
<td>I found it interesting that you got to know people’s sense of humour, without any real cues like you would get in a f2f environment, like body language</td>
</tr>
<tr>
<td>My friends reached out to me on weeks when I was struggling</td>
<td>It levelled the field for me as the teachers did it too, so we could see who they were as people, which made me want to contribute more</td>
</tr>
<tr>
<td>Really valuable! Best course I’ve taken in this degree</td>
<td>One week my digital moment was about a family member who had died, but she really had inspired me to go back to school so, it was really good to share it with the group</td>
</tr>
<tr>
<td>I am amazed at how well I got to know my colleagues in this class; I’ve had some awful online experiences and this was a refreshing change</td>
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6. Findings

Several key elements for building online community emerged as the study progressed. 1. Building relationships, 2. Risk-taking and valuing mistakes, and 3. Sharing our own narrative stories through weekly Digital Moments. The interplay of these first three factors was critical to understanding the lenses we each brought to the digital environment. The online community developed easily by sharing our humanity and vulnerability through weekly sharing of our Digital Moments. Further to this, interviews with the students to ascertain how their own learning and professional expertise had evolved demonstrated additional important themes. Among these, were; 4. Empowerment 5.Finding voice, and 6.Increased confidence and competence both using technology which spawned a greater willingness to experiment with technology in their own professional practice.

6.1 Building relationships

During the course of our six weeks of classes together, the online chat room became a place where students could share their personal stories through digital moments. This is what Connelly and Clandinin (1995) refer to as “collaborative story-telling: in our story telling, the stories of our participants merged with our own to create new stories, ones that we have labelled collaborative stories; a mutually constructed story created out of the lives of both researcher and participant” (p. 12). The value of story-telling enabled us to learn more about each other. Sticking to “the content” was important, but straying to the personal became equally important to the learning experience. The affordances of Adobe allowing the class lecture, presentation and simultaneous live chat mirrored the informal learning that occurs in a face-to-face environment. In fact, it was
ameliorated by the fact that the instructor was privy to all of the chat, so while it was challenging to attend to both, the formal and informal learning portions were seamlessly integrated. In a face-to-face situation, this may not have occurred as the instructor would not hear all side conversations. During the course, students became new parents, started new jobs, and shared stories of travel and what presented in their daily lives despite being in locations around the world. We said simultaneously good morning and good night to students in various time zones. And thus, through the use of digital moments, we shared our personal and emotional lives; real relationships developed. Beatty (1995) refers to this as the construction of personal professional practical knowledge. Each week a highlight of the class was having students arrive with enthusiasm to find out which digital moment would be shared by peers. Students new to the online environment were assigned a “buddy” to help them with any specific questions they had. In addition, giving students Adobe “host” responsibilities increased their empowerment and the sense of trust in the group. The inevitable mistakes did occur, with files magically disappearing or reappearing, but over the term the classroom became their own. This sense of ownership over the learning environment was essential to students taking risks in presentations and assignments. Teachers in online environments should not underestimate the importance of investing in community building activities, much as they might do in a face-to-face-setting; in the digital setting, this is a virtual, and mostly sedentary learning space, so keeping students in the ‘mental ready position’ is essential to keeping them engaged and on task.

6.2 Risk-taking and finding courage

Understanding and accepting the important roles of failure and mistakes are keys to developing a successful online pedagogy. Students arrive with a wide variety of backgrounds, not only in the course content but also in technological skills. Thus, the development of confidence in the value of our mistakes, and the expectation to make mistakes are important. As Schon reveals, we feel like failures “whenever learning a new competence requires unlearning deep-seated theories-in-use or whenever in situations of uncertainty feelings of vulnerability and ‘knowing what to do’ evoke a failure response” (1987, p. 290). It is important to cultivate our errors as sources of important information and pivotal learning moments. As athletes and other high performers do, analyzing our errors can be an important touchstone from which we can move forward. If students “hold unrealistically high expectations for their performance, once they become aware of their error, they believe they should produce complete and perfect interventions. They see error as failures and a blow to self-esteem” (Schon, 1987, p. 291). Learning from mistakes is a pattern followed by the best performers across professions. As sport psychologist Terry Orlick attests, failure can be instructive more quickly and accurately than any other learning experience (2000). Here again, using digital moments creates a safe and supportive learning community within which risk-taking is encouraged resulting in significant personal growth and innovative thinking in students.

That being said, our tolerance of mistakes is directly related to our ability to maintain focus and enthusiasm for learning. Monitoring the energy and engagement of online learners can be key to their success. This may mean tailoring assignments to their current skill level, rather than assuming that all students will perform at the same level and in the same way. It also means allowing for creativity and ownership of assignments, so that students can choose to demonstrate what they know in the way that makes the most sense to them, using the technology that best fits their usage. This level of meta-teaching is not unique to the online environment, but it is essential, since one of the lessons that students should leave with is the ability to choose which technological tool best suits their purpose; they should be able to critically analyse which ones work best and why, and they should have the confidence to use peer support to learn new modalities that they had not tried before. Again, the importance of a learning community, based on human interactions and relationships, can provide a foundation from which mistakes are no longer feared, but celebrated. Innovations are not products, but points on a continuum within which students can operate flexibly, based on their level of online skills. In a world where our access to information is becoming overwhelming, a discerning student should be able to select wisely the tool that is appropriate to answer the questions they pose. This, again, puts the curious student in the driver’s seat, reduces fear of errors, decreases perfectionistic tendencies to produce a “finished product” and emphasizes the advantages of working together through our inevitable stumbles and errors.

6.3 Finding humanity in digital moments

While the challenge of transforming oneself to an online pedagogue was daunting, certain shifts in my thinking and values had to occur. This dissonance was both cognitive and emotional, and is described by Whitehead...
(1993) as a ‘living contradiction’. Trying to mould old ways of teaching into an online format does not work; there was no quick translation, since the transmission of information is no longer enough for ‘real’ and meaningful teaching. Truly authentic and transformative teaching and learning required certain elements that could, and would emerge in the online class. Group work, activities, and getting to know one’s students still occurred, they merely appeared differently. Ultimately, it was only upon using digital moments online through adobe connect that my pedagogical approach shifted, and I was able to create and observe the development of a rich online learning environment.

Becoming ‘real’ online was a journey fraught with highs and lows, like any good adventure. It is clear that digital classrooms can provide uniquely human learning experiences. The gaps that I had anticipated in getting to know students, creating relationships between students online and designing a safe environment for taking personal risks in learning were not as scary as previously thought. Prior to teaching in this environment, I believed that “authenticity in teaching” would be more difficult online. In some respects, it is, but in our unfolding global world, perhaps we need to use this venue for reaching out to learners across the world. The technology was a powerful tool, but the humanity in the classroom remained untouched as the real driver of the learning experience. It is important to remember that the teacher-learner relationship cannot be replaced, nor does it need to be replaced by high tech solutions. The two must be woven together in an authentic and meaningful way, with both parties deciding how, when and why to use online environments. Margery Williams’ classic children’s tale of the Velveteen Rabbit sums up this notion:

“What is real”, asked the rabbit, “does it mean having things that buzz inside you and a stick out handle?” “Real isn’t how you are made” said the skin horse, “it’s a thing that happens to you. It doesn’t happen at all once. You become. It takes a long long time. That’s why it doesn’t often happen to people who break easily, or have sharp edges or who have to be carefully kept. Generally, by the time you are real, most of your hair has been loved off, and your eyes drop out and you get loose in the joints and very shabby. But these things don’t matter at all, because once you are real you can’t be ugly, except to people who don’t understand” (1991, p. 32).

A further addition to successful online pedagogy is the preservation of what can only be termed “gumption” (Pirsig, 1974; Atkinson & Claxton, 2000). Our enthusiasm for learning in a digital space must be nurtured and maintained. It is a level of energy in class that can be transformed for the benefit of both instructors and learners. However, it is important to maintain this quality when faced with the inevitable fact that, well, the technology does not always work. Pirsig states this succinctly:

Gumption is a reservoir of good spirits that can be added to or subtracted from; it’s the result of the perception of Quality; a gumption trap consequently can be defined as anything that causes one to lose sight of Quality and thus lose one’s gumption for what one is doing. Watch out for gumption desperation, in which you hurry up wildly in an effort to restore gumption by making up for lost time. It’s time for that long break (1974, p. 276).

Monitoring the level of gumption is a key component of online teaching success. Because we generally lack the face-to-face interactions, some elements of body language that might indicate disengagement cannot be perceived. Thus, the instructor must continually keep an eye on the level of energy and take as many breaks as needed to keep everyone focused and fully engaged. Using digital moments levels the learning field, and can successfully help both teacher and learner to maintain enthusiasm and ‘gumption’. While this implies a level of trust in our teaching instincts, Atkinson and Claxton concur that this “indefinable but desirable quality of gumption” (2000, p. 54) is essential to good online pedagogy.

6.4 Empowerment– An Artist’s Adventure with Digital Technology

As a traveller, an artist and an educator I have worn many hats over the years, but none have been more poignant than in my role as a student of graduate studies. For some people academic scholarship comes as natural as breathing, while for others it is a task far more daunting. For me school was neither easy nor difficult or very much fun. In fact, for the most part academic life held very little appeal until I discovered a more creative model through which to learn. Though I have long been an advocate for artistic expression and creative learning, prior to beginning this course of study nothing had prepared me for the transformational changes that would eventually occur throughout my professional practice.
From the concept of constructivism to the relevance of authentic learning, it was ideas such as these that led to the unearthing of more innovative methods for teaching and learning. So it is through this lens as both an educator and a student that I was invited to revisit the past as I evaluated prior practices and merged current theories with differing beliefs. In this selective incubator for higher learning, communities of practice developed, friendships were made, and collaborative projects tackled. Though new to this style of online teaching, it appeared to emerge seamlessly integrated from its use in a physical space to that of a virtual one, which seemed ideally suited to multi-modal learners like myself. In this shared space of digital expression and personal empowerment the traditional role between teacher and student, which was once was so clearly defined, has now become less focussed and far more transient than ever before.

In this altered universe where a teacher takes on the role of learner and vice versa, a more level playing field will ultimately emerge, thereby offering students a less intimidating environment in which to learn. Furthermore, the allowance to apply our learning through modalities of our own choosing was a strategic move that inspired visual learners like myself to achieve deeper understanding, especially when there were difficult concepts to be undertaken. Likewise, the endorsement of alternative processes promoted more original work, encouraged greater creativity, and supported freedom of expression; all of which gave students the confidence to delve into unfamiliar territory and take ownership of their learning in ways that were meaningful to themselves. This sharing of expertise can be seen as empirical evidence that communities of practice and the human spirit are alive and well in the virtual classroom.

6.5 Finding Voice

Students in this graduate course entered the experience having been part of the traditional university environment, where prestige of the instructor was based on achievements within a competitive world. While this world of the past may have been research-focused and knowledge-building, students did not feel that it allowed them to be creators of their own knowledge experience. Because of what Schon (1987) refers to as the competitive nature of the university, it became difficult if not impossible, and certainly not desirable to make mistakes in the creation of new knowledge. “Universities tend to see tasks or problems through the lens of their own subjects and courses, academic provinces are also political territories and interdisciplinary projects are quickly politicized” (Schon, 1987, p. 310). Thus, students in this course found that the removal of the competitive framework, and the subsequent development of a collegial and collaborative environment allowed them to find their own voices. In particular, it allowed them to ask for help with new technologies as needed, to offer help without expectation or reward, and to develop their authentic relationships with others. The idea that each individual voice held wisdom and artistry appeared to be foreign to the university culture, where certain types of knowledge were more privileged than others. When technical rationality is not balanced with autonomy and authentic creative practice, students stop using their own voices and the learning environment becomes stunted. It reverts to a traditional one where power structures favour the teacher. This is not what occurred when using digital moments. Students found voice each week, expressed themselves safely and honestly, yet in a context that was appropriate for a graduate course.

6.6 Confidence and Competence –Transforming Professional Practice

This pedagogical strategy enabled students to develop greater confidence and competence when using new modes of digital technology and to take it forward to their own professional practice. By feeling they could ask each other and the instructor for help, students were situated at the centre of learning experience, creating their own knowledge, translating it forward into their own professional worlds. This willingness to ask for help did not stop at the end of the course, as students began to create their own communities outside the university via Facebook, Linked-in and Twitter. As an example, one public school teacher in the course began to use the digital moments strategy with her grade 5-6 students. Having seen the powerful sense of community and safety it created, she used the smart board and an anonymous weekly submission to have students develop their own digital moments. Each Friday at the students’ request, she posted the class’s digital moments. Comments from these young learners indicated that it gave them more confidence because they felt more ownership in their learning environment. The teacher was able to teach ethical principles about appropriate use of technology to these young learners and reported that she believed that using digital moments had enabled her to do this.
7. Discussion

Several features emerged as key components of a good online community. First, there is critical importance to developing relationships and a sense of trust. Second, it is essential to create a learning environment where both the instructor and learner are taking risks. Third, there is great importance to injecting a human element to each class, including humour, grace, and emotion. And finally, it is important to address students’ pre-conceptions and fears of using new technology. This, in itself can be a barrier which needs to be overcome. Digital moments were an extraordinarily useful strategy for humanizing the digital learning space. This pedagogical strategy resulted in empowering students to create their own adventures with digital space, to find their voices as creators of knowledge and to use their connections with others to develop greater confidence and competence using the technology. Further to this, students were able to leave the graduate course and apply what they had learned beyond the confines of the university. This translation to professional practice is a testament to the power of this simple pedagogical tool. It also underlines that we cannot eliminate the human aspect when working in digital learning environments; in fact, it is even more important that people connect to one another in human ways so they do not become lost in the sea of information and technology that surrounds them.

The author’s initiation into the world of e-learning began by transforming a face to face course in Authentic Assessment to that of a digital platform. As is the case in most programs of study the participants enter the class with differing backgrounds, experiences, and levels of expertise, but ultimately it is how the instructor addresses these differences that determines student outcomes. By using digital moments, the style of teaching emerged seamlessly integrated from its use in a physical space to that of a virtual one, which was well suited to multi-modal learners and effortlessly connected that which made us different.

Moreover, the author’s use of icebreakers and the sharing of personal information were methods used to establish interaction, as well as initiating dialogue between members of the class. These activities were essential in building personal connections, encouraging students to adopt the role of mentor, and in becoming sources of inspiration for one another. As the course evolved these initial activities along with hosting privileges in Adobe connect fostered greater independence and gave students a sense of empowerment. By the same token, our acknowledgment that failure can be a highly instructive tool helped to minimize the burden on students who often see mistakes as a purely negative measure of their abilities.

It is the author’s conviction that exploiting the human element in cyberspace is not only possible, but should be essential, something that can be accomplished through the exploration of relationship building exercises, as well as the utilization of assorted tools employed in building communities of practice. These findings, supported through observation, group activities and the deployment of online tools such as chat rooms, discussion boards, and breakout rooms allow for the facilitation of large and small group discussions, thus providing the instructor with an overview of all that is happening in the virtual class.

8. Conclusion

The journey to developing an online pedagogical style has been chronicled in this paper. But the outcome of the struggle still must be student success. At the end of this course, students produced original work, combining their creative skills and unique talents with the appropriate piece of technology to demonstrate they had mastered the concepts. One student constructively used her life experiences in travelling, her photographic arts and her background in art to assemble a video which was truly inspiring. Her ability to use the technology as a vehicle through which she could express her learning, her way, is the best barometer of success a teacher can have. Another student, with seven years of teaching experience and new to the program, expressed distaste for and a lack of comfort using written text. He integrated the literature on the course to a video which is a model of alternative means of assessing students in digital environments. While a few of the students produced assignments with traditional modes (written work), the predominant feature was that once one student had done something original, the others wanted to learn how to do it. Students taught students; they taught their instructor. As a teacher, my barometers for a successful class in a face-to-face environment were not that different than online: the creation of supportive meaningful learning experiences: human interaction and sharing of the vital emotional components of learning; valuing and cherishing our mistakes and the important learning that emerges therein: and finally, the best of all, wanting to come back for more.
Working and living in the digital landscape requires that we do more than just build knowledge that is measured, assessed and framed by what we currently know. It requires us to step into worlds as yet unknown; to create new knowledge, and to use that knowledge to begin to address some of the complex social problems that exist. Students in these courses began to realize the power of digital learning environments, but they also came to realize the power they had within themselves to manage, invent, and create learning that worked for them. Both individually and collectively, confidence and competence increased.

The new challenge is initiating the young into a culture devoted to advancing the frontiers of knowledge on all sides. At the deepest level, knowledge building can only succeed if teachers believe students are capable of it. This requires more than a belief that students can carry out actions similar to those in knowledge-creating organizations and disciplines. It requires a belief that students can deliberately create knowledge that is useful to their community. (Scardamalia & Bereiter, 2006, p. 118)

While technology is a wonderful tool, the use of digital moments can be an effective strategy to bring humanity to the online learning environment. One may conclude that the relationship between teacher and student is an important element in e-learning that cannot be easily replaced with high tech tools. By embracing this journey through the telling of our stories using digital moments, we share emotion and empathy; it serves to remind us that when working with technology or beginning something new one can feel both intense frustration as well as sheer exultation. Instructors must embrace these often strong emotions in themselves and their students with courage and conviction.

It is important to note that both co-authors experienced this teaching style as students with the lead author. Their inclusion in this paper is testament to the power of digital moments to create lasting relationships in online environments. They too are advocates for creative expression, multi-modal learning, and the inclusion of alternative forms of assessment. Besides the large body of research attesting to the merits of a more creative approach to learning, it also nurtures multiple intelligences and allows the more timid or those left behind to ultimately find their voice. Moreover, there are some things that just cannot be articulated through text, and words cannot always convey what you wish to say. So perhaps it is time to not only transform one’s digital pedagogy, but to also transform academia’s traditional shades of grey with a little splash of colour in every digital moment.

References

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Knowledge Sharing: Exploring Institutional Policy and Educator Practice Through Eportfolios In Music And Writing

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Abstract: Many higher education institutions have embraced e-Learning and urge, or make compulsory, engagement by academics. Despite this, it is often the educators themselves who take the initiative to engage with innovative e-learning approaches. These approaches, in turn, can influence both peer- and institution-wide thinking about e-Learning. This paper focuses on the introduction or extension of ePortfolios within the creative arts at four Australian universities. Each educator adopted the ePortfolio for a different purpose, and in doing so has influenced, or is at least being monitored by, their university. All four studies have resulted in the growth, development and enrichment of teaching and learning because of the ePortfolio’s facility to engage students in such activities as reflection, ongoing student-teacher dialogue, collaborative essay writing, peer evaluation, identity formation, and the documentation of skills, competencies and graduate attributes for career awareness and employability. In sharing this knowledge the studies have also influenced curriculum design and e-learning policy. The academic literature notes institutional interest in ePortfolios in relation to career preparation, demonstrating and assessing student learning, academic advising, and addressing public accountability concerns by facilitating internal and external departmental review and accreditation. Within this paper we discuss the bi-directional impact and sharing of knowledge about ePortfolio use as it occurs between institution and educator. The study findings inform future development of curriculum, policy and practice for creative arts students and academics in a variety of higher education settings. Further, the findings suggest that ePortfolios provide an efficient and transparent means to archive and access student work, and that they facilitate internal and external departmental review and broader institutional assessment.

Keywords: ePortfolio, creative arts, curriculum enhancement, reflective practice, institutional knowledge sharing

1. Introduction

Taking as its context the creative arts programs of four Australian universities, this study explores the two-way impact of ePortfolios between institutional policy-makers and academics teaching undergraduate students. The researchers undertook a teaching and learning project focused on ePortfolios in the creative arts¹, funded by the Australian Office for Teaching and Learning². As such the paper focuses on the use of the ePortfolio in creative arts departments working with students in music performance, professional practice, music education, sound technology, creative writing and feature writing. Each educator/researcher adopted different platforms for different purposes and with a different cohort of students. We discuss this use and its influence on the institution, together with each university’s ePortfolio policies and planning.

2. Background

Uses for ePortfolios

Institutional ePortfolio policy and practice varies considerably across Australian universities. Indeed, ePortfolio use within a university often originates from within different departments or faculties and can be adopted for a variety of reasons (Reardon, Lumsden and Meyer, 2005) with institutional policy often reflecting these reasons. Factors can include, for example:

- graduate competitiveness (Chan and Cheng, 2010);
- career preparation (Reese and Levy, 2009); and
- demonstration and assessment of student learning (Jafuri, 2004) and student achievements (Baume & Yorke, 2002; Nystrand, Cohen & Dowling, 1993)

Similarly, data collection can inform:

¹ http://capaeportfolios.ning.com/page/aboutus

- curricular improvements (Miller and Morgaine, 2009);
- academic advisement and choosing the type of ePortfolio carefully to suit students’ needs (Reese and Levy, 2009);
- ePortfolio as a central storage facility or archive to guard against document loss (Herman and Kirkup, 2008); and
- addressing public accountability concerns (Lorenzo and Ittelson, 2005a) by facilitating internal and external departmental review and accreditation (Reese and Levy, 2009).

Institutions must also decide which type of ePortfolio best suits their needs across disparate disciplinary and student needs (Lorenzo and Ittleson, 2005a). In this respect, four main types of ePortfolio platform have been identified: home grown or proprietary software; open source software; commercially available software; and software generated or web-authoring tools (Lorenzo and Ittleson, 2005b; Stefani, Mason and Peglar, 2007).

Other factors for consideration by an institution include: licensing conditions; development and maintenance expenses; the level of integration with campus-wide systems and the degree of desired adaptation; the level of technical support required and available to cater to ICT literacy levels of staff and students; vendor support; potential longevity of a system; the degree of structure and guidance required for users; and the degree of creativity offered to the users (Hallam et al., 2008). Added to this are practical considerations including whether the ePortfolio is a stand-alone activity or part of another experience such as an internship; whether a faculty member will be responsible for guiding the process; timing of implementation and access within student progress; and how, when, and by whom the portfolio will be evaluated (Buzzetto-More and Alade, 2008).

**Institutional policy – top down**

Several writers acknowledge that support at the policy level within universities is crucial to successful ePortfolio implementation and practice (Cooper and Love, 2007; Cosh, 2008; Emmett, Harper and Hauville, 2006; Espinosa, 2007; Reese and Levy, 2009; Richter, 2006). To promote effective ePortfolio practice academic managers require

> a broad understanding of the benefits and value that ePortfolios can bring to the learning, teaching and development processes, so that an ePortfolio culture becomes an integral aspect of the academic environment. ... [Benefits include contributing] to contribute to student-centred learning strategies, transparent learning outcomes and the relevant employability skills for graduates (Hallam et al., 2008: 15).

Commitment to, involvement in, and support of, ePortfolio implementation by high-level administrators, such as a deputy vice-chancellor or university president, have been shown to contribute to successful implementation and utilisation of ePortfolios through lending credibility and giving visibility across campuses (McCowan, Harper and Hauville, 2005; Reardon, Lumsden and Meyer, 2005). Further, a study on ePortfolio use by university students in Australia, conducted by Hallam et al., (2008), states that strong alignment between strategic, tactical and operational areas of academic management is required for successful implementation. Effective practice is supported by clear communication within and across the institution; a common, collaborative language; strategic and technical leadership that provides examples of good practice; a cohesive approach to management and funding responsibilities; investment in staff development; and reward and recognition for staff in both academic and professional areas.

Two provosts at USA universities have agreed that an ePortfolio presents information in ways which are both “certifiable and practically useful” (Plater, 2006: 64). One of the certifiable aspects is that the ePortfolio allows students to transfer records from institution to institution. This provides a ‘true seamless transfer’ (Henry, 2006: 55) and enables better advice to be given to the student regarding placement. It even has the potential to ‘supplant the traditional transcript and replace the degree’ (Plater, 2006: 63). With further potential for an ‘interweaving [of] schooling, work, and civic engagement into a record of performance and a plan for future growth’ (68) for vocational choice, the ePortfolio has ‘global implications’ (63).

Another certifiable issue is the use of random samples of ePortfolio work to monitor the quality of an institution’s academic program and ‘determine areas of improvement’ (Henry, 2006: 60). Once in a university program, the ePortfolio can help students plan and think ahead to choose a major area of study and track their own progress, resulting in graduates who have a ‘demonstrated mastery of learning outcomes’ (55). For Henry, students’ fascination with presenting themselves and their own work will provide ‘the hook for students and
ePortfolios’ (57). A third US provost has focused on the ability of the ePortfolio to store all course material and outcomes, thereby allowing faculty to access their own work efficiently and directly and, in doing so, to ‘study their own assessment practice over time’ (O’Brien, 2006: 80). However, Plater (2006) acknowledges the importance of the need for a collective will in the institution, without which the provost has a lonely and uncertain path ahead.

An ePortfolio policy for all - horizontal

In considering the implementation of significant educational change, Hall and Hord (2001:10) state: ‘Although top-down and bottom-up change can work, a horizontal perspective is best’. They acknowledge that change mandated from administration may be effective if accompanied by support, training, and an understanding of the change process. Fullan (2013) is in agreement, noting that top-down changes may meet with resistance, but can be effective if implementation includes empowerment and choices for those involved. Fullan outlines several elements necessary for successful change, including improving relationships between all involved; informing change with research; and spreading leadership among many. A horizontal approach to implementing change includes administrator support and assistance in securing resources, as well as commitment from those involved in implementing the change (Strudler and Wetzel, 2005). Looking at ePortfolios as a fluid resource that will continue to grow beyond the years of university study, Heinrich (2008) argues that if ePortfolios are to support lifelong learning the institutional role should be one of support, rather than control, and suggests that the advantages of institutional types of ePortfolio may be maintained by hosting an ePortfolio system with an external provider.

Shared governance in higher education is a recent tradition that has evolved as faculty has sought delegated authority in decision-making on key issues such as curriculum, students, and teaching and learning within areas of their expertise (Kezar and Sam, 2012). While faculty participation in institutional governance is considered both desirable and important in higher education, Jones (2011) has also found that faculty are rarely satisfied with their level of involvement in governance. Within an institution, multiple interests may also be represented in the development of ePortfolio policy and practice as various parties envisage different usages (Hallam et al., 2008). To this end, Jafari (2004) has noted that different functional requirements of ePortfolios may be perceived by provosts, deans, chairs, career centres, faculty, students, accrediting bodies and professional organisations. Hallam et al. (2008) have claimed that policies and strategies are required at sectoral and institutional levels in order to ensure advantage is taken of connectivity and cohesion opportunities. They recommend open dialogue and collaboration across a range of contexts. Moreover, they assert that such dialogue should include those involved in teaching and learning and those involved in academic policy, government policy and technical standards.

An example of shared governance can be seen at the University of Western Sydney (UWS), where in order to develop quality websites and improve the online environment, teaching and learning staff followed two underlying principles. One of these was to adopt:

- a collegial approach, rather than a top down “auditing” or pejorative approach … to review sites according to the standards. Our view is that, in order for the process to be truly developmental and collegial, this approach has to be adopted by academics rather than being imposed upon them. This implies a major cultural shift in understanding and practice (Correia, Malfroy, Griffin, Ireland and Rankine, 2008: 198).

The next stage of the development and implementation process at UWS benefitted from the knowledge sharing gained from this collegial approach. Similarly, Curtin University sought the views of students in relation to its purpose-built iPortfolio platform (von Konsky and Oliver, 2012), which had been designed after considerable consultation with staff and students. This enabled the institution to understand the platform’s primary use and to inform its future development, including the need for graduates to demonstrate skills to potential employers, possibly ‘aggregating digital artefacts from the cloud providers and social media sites … to make more extensive use of templates for guiding reflection activities’ (87).

3. Methodology

A case study explores a system ‘bounded by time and place’ (Cresswell, 1998: 61). This takes place ‘through detailed, in-depth data collection involving multiple sources of information rich in context’ (61). The four institutions at the heart of this paper produced multiple case studies from two predominant sources of information: the e-learning/ePortfolio policy and its application at each university, and ePortfolio use by four
academics and their students in the creative arts. In doing so, the multiple case studies were designed to ‘probe deeply and to analyse intensively the multifarious phenomena that constitute the life cycle of the unit [ePortfolio policy and use] with a view to establishing generalizations about the wider population to which that unit belongs’ (Cohen and Manion, 1994: 106-107).

Participant observers engage in ‘the very activities they set out to observe’ (Cohen and Manion, 1994: 107), and in our study the researchers were also the academics using ePortfolio in their departments. Clements (2010), when exploring creative ways in which university music educators engage with emerging practices in music teaching and learning, has offered ‘personalized case studies’ (ix) in which the researcher is often the active participant and facilitator. As she notes: ‘these models of successful alternative approaches can be replicated in a variety of school, university, or community settings’ (ix). Because the literature review of our study notes a lack of research on ePortfolio use in the creative arts in universities, we hoped that the findings would establish some issues for the wider creative arts population and that they could be replicated in other universities.

3.1 ePortfolio case studies: Institutions and academics

In this next section of the paper we present a brief overview of the four institutional ePortfolio projects that formed this study. Specifically, we consider institutional policies, the academics’ use of ePortfolios, and the impact of each project on academics and the institution.

3.2 Sydney Conservatorium of Music – The University of Sydney

3.2.1 Institutional policy

At the University of Sydney, eLearning is a unit within the DVC Education Division and the university-wide e-learning strategy is part of the division’s strategic plan. However, each faculty is expected to develop their own Teaching and Learning Plan aligned with the University’s strategic plan. The eLearning aspect of the Sydney Conservatorium of Music (SCM) Learning and Teaching Strategic and Operational Plan: 2011-15, actions technology to be used ‘appropriately and consistently so as to support multi-modal learning’, [part of which is to] ‘trial the development of e-portfolios’ (Sydney Conservatorium of Music, 2010: 2).

3.2.2 Impact on the academics

For the academics working with ePortfolios, the impact of this policy directive and the specific action point has been that, firstly, staff had to establish eLearning sites using proprietary, closed-source learning management systems or ePortfolio platforms. Although staff uptake of ePortfolios across the university is low, Rowley and Dunbar-Hall (2012) have used the eLearning policy as an incentive and encouragement to trial ePortfolio in their classes with music students.

3.2.3 Academic ePortfolio use

Prior to 2009, ePortfolios were new for all students other than those in music education. Acting as capstone objects in the music education program, ePortfolios were intended for use in job applications and they were designed to address the requirements of professional teacher accreditation (Rowley, Dunbar-Hall, Bell and Taylor, 2012; Rowley and Dunbar-Hall, 2012; Dunbar-Hall, Rowley, Webb and Bell, 2010). A project subsequently analysed their implementation for advantages to student learning and self-reflection (Rowley, 2011), implications for curriculum design (Rowley and Dunbar-Hall, 2012), their IT requirements (Taylor, Dunbar-Hall and Rowley, 2012), their relationships to assessment (Rowley and Dunbar-Hall, 2012), and accreditation (Rowley, Dunbar-Hall, Bell and Taylor, 2012). The university selected a commercial ePortfolio platform.

The project assessed the expectations of ePortfolio use with different cohorts of students, staff and programs. The findings demonstrated differing levels of student engagement with ePortfolios, ambiguities over their efficaciousness in music as a profession, a range of student motivation to engage with ePortfolios and the technology required to work on and through them, and a spectrum of possibilities for their use.
3.2.4 Impact on the institution

Both the process and product of the research acted as a model for ePortfolio development in the creative arts and more broadly in the institution. Results of the research were published in articles and presented at conferences, and they were also presented to a university audience at the invitation of the university’s eLearning office. The project summary was presented to staff and students at the Learning and Teaching annual forum, and exposure within the institution led to broader uptake and interest.

4. Queensland Conservatorium – Griffith University

4.1 Institutional policy

At the Queensland Conservatorium, eLearning had taken various well-supported and centralised forms over the past decade. While there is no individual policy on ePortfolios at the time of writing, Griffith has a range of policies and statements that pertain to engaging in online learning and teaching strategies. These include academic and strategic plans, the lecture capture policy, the policy on staff engagement with learning, and the blended learning strategy. The blended learning environment at Griffith is characterised by:

- strategic and systematic use of technology in association with a quality face-to-face environment to support student learning;
- enhanced interaction between students, staff, peers and the learning community;
- creation of collaborative, distributed learning environments;
- increased capacity for student-managed learning;
- learning that takes place at students’ discretion in terms of time and place; and
- flexibility in terms of implementation at the program and course levels.

4.1.1 Impact on the academics

At the time of the study, Griffith had supported the development of online and distance-learning strategies for well over a decade with support aimed almost entirely at uni-directional models focused on delivering materials and information to students. Simultaneously, academics considered to be early-adopters of technology were spearheading moves to create bi-directional online strategies that placed emphasis on students’ ability to generate, upload and edit their own content. It was not until the late 2000s that the impact of these early adopters gained traction to the point of influence.

During this time, academics were given financial and workload support to establish online strategies, however, significant constraints existed in the interface between ICT administrators and academics. Over time, concerted efforts from academics, high-level administrators and pro-change information and ICT team-members coalesced to erode many of the significant challenges.

Hitchcock (2008) has observed historical tensions between two fundamentally opposing (but not mutually exclusive) motivations to technical and pedagogical innovation in the 2000s, which were seen as techno-centric versus user-centric. Herein, techno-centric can be characterised as ‘technology in search of ideas’, whereas user-centric inverts the aspects to become ‘ideas in search of technology’. The ‘technology in search of ideas’ approach created some significant challenges to user acceptance and uptake, often through poor graphical interface design, overly complex structures, or ambiguous pedagogical or epistemological foundations. Similarly, it is noted that the ground-up design and creation of user-centric technological infrastructure to support pedagogical imperatives is also problematic. This is often due to a lack of understanding on the part of academics as to the detailed technological challenges and long-term commitment required to realise a viable outcome.

Consequently, top-down approaches have achieved overall acceptance of a process leading to the uptake of technology for student-centred learning, including proprietary learning management systems, real-time communication strategies and video capture, and delivery of lectures for student consumption. Hitchcock (2009) has noted, however, that these one-size-fits-all strategies require a heavy centralised commitment from the University in time, money, technological support and manpower, thereby limiting the number of ‘top-
down’ directives via a form of natural selection. Further, some aspects now appearing as top-down directives were instigated by bottom-up activities a decade earlier. While some outcomes may have been a decade in the making, institutional vision and long-term strategies, guided by perseverance, strength of purpose and commitment to quality outcomes, have been a major contributor to successes. The impact of ePortfolios on an institutional level is certainly slow in coming, partly because the number of mandated eLearning (and blended learning) initiatives are not insignificant, and partly because a critical mass is required to elevate initiatives to centralised support. Given the size and bureaucratic weight of each institution and the financial commitment involved, this is hardly surprising.

4.1.2 Academic ePortfolio use

Academic ePortfolio use at the time of writing is driven by staff interest and there are no current plans (or indeed perceived demand) for the institution-wide integration of ePortfolios. Use of ePortfolios in the music department arose because work in music technology is largely driven by hard-copy portfolios similar to those in many creative arts sectors such as photography and art. For students, creating portfolios in this area is a process of creativity in establishing identity, potential and evidence of skills, reflective ability and professional capability. It is a career object because of several important factors, namely, an ePortfolio:

- has traditional use throughout the professional sector;
- is evidence-based;
- depicts personality & aesthetic character (uniqueness and identity) reconfigurable for different contexts;
- displays understanding and potential not just outcome; collates rich media in different forms; is often bulky and costly to produce (and share/reproduce/update); and
- encourages wide dissemination in network-driven industries where most jobs are not advertised, as opposed to the inherent impediments of traditional hard-copy material.

Work with ePortfolios was reinvigorated in the Conservatorium’s music technology department by the funded project of which all authors are members. For this project the researcher chose to use only open source web-software, with six issues as the basis for the decision, namely that the platform is:

- not tied to any single solution (for example distributed component architecture, cloud components);
- intuitive to learn and be situated in real-world contexts including transferability, sustainability and agility;
- has a defined place(s) to start embedded support through stages;
- is sufficiently frustrating to provide challenges including peer recognition and benchmarking;
- builds desire to repeat and improve leads to regular (staged) rewards; and
- is customisable enabling a sense of personalisation and ownership.

4.1.3 Impact on the institution

Earlier trials identified the main impediments to broader uptake by students and staff as being the difficulty of maintaining the ePortfolio in-house; the commercial sector not being ready for online portfolios; student resistance to uptake of the platform in relation to workload and cutting edge concerns; bandwidth issues overall including costs, consistency and reliability; and cross platform and browser issues including coding inconsistencies, formatting inconsistencies, accessibility issues, proprietary versus open source content, ownership and long-term storage. As a result of this study, techno-centric thinking was observed to diminish with a view to raising potential for other interested academics to embrace ePortfolios with low technological barriers to engagement.

5. Curtin University

5.1.1 Institutional policy

In 2009/2010, Curtin University developed an ePortfolio platform known as ‘iPortfolio’ for use by staff and students. The platform’s development was championed by an academic whose efforts led eventually to university-wide support, and one year after its introduction it had more than 17,000 users (von Konsky & Oliver, 2012). Flexible learning in all its guises comes under the Deputy Vice Chancellor Education, and the policy covers online access to learning resources, online teaching and learning, and online assessment.
management. As such, the iPortfolio is described in the 2011 Flexible Learning Policy and Procedures as one of the approaches “that facilitate effective student engagement through the provision of appropriate online environments” (Curtin University, 2011: n. p).

5.1.2 Impact on the academics

The impact on academics has varied according to uptake by schools and faculties, determined in part by whether the iPortfolio was embedded within programs. A distinct advantage for academics has been that the platform was fully developed and centrally supported, which has meant that engaging with an ePortfolio is very easy, requiring minimal technological skills and no new design or development. Beyond the practical implications, the most impactful aspect has been that the iPortfolio was designed to ‘encourage student reflection on ‘lifewide’ experiences that enhance employability and augment learning within the formal curriculum’ (von Konsky and Oliver, 2012: 67). This includes space for students to evidence each of their graduate attributes as well as the three main aspects of the University’s ‘Triple I curriculum’, which incorporates Industry (graduate employability), Indigenous, intercultural and international (global citizenship), and Interdisciplinary experiences (Curtin University, 2010). A future-oriented focus such as this necessitated a commitment by the university to give students lifelong access to their portfolio, which is becoming more problematic as the number of users increases over time; however, it was a distinct advantage to the project team.

The iPortfolio’s emphasis on ‘self and career’ enabled academics to house within a student’s portfolio the results of career development activities such as work-integrated-learning or evidence of the skills and knowledge required for professional accreditation. Students and staff have been pleased with the inclusion of features such as an app, which enables users to photograph evidence with their smartphone and upload it directly to their iPortfolio. Another advantage has been the ability to incorporate multimedia files, which are used to evidence multiple artefacts including film, video résumés and 3-dimensional design work.

5.1.3 Academic ePortfolio use

Given the complex nature of careers across the creative sectors, the development of employability skills is a high priority for every institution. As elsewhere, students at the university explore practical techniques and theory, developing both collaborative and creative skills. What the students tend not to consider is the relevance of this learning to their future lives and careers; and in an already overcrowded curriculum there is little space for this discussion. The project aimed to determine whether an ePortfolio could be a means of exploring possible future selves and careers, assisting students with the transition from student-hood to graduate professional.

The study involved first-year theatre students and third-year professional writing students, who were challenged to think about the role of undergraduate study in their future lives and careers. This thinking enabled students to compile evidence within their portfolios of a broad range of skills and abilities. As part of this, the writing students engaged in blogging about their internships. This blogging acted as a collection of artefacts about skills and competencies that could be articulated through ePortfolios.

5.1.4 Impact on the institution

At the time of writing there are 30,000 users of iPortfolio, the majority being students. The activity level on each these accounts, however, is not known. Given growing concern that many higher education students feel unprepared for the workplace and have not had career-related discussions as part of their studies (AUSSE, 2010), it is likely that the use of iPortfolio as a career and life-development tool will continue to increase. In the case of this study, the researchers noted increased career awareness among the students and much more motivation to engage in future-oriented thinking. Students reported feeling more prepared for, and aware of, their professional selves, and the ePortfolio approach will be embedded within the writing degree from 2014.

5.2 University of Western Sydney

Institutional policy

The University of Western Sydney (UWS) feels that ‘the push towards greater flexibility of learning, supported by existing and emerging technologies, is substantially being driven by students who increasingly seek to
engage in learning when and where they choose’ (University of Western Sydney, Blended Learning, 2013). Because many student learners are ‘digitally literate, frequent users of mobile devices, and seeking highly interactive, visual, immediate, and socially engaging learning’ (ibid), the university is adopting a ‘strategic and systematic approach to combining times and modes of learning, integrating the best aspects of face-to-face and online interactions for each discipline, using appropriate ICTs’ (ibid) through a Blended Learning Quality Framework currently being implemented by Schools. The blended learning website offers ‘a guide to a range of technologies’ for user consideration, with four headings – content creation and presentation, synchronous communication, asynchronous communication and e-Assessment – and ePortfolio is listed under content creation and presentation. (University of Western Sydney, Using Technology for Blended Learning, 2013). In recognition of their potential value an ePortfolio trial commenced in 2012.

5.2.1 Impact on the academics

The trial of ePortfolio engaged a commercial ePortfolio platform for use with four academics and their students in music, medicine and engineering. The confluence of two events—looking at an existing CV platform as a possible career professional ePortfolio component of a professional practice subject, and the funded national project reported here—introduced the researcher to the idea of embedding an ePortfolio platform into a second-year group music performance subject and into a final-year professional practice capstone subject in which music students take their arts practice into the community.

5.2.2 Academic ePortfolio use

Students in the music performance subject focused on group rehearsal and performance, and the ePortfolio offered a collaborative platform for essay writing in pairs, drawing in video and audio clips for deeper analysis and discussion. Through their commercial ePortfolio platform and their learning management system (adopted in consecutive years), students individually reviewed two in-house concerts of professional performers, often accompanied by video footage taken by students on a mobile phone. At the end of the semester, each student peer-reviewed the essay of another collaborative writing pair, with guided criteria to focus their comments. This e-written task, plus the ability to type comments in real time for assessable rehearsal and performance events, sending marks and comments immediately to students, has drawn the ePortfolio deeply into the teaching of this real time activity. Using two different platforms for the ePortfolio work highlighted strengths and weakness for the task and enabled considered decisions to be made for the future in relation to the suitability of one platform over another when submitting the peer review.

The third-year professional practice capstone subject required students to take their music practice—performing, event organising, recording, music criticism, music survey, teaching, among others—into the community. A summary of this practical project including written, edited visual and audio artefacts, together with a professional career portfolio of CV, photo and letter of introduction, were housed on the ePortfolio platform. This collection of artefacts is available for a potential employer to view on invitation.

5.2.3 Impact on the institution

The four academics undertaking the ePortfolio trial were monitored by the university through an annual questionnaire and discussion meetings seeking student and teacher responses to using the platform. At the end of 2012 an in-house summary report noted the need for ongoing workshops for both students and staff, representing a ‘user guide’ approach with specific instructions for each subject for completing and submitting work through the portal, and for careful consideration as to whether this was the most suitable platform for the outcome. A specific concern related to students working in groups and sharing within teams, as the commercial platform was found to be more suited to individual development.

Data has so far been gathered from students on several ePortfolio uses including peer evaluation, collaborative essay writing about music performance, and student views on how the ePortfolio could be used in a music program. The key findings indicate: a dislike by students of learning a new and unfamiliar commercial platform although several see its potential; a range of different collaborative essay writing styles (Blom, 2014); and a positive student attitude to peer evaluation of the essay.
6. Conclusions

A spectrum of two-way relationships between institution and teaching academics has emerged in this study with respect to how information is shared regarding the ePortfolio as an eLearning approach. This sharing ranges from the discussions held by early adopters of ePortfolios, who have influenced institutional eLearning policies; academics serving on eLearning policy-making committees and informing potential online learning and engagement strategies; academics designing platforms specifically for the institution with feedback from staff and students; influential trials being adopted by other disciplines; and monitored trials of an ePortfolio platform for possible purchase and adoption by the institution, involving regular sharing of information by academics and ePortfolio support staff who, in turn, reported to the wider institution. These extend the thinking and findings of USA provosts and other researchers in the literature. As well, academics in this study impacted on their institutions through the work funded by internal and external funding, which enabled time to explore teaching and learning use of the ePortfolio. From these activities came institutional workshops, conference presentations and published papers disseminating information within and outside the institution. In combination the groundswell of interest has influenced curriculum design and university policy. Within this spectrum of knowledge sharing, platforms ranged from home grown, one-size-fits-all platforms, through commercial ePortfolio or eLearning platforms, to open source software, all introduced in the literature. The use of ePortfolio platforms facilitated student reflection, collaborative essay writing, peer evaluation, the housing of multiple artefacts and the representation of multiple interests; and enhanced the relevance of learning for career development and employability. While some of these uses are reflected in the literature, in particular career preparation, several offer new thinking.

When the institution and its academics work together to pool information and ideas about ePortfolio, three things result: other disciplines benefit, unsuitable uses are noted and discontinued, and students benefit from a platform for use within and after their studies, thereby breaking down barriers between student-hood and graduate life. From our experience with ePortfolios, we support the notion that institutional leadership must impact on their institutions through the work funded by internal and external funding, which enabled time to explore teaching and learning use of the ePortfolio. From these activities came institutional workshops, conference presentations and published papers disseminating information within and outside the institution.

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Wiki Based Collaborative Learning in Interuniversity Scenarios

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Abstract: In business education advanced collaboration skills and media literacy are important for surviving in a globalized business where virtual communication between enterprises is part of the day-by-day business. To transform these global working situations into higher education, a learning scenario between two universities in Germany and Austria was created where students worked together in virtual interregional learning groups. This article reports about a study of an interuniversity collaborative learning scenario within the subject of e-business. Participating students collaborated virtually and documented a shared case study in a Wiki. When working together, learners used different synchronous and asynchronous tools for close virtual collaboration around a Wiki toolset such as forum, chat, video conferencing and other social media. Students applied given case studies (e.g. from Harvard Business Review) or they worked out a business case from their own experience, which covered a range of upcoming e-business topics. In an attending evaluation study with around 460 participants from two universities, 259 questionnaires were evaluated. It reveals several substantive effects like

• Tremendous influence of interregional group work for media competencies
• Hidden social aspects and conflict potential
• Scenario design and different media usage
• Teaching effort vs. learning outcome of such a scenario
• Learning impact for different student groups depending on gender, employment, graduation or online-moderation.

The findings of this study reveal several interesting aspects concerning media usage and show how students benefited from Wiki work in this virtual learning scenario.

Keywords: Wiki learning, collaborative learning, virtual collaboration, cross teaching, business education

1. Introduction

Throughout recent years, the media didactics discussion has mainly been dominated by constructivist approaches. In these approaches, the conceptualization of knowledge plays a central role. Knowledge is thereby not regarded as the immediate result of a knowledge transfer within a learning process, but constructed by the learners themselves. Constructivism puts the learner into the center of theory construction and supersedes the idea of a possible external controllability of learning. Special focus is thereby placed on the collaboration of learners within learning communities (Papchristos et al 2010). Especially business students have to be able to work well in teams and therefore courses should include critical elements that encourage teamwork and group skills.

To learn with the aid of Web 2.0 services – such as Wikis or Weblogs – can be associated with constructivist learning, as it supports an active construction of knowledge as well as a self-regulated learning process. Through interaction, joint learning and learning from each other become possible. Especially Wikis open up new possibilities concerning learning and a collaborative construction of knowledge (Cress et al 2008). In this connection various recent studies could confirm certain benefits for learners. (Zdravkova et al 2012; Wang et al 2013; Heng 2012; Huang et al 2013; Laru et al. 2012).

The basic idea of collaborative learning is that knowledge is not regarded as static content but rather as a constructive process. Through dialogue different contents are extended and refined jointly and subsequently interlinked with each other. Collaborative learning facilitates a joint knowledge construction on the one hand, but on the other hand demands a lot from the learners. In collaborative learning students have a need for assistance in the form of productive and structured interaction. The importance of structured and guided collaboration is essential for an online team to be successful, as documented in various studies (De Smet et al. 2008).

Collaboration is characterized by a common goal. All participants involved have to share an interest in this common goal – in the present case the development of a Wiki documentation of an e-business case study –
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even if conflicts may occur on the way. In order to achieve this common goal, all participants contribute their knowledge, skills and hours of work. The equal status of all actors is the basis for collaboration in this connection. The rights, duties and tasks dynamically arise from the working process. (Schmalz 2007) A further basic idea of constructivist learning approaches is situational learning. Gräsel et al (1997) particularly emphasize active learning, which is situational as well as context-bound and facilitates a self-regulated learning process.

The article at hand focuses on Wikis as supporting tools for the learning process. In 1996 Ward Cunningham coined the term “Wiki” for HTML documents that are developed and edited via a web browser. In order to do so, no programming skills are needed. All that is necessary is a web browser and Internet access. The basic idea behind a Wiki is the collaborative work on hypertexts that can be read but also modified by everyone. To put it another way: a Wiki is a tool for collaborative publishing.

In order to be able to reconstruct what has been modified Wikis have a revision control system and also allow access to previous versions. At certain views a discussion may be opened, which means that the quality of individual publications results from a “Wisdom of Crowds” (O’Reilly 2005). Within the context of learning this means that a learning group may work jointly on the solution of a certain task and thus gain new insights.

Globalized economy is characterized by virtual communication. The communication partners are often located at different places and – due to the different time zones they live in - communicate at different points of time. To facilitate communication and collaboration between partners who work in different places at different schedules and even in different time zones, tools of web 2.0 are adequate means to support such work processes. Especially working together by means of a Wiki and similar collaborative Web-Tools ease asynchronous communication processes because all group members can trace changes, view the history of their colleagues’ work, and communicate about it. Hence the requirements that are put on economic science students concerning communication and media competencies get higher and higher, which is why learning scenarios that facilitate these competencies find their way into e-business education.

Working, as well as learning with others requires certain collaborative skills such as receiving and giving feedback, accepting one’s commitments, contributing to a fair division of tasks, the co-creation of a good collaborative atmosphere and taking over responsibility. Many of these values can be trained and applied when developing Wiki-based learning.

Wikis are also used as tools for knowledge management in business and can be used, for example, for project documentations. In this context the advantages of Wikis are that knowledge may be documented easily on the one hand and that it can be easily accessed by means of a search function on the other hand. Thus it is an important goal of e-business education to make students familiar with the application of the tool Wiki (Erpenbeck et al 2013). Especially in the academic environment, Wikis are often used as collaborative learning tools (Hug 2010).

In recent years Wikis have got evermore hypermedia integration functions like graphics, images, and video support (Blankinship 2007, Seidl 2012). Social Media tools – like an advanced discussion section within a Wiki – allow direct linking of several communication opportunities to the content. Semantic Wikis open with new kinds of analytics and supervising tools, enhancing the observation of group working processes, e.g. organizing genomic knowledge, coding software or tracking environmental data (Gil 2013). Supporting simplified mobile access to Wikis has become a further challenge in the current development. The integration and reconfiguration of all these technologies in a web environment will open Wikis to multidimensional collaboration tools.

Hadjerrouit (2012) characterizes the pedagogical issues of Wiki-based learning and instruction as follows:

- Motivation: The basic learning principle involved is that success is more predictably motivating than failure. However, no technique will produce sustained motivation unless the goals are realistic for the learner. The motivation increases when the Wiki is inherently enjoyable and contains information that is of high value for the student.
Collaboration: Wikis are used to facilitate communication and collaboration. The first step of collaboration is when a student comments on the work of other authors. In the next step of collaboration one author modifies the posts of the other participants of the article.

Discussion: Basically the Wiki has a discussion page where the authors can discuss their collaboration and tasks as well as reflect on critical issues of the cooperated work.

Assessment: The student’s contribution is part of the evaluation of the Wiki work. The individual participation and the group process are important factors for the achievement of the collaboration process.

Peer review: The collaborative activities within the group benefit from the feedback of the group members and of others.

Using these rich media environments in an effective way requires a high level of expertise in media literacy. To train university students in media and social competencies needed today for virtual collaboration was one of the reasons and decisive factors for creating the following learning setting.

2. Learning setting

The elaboration of business case studies was applied as a learning method within the course-scenarios at two different institutions of higher education. The interregional collaboration of these two institutions arose from an ERASMUS teacher exchange between the Johannes Kepler University Linz and Magdeburg-Stendal University of Applied Sciences.

Not least because of the narrow resources the development of the learning setting aimed at various different goals at the same time. The strengths of both participating institutions should be used within this learning setting. While the German university has an emphasis on IT, the Austrian university focuses more on business sciences. The collaboration between these two institutions should not only be furthered on the part of the teaching staff but also on the part of the students. The exchange was financed by the European ERASMUS Teaching Program.

In addition to that, the learning scenario should meet academic demands. In order to achieve this, the case study method was chosen, whereby the case should be worked on jointly in a group by means of a Wiki. The Wiki was realized in the learning management system Moodle that is used in both institutions. The enrollment of students of the other institution to Moodle turned out an organizational problem because both institutions accept only students of the own institution on the learning management system. Thus an evaluation version of Moodle was installed to accept students of the other institution.

For the collaboration within the individual learning groups, different communication media were offered to the students (see figure 1). In the learning management system each learning group had a forum and a chat room. Beside the LMS the students had the possibility to use an Adobe Connect room for video conferencing. Furthermore students were allowed to additionally use other media if they wanted to. However, these additional communication media are not considered in the paper at hand.

![Figure 1: Cross teaching scenario](www.ejel.org)
The case study approach has been chosen as a learning setting (the case method is also known as case study method, Harvard method or case study approach, see. Lasch et al. 2008, p. 5; Matzler et al. 2006, p. 241). The introduced case studies describe operational situations from the topic area e-business, each containing a decision problem. For example, some case studies were taken out of the Harvard Business Review, such as “The Dark Side of Customer Analytics” (Davenport et al 2007) or “Open Source: Suicide or Salvation” (Scott et al 2008).

Throughout three terms (winter term 2009, summer term 2012 and summer term 2013) overall more than 460 students were organized into regional and interregional learning groups of four to six students. For this survey we analysed the questionnaires of 259 students. The interregional groups were usually composed of two Austrian and four German students at the maximum. Significantly more students attended the courses at the German institution, which is why the learning groups were composed of this unequal ratio of German and Austrian students. Some of the learning groups even consisted only of students from the German University. Therefore some of the findings in our survey were evaluated in terms of regional and interregional learning groups. The students formed the respective groups via a Moodle choice module. Subsequently each learning group received the task to work either on one of the seven predefined case studies or on a self-chosen business case relevant to e-business. The result of the four to six weeks of collaboration had to be documented in a Wiki and presented in a short talk at both locations. The learning group prepared a handout for their colleagues, as well as a presentation, which was then presented by them at both universities. After the presentation the students and the teacher discussed the findings of the case study. For the assessment of the course the Wiki, the presentation and the discussion were graded separately, which explains why one group could receive different grades.

3. Preconditions for the implementation of the solution

Approximately half of the learning groups were supported by students of the specialization field e-learning at the JKU Linz, who acted as moderators. These students previously attended a course “e-tutoring”, in which they learned how to manage and accompany virtual learning groups (Katzlinger-Felhofer et al 2010). The lecturer of the JKU Linz instructed them. The task of these moderators was to support the learning groups concerning organizational matters. Especially at the beginning of the collaboration the moderators were in demand, as they arranged the first virtual appointments or helped the learning groups to choose their topics. The moderators merely helped the learning group to organize their work together; however, they did not support them with problems concerning the content of the case study. Due to the fact that learners were located at different places the effort of coordination was much higher than in common (regional) learning groups, as e.g. informal on-campus coordination meetings were not possible. This is one of the reasons why the online tutors’ assistance was so important for the group work, which is also shown in the findings. One of a moderator’s tasks is to lead the group by means of asking questions. The “technique of asking” was trained in the course and became a helpful tool in order to assist co-operative learning processes in learning chats, forums etc. The online-tutor thereby summarizes posts and focuses on specific topics. This is particularly important as it can be observed that users frequently wander from one topic to another during learning chats. Other skills that are important for leading a discussion also proved to be of help for the online-tutors.

The first step on the way to solve the given task was to choose either one of the predefined case studies or to find an adequate topic for a self-chosen business case, which already turned out to be a difficult task for some groups. The lecturers provided a structure for the work on the case and students were encouraged to make their own investigations on the case and to consider the respective situation (e.g. legally) in Austria and Germany, too. The result of the case study was documented in a Wiki. Both institutions work with the learning management system Moodle but in different versions and with different user policies. A separated Moodle course only for collaboration activities was created and within this course, the activity Wiki was used for the documentation of the case study. This resulted in an extra workload for all participants but showed that information systems integration problems are still not unusual in global organizations.

The here-described study is connected with the investigation of further ICT supported learning settings, like a game based and a peer review based scenario with overall more than 500 participants (Herzog and Katzlinger 2012).
4. Findings and transferable results

Concerning demographic data, the two groups differ from each other regarding average age and percentage of women, as becomes apparent from table 1. These two aspects can be interpreted by the different positions the two courses have within the curriculum. At the Austrian University also graduate students, who are in their third or fourth year, attend the course and, in addition to that, it is also attended by many students with the major business informatics, which is chosen less often by female students. At the German University the students are in their second year and there are significantly more female students.

<table>
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<tr>
<th></th>
<th>Male Number</th>
<th>Age</th>
<th>Female Number</th>
<th>Age</th>
<th>Total Number</th>
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<td>18</td>
<td>23.7</td>
<td>55</td>
<td>24.8</td>
</tr>
<tr>
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<tr>
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<td>161</td>
<td>24.9</td>
<td>98</td>
<td>23.5</td>
<td>259</td>
<td>24.4</td>
</tr>
</tbody>
</table>

Table 1: Average age and gender ratio

Concerning Internet usage there are certain differences between undergraduate and graduate students. As becomes apparent from figure 2, in general the Internet is mainly used for information retrieving and surfing, communication (e-mail) and social media. Active Internet usage (e.g. content generation) is of second rank for both of the groups. The undergraduate students use the Internet more often for surfing, Social Media and music streaming and download, the graduate students use the Internet more often for communication like video conference or VoIP on the one hand, and on the other hand they often have their own homepage or blog. More graduate than undergraduate students use the Internet for online banking, software download and reading Wikis and Blogs; the high rate of working students in this group may be the reason therefor. In professional life media competency is on demand.

Although there are no striking differences concerning the average time spent online between the students from the two different universities, there is a significant difference between male and female students. In the group of students who spend more than 20 hours a week online there are significantly less women than men (figure 3); one third of the female students spend less than 10 hours a week in the Internet as compared to only one fifth of the male students; more than 40 % of the male students spend more than 20 hours a week in the Internet.
What is additionally striking when comparing the two groups is that the percentage of working students is significantly higher in Linz (only 16.4% are non-working students) than in Magdeburg-Stendal (46.6% are non-working students), see figure 4. The study programmes in both institutions are not especially developed for part time students but for full time students.

In this survey students ranked three different learning and teaching methods (case study, game based learning, peer review) used in the courses on a scale from poor to very good. They ranked the case study method in virtual learning groups high and thereby especially acknowledged it as a method to enhance media competencies (figure 5). To practice virtual communication was one of the learning targets in the learning scenario that students ranked high as well. Virtual collaboration within the learning group was an important factor for their personal learning outcome. To work on the case study and the Wiki was a time-consuming work for students so the cost-benefit ratio and enjoyment were rated lower.
Figure 5: Ranking of case study as teaching method (n=202)

About one third of learning groups in the study were regional groups and included no participants from the other institution. The comparison of the interregional groups (with only virtual communication) and regional learning groups shows that the work in interregional groups is more intensive as they need more time for particular processing steps. An interesting aspect thereby is that the duration of the steps of forming of the group, which are more social phases, differed hardly (figure 6) between the regional and interregional groups investigated for this study. The collaboration with the Wiki and beside the Wiki, the phases where students had to work out the content, lasted longer in the interregional groups and the results presented in the presentations and on the Wikis were often better than in the regional groups. Interregional partners force the motivation to dive deeper into collaboration tools, to spend more time and to perform strongly.

Figure 6: Phases of teamwork (average duration in days, n=197)

Students used different media for communication and collaboration. Teachers offered several media for students in the learning management system like a videoconference room, forum and chat. Social Media is a common communication channel between students today; in the cohorts investigated here it is used by 83.5% of the students (n=249). Surprisingly Social Media is not the preferred channel for collaboration in a professional context; they are used more for leisure and friendship activities. Concerning the case study projects students rated face-to-face communication highest in both cohorts. They rated audio communication, chat, forum, Wiki and email as very useful or useful (figure 7). In comparison, graduate students seem to appreciate the advantages of e-mail and audio-/video communication more than undergrads. From today’s perspective this could be interpreted as greater working experience in the elder group which is probably connected with higher media literacy. But it could also be regarded as a changing effect in the media use of the younger generation who was influenced earlier by social media and mobile Internet gadgets.
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Figure 7: Rating of used media (n=200)

In the individual comments students reported about their personal mix of the different media they used for communication within the learning group.

“I’d rate video conferencing with a concurrent use of Google docs best, as it allowed us to talk simultaneously without any time lag, so we could work out the core points really together.”

“For us audio communication via Skype was very important as well. We used it to discuss the outline and who should work on which issues. The Wiki allowed us to follow the progress of this work; therefore it is useful, too.”

“Email, Wiki and forum ease communication but can be really time-consuming, because you always have to wait for answers. Chat is a very good alternative, although the typing is quite time-consuming as well. Direct contact still is the fastest and most effective way of communication to solve problems or manage difficulties.”

As shown above, interregional collaboration demands greater media use and students are motivated to train their media competencies. Figure 8 shows the average time (in hours) the students used the different media. In interregional groups the use of media is more intensive and time consuming, not only for video or audio communication but also for working on the presentation, the text or the wiki.

Figure 8: Use of media for case study (average time in hours/percentage of media use; n=123)

Students discussed the task and questions of the case study in their learning groups and documented the conclusions in a Wiki. 90% of students rated the Wiki as very useful or useful for this purpose. Figure 9 shows
that students who rated the Wiki as very useful worked more hours on the Wiki than others. The period of time that students worked on the Wiki differed between one and twelve hours, in the group of students who rated the Wiki as not so useful only one student invested ten hours in the Wiki, the others less than four hours.

Figure 9: Average time working on the Wiki (n=199)

Especially those students, who worked in interregional learning groups rated the Wiki as a very useful tool for collaboration.

The high acceptance of the different media leads to increased utilization. The better students are familiarized with the Wiki, the higher their interest and utilization rate seems to be. This result allows arguing in favour of a better media competency training within higher education: the better students are familiarized with different media the more effective they will use them in practice.

“The Wiki is really good, because all group members have access to the whole communication which is not the case with emails or other media, where it can happen that some just do not get certain information.”

“The Wiki offered us the opportunity to keep track of our work. But as the Wiki often seemed to work against us, it was rather time-consuming to take care of the Wiki problems. To keep direct contact is still the best. And of course video conferencing is also very useful if you have to work with students from other countries. But as we had no other students in our group, it was not necessary for us to use it.”

Taking a look at the learning outcome using Wikis for the case study scenario, the interregional aspect indicates clear advantages (figure 10). Students, who worked in interregional teams scored more success points than their colleagues, who worked in local groups. This effect could also be enforced by the conclusion above (figure 10), that interregional groups invest more working time on Wikis and text work.

Figure 10: Learning outcome of case study in interregionality (n=179)

In this survey 100 students noted, that they were supported by e-tutors in moderated groups. 39 worked in unsupported groups. Even if the study was not designed to compare moderated and non-moderated groups, figure 11 could venture the hypothesis that working in moderated groups has an effect on the learning success. The supporting effect of E-tutoring - as it is also recognized here – was not discussed controversially so far.
Taking a look at the connection between the students’ employment and their success points brought up an amazing result (see figure 12). Surprisingly fully employed students got the best grades but they were also affected by the highest failing rate. The reason for this strong division should be analysed in future investigation.

5. Conclusion and outlook

The use of Wikis in training situations is described in literature for a variety of scenarios. This study looked behind the approach of using Wikis in interuniversity learning projects using the case study method. Developing professional as well as personal skills like media literacy can be addressed well by such a mostly learner controlled constructivist teaching scenario.

Collaborative learning with a Web 2.0 tool like a Wiki in combination with the case study method can be quite effective in higher education settings. The methodical design of a learning scenario and choosing an adequate media toolset is worth to be planned carefully. Especially the presentation and debriefing requires a personal reflection of the case study itself and virtual collaboration on it in several groups. However, this resulted in a highly professional and social learning outcome on the part of the individual students.

For students it is challenging to work together in interregional learning groups. They are used to work together in groups on campus. There face-to-face communication is the most preferred way of communication. The majority of students is not familiar with using a Wiki as a collaboration tool. Most learning groups worked together with other media and used the Wiki only in the last phase of the group work. The students had to learn the syntax of Moodle Wiki and surprisingly it was a challenge to them. From the perspective of teachers, the use of Wikis in university education enriches the teaching methods especially to improve the self-regulated learning process. With view history it is possible to influence the progress within learning groups and to see which persons are the main authors.

The interuniversity learning scenario provided students the opportunity to gain experience with virtual group work. Results of the survey reveal a number of interesting aspects. The more time-consuming and intensive
the collaboration of a group was the better results it achieved and the better it rated the case study as a learning method. The intensive collaboration was furthermore important for the learning outcome. Interregional groups did considerably better than regional groups, especially those interregional groups that were supported by an online moderator. This leads to the conclusion that being supported by tutors seems to be crucial for the learning success in virtual learning groups.

The case study method seems to be a suitable learning method for working students, as this group of students did noticeably better than other groups, despite their limited time budget, which is an aspect of great interest for further research.

Enhanced Wiki functionality for learning purposes will be welcome in future environments. This could be an enhanced Media support, synchronous and asynchronous video communication, video annotation, and semantic properties. In university environments plagiarism prevention is a widely discussed topic and there are already several tools available in learning management systems (e.g. Moodle) like the commercial Turnitin, the free Crot Checker for uploaded documents, or MOSS for texts and computer programming codes. In combination with Wikis this functions could give learners also a better sensitivity concerning academic oriented working in collaboration processes. On the other hand the recombination of digital media content for learning purposes is worth rethinking the role of authorship and copyright (cf. Gray et al 2008). However, this shall be discussed in another article.

References


Designing for Quality: The Understanding Dementia MOOC

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Abstract: The introduction of Massive Open Online Courses (MOOCs) as a vehicle for education delivery presents opportunities and challenges. In the context of the Wicking Dementia Research and Education Centre (Wicking Centre), the driver to develop a MOOC was the promise of addressing the international deficit in evidence-based dementia education, as well as the lack of research into international perspectives on dementia. The Wicking Centre’s activity integrates research and education, framed by the concept of ‘quality of life across the trajectory of dementia.’ With dementia emerging as the public health issue of the 21st century, lack of dementia education at multiple levels, professional and non-professional, is of increasing concern. The disruptive character of MOOCs, with associated risks and uncertainties, warranted the application of a research-oriented project management approach to development. This included investing resources in gathering and analysing data to underpin each phase of decision-making. We used a design-based research approach incorporating the concept of ‘life-cycle of an e-learning design’ (Phillips et al. 2012). Data collection and analysis focused on three dynamically interacting components: 1) expertise in dementia knowledge and dementia education; 2) a cohort-centric approach to design and delivery, and 3) models and designs for MOOCs currently promoted, discussed and reported in the higher education discipline. Laurillard’s Conversational Framework, relating types of learning, teaching-learning activities and the digital technologies that support them (2012), informed the selection of digital technology elements for massive-scale engagement of our identified cohort. The paper describes the initial design process and the outcomes of the limited release pilot that informed the first full offering of the MOOC.

Keywords: MOOC, Open Education Resources, Dementia, Education, Online Learning, Design

1. Introduction

This paper addresses the design and pilot of a Massive Open Online Course (MOOC) about dementia, an issue of global importance. Dementia refers to a decline in cognitive and behavioural function, primarily as a result of neurodegenerative disease. The trajectory of most dementias is progressive mental and ultimately physical degeneration, leading to death over a variable period, usually 3-8 years from diagnosis. The prevalence of dementia worldwide has sharply increased as populations age, with numbers expected to double by 2030 and triple by 2050 (World Health Organization 2013). In the Australian context, and consistent with these figures, it is estimated that the number of people with dementia will increase from 298,000 to 891,000 from 2011 to 2050 (Australian Institute of Health and Welfare, 2012). To accommodate the care needs of this group, it is estimated that the current aged care workforce in Australia must quadruple (Productivity Commission 2011). There is, therefore, a need to provide quality dementia education for health professionals, care workers and family members who care for people with dementia. A lack of dementia knowledge has the potential to diminish the quality of care, and thus quality of life, for the person diagnosed, particularly at the end of life stage (Mitchell et al., 2004, DiGiulio et al., 2008, Sampson et al., 2005). Caring for people with dementia involves a range of management and decision-making requirements including those associated with diagnosis, health and social support, medical management, carer support, behavioural strategies, psychological and psychiatric care, and palliative and terminal care.
The authors work at, or are otherwise affiliated with, the Wicking Dementia Research and Education Centre (Wicking Centre), Faculty of Health, University of Tasmania. The Wicking Centre integrates expertise in neuroscience, translational dementia research and dementia education. In particular, the educational programs of the Wicking Centre brings together research-based knowledge of the neurobiological basis of dementia with evidence-based approaches to the care of people with dementia. In this regard, care strategies are developed through the prism of dementia as a degenerative, progressive and terminal condition. Recognising that dementia is a problem of global significance, the Wicking Centre sought to extend its reach, and increase the global awareness and understanding of dementia through its educational programs.

The Wicking Centre introduced an Associate Degree in Dementia Care for domestic Australian students in 2012. The course was targeted at non-traditional learners: people primarily employed in the aged care industry as personal and community-based carers for people with dementia. The course was further developed into a fully online Bachelor Degree in Dementia Care, available internationally in 2013. The need for large-scale dementia education delivery, in conjunction with the Wicking Centre’s particular expertise in both dementia research (investigating the nature of the disease) and dementia education (providing health professionals with evidence-based knowledge to inform their practice), was a driver for the decision to investigate the new pedagogies and learning platforms being developed in response to the disruptive technology that is MOOCs. Despite the high risk of expending considerable resources to develop a free education service, it was clear that a MOOC design had potential to address the problem of scale, and reduce the education deficit internationally. In particular, it presented an opportunity to serve non-traditional cohorts, particularly care workers and family-based carers, who typically do not have access to formal education opportunities.

2. Open Education and Massive Open Online Courses (MOOCs)

2.1 Open Education

Universities have a long tradition of freely sharing information and knowledge but, over the last century, access to this information has become increasingly restricted due to commercialisation and a market-driven approach to education delivery. The emergence of Internet technologies has enabled increased access to information and knowledge, and various ‘open’ initiatives have emerged to challenge the restricted commercial model.

At its core, Open Education emphasises the ‘public good’ over the ‘private good’. It provides opportunities to those who find it difficult to access education via traditional channels. This might include people from disadvantaged backgrounds and those in developing countries. However, in addition, a University might adopt Open Education:

- to enhance reputation and attract students;
- to apply its expertise to address global problems;
- to generate income;
- to improve the efficiency of learning and teaching practice;

The University of Tasmania supported the development of the Understanding Dementia MOOC in line with its strategic intention to enhance its reputation in Open Education. The Wicking Centre’s rationale for developing the MOOC was to apply its research and education expertise to address a global deficit in dementia knowledge and to enhance its reputation while attracting students into a fee-paying course, the online Bachelor of Dementia Care.

2.2 Massive Open Online Courses

The concept of MOOCs has evolved over recent years. In the original expression of the idea, an open course was offered in a distributed fashion across the Internet, outside the confines of an individual institution, to make it ‘massively open’. It was taught collaboratively, with participants and course materials dispersed across the web using a ‘connectivist’ pedagogy, in an attempt to democratise education and empower people from disadvantaged backgrounds (Downes, 2012). As the use of this term has evolved, it has become known as a cMOOC (Siemens, 2012).
More recently, MOOC has been used to refer to a course offered freely to the world by one institution, sometimes through commercial brokerages such as MITx (subsequently EDx), Coursera and Udacity. The first instances were by high-profile US institutions supported by venture capital. Large enrolments occurred in some cases, and the concept captured the attention of the mainstream press and university decision-makers worldwide. The commercial style of MOOC has been labelled an xMOOC (Siemens, 2012), a reference to the ‘x’ in the name of some of the early commercial providers.

While MOOCs are a relatively new phenomenon, they build on decades of research into technology-enhanced learning, discussed, for example, in Collis (1996), Harasim et al. (1995), Herrington et al. (2010), Laurillard (1993, 2002, 2012) and Salmon (2000, 2003). A key finding of this body of work is the need for teachers to support students to construct their own knowledge. While online approaches have enriched the experiences of (previously correspondence-based) distance education students, in recent years, they have been extensively used to ‘blend’ on-campus activities with online activities (Littlejohn and Pegler, 2007), retaining face-to-face facilitation of learning.

Laurillard’s Conversational Framework (Laurillard, 2012) represents the different kinds of roles played by teachers and learners. Used as a design analysis tool, the framework exposes the inherent constraints of a MOOC design for student learning. Teacher presence is minimal in a MOOC environment for reasons of cost and scale, and the predominant means of student-teacher interaction are through asynchronous transmission of information provided by the teacher. Embedding opportunities for engagement that enhance interactions between student and student and between student and content can compensate for any perceived learning deficits due to minimal teacher presence, but is difficult to achieve for ‘massive’ cohorts.

The approach taken in many xMOOCs explicitly replicates a traditional, transmissionist model of classroom practice (Borden, 2012, Knox et al., 2012). As an example, Norvig’s (2012) approach to a 100,000-student artificial intelligence MOOC is representative of a minimalist teacher presence. The design of cMOOCs, by contrast, aims to create a MOOC community that leverages the shared knowledge of members, but this relies on the presence of some “more knowledgeable other in the group” (Borden, 2012). This approach requires students to engage collectively in developing shared knowledge but only works if students are motivated and technically competent to use and develop the MOOC environment.

Thus, the characteristics of students who might successfully complete a MOOC is an important consideration in a MOOC design. Completion rates in MOOCs have been reported to be around 4% (Penn Graduate School of Education 2013). Daniel (2012) argues that such completion rates would be of concern to higher education accreditation bodies and distance education providers. The distance education literature recognises that students need self-efficacy and metacognitive skills to succeed in an isolated online environment. Thus, the target audience needs to be clearly understood and assumptions about their capabilities for a MOOC environment aligned with its design.

Norton’s (2013) analysis distinguishes between three general types of outcomes sought by students: learning new things; improving employment prospects; and a general broadening of the mind. He subdivides these into 11 components, and analyses which of these can be achieved effectively through a MOOC, vis-a-vis a blended educational environment. This analysis establishes that there are four outcomes that a MOOC may be effective in achieving: vocational knowledge, knowledge for its own sake, formal credentials and evidence of achievement.

2.3 MOOC Design

2.3.1 Laurillard’s (2012) ‘Conversational Framework and the Learning Design’

Laurillard’s Conversational Framework (2012) provides a way of thinking about learning that accounts for teacher and learner activity, individual and social aspects of learning and the interaction of theory and practice. It represents “the different kinds of roles played by teachers and learners in terms of the requirements derived from conceptual learning, experiential learning, social constructivism, constructionism, and collaborative learning, and the corresponding principles for designing teaching and learning activities in
The Conversational Framework encompasses six types of learning through: acquisition, inquiry, practice, production, discussion and collaboration. Laurillard provides a map of different digital learning technologies that support those ways of learning in (2012, p. 96, Table 6.3). The peculiar affordances and limitations of learning design for a MOOC meant that in the design of Understanding Dementia, we focused on learning through acquisition, practice, production and, in a limited way, discussion as shown in Table 1. These are discussed in more detail in Section 3. Design of the e-learning environment and summarised in Table 2.

Learning through discussion includes a teacher “providing stimulus in the form of a question, or issue” and a learner to “modulate their ideas, and generate further ideas and questions” (p.98). Given that online, large-scale discussion is inherently difficult to manage from both delivery and participant perspectives, we successfully trialled a ‘discussion-like’ forum of providing sentence stems with invitation to “complete the thought”. The ‘thought tree’ was designed to facilitate a collective ‘flow’ of personal perspectives and understandings surrounding big concepts like ‘quality of life’ and ‘what the nervous system does’. The thought tree concept generated a large body of contributions from participants, achieving its intended purpose of enabling low stakes, large scale sharing of perspectives that could be analysed by the development team and also dementia researchers.

The outcome of learning through inquiry (learning through finding out) is that students “modulate their conceptual organization” (p. 98) through the process of investigation of materials, guided by the teacher. This learning type assumes a level of motivation and self-efficacy from the participants to investigate resources provided and reflect on concepts taught. We assumed high motivation, but low technical and academic literacy for our target participant cohort and therefore did not design for learning through inquiry.

The affordances of the available MOOC platform and the assumptions about the target cohort meant that our understanding of what comprised “collaboration” was challenged. According to Laurillard, collaboration “incorporates learning through discussion, practice and production.” (p. 98) Through learners exchanging experiences of learning through practice, as well as products of practice, individual actions are modulated and discussion generated. For participants of the Understanding Dementia MOOC, the learning experience of the MOOC functioned as a launchpad for many participants to use the content provided to initiate collaborative activity in their local context.

This may be a function of the intersection between the topic (dementia) and the cohort: over 60% of students in the first release were caring for someone with dementia. It is not surprising that such a group would be highly motivated and able to apply in practice the knowledge acquired from the course. That emergent collaboration activity occurred within localised (geographical) contexts is also a reasonable outworking of the networked nature of marketing we employed. Not for profit organisations dedicated to providing support and information about dementia, as well as aged care facilities, were contacted and agreed to advertise the Understanding Dementia MOOC to their mailing list.
2.3.2 Approach to the Learning Design

We approached the design of the MOOC as a ‘wicked problem’ (Rittel, 1984 [1972]). This concept applies to situations in which a problem cannot be well-defined and decision-making is best approached as a process of inquiry rather than goal-directed problem-solving. The many uncertainties currently associated with MOOCs warranted a research-oriented and iterative approach to design decisions. Thus, the design evolved over time and was open to a range of MOOC styles, educational design methodologies and pedagogies. The iterative reconceptualising of the MOOC took into account competing tensions between MOOC style, expertise of the content developers, proposed target audience and the limitations of the available MOOC platform. Incremental partial solutions with emergent properties were then reflected on and fed into the next iteration of decision-making (Checkland and Scholes, 1999). The iterative process of investigating possibilities for the design of the Understanding Dementia MOOC took place over several months. We started with the target audience and desired outcomes. This led us to consider the kinds of expertise we could deliver as content, and that we needed translation of expertise into course content. We also carefully considered how to use the technology platform in ways that would facilitate the participants’ role of learner (Laurillard, 2012), in particular, as reflective practitioner (Schön, 1983).

We decided to use a design-based research approach (van den Akker et al., 2006) for the specific learning environment of the Understanding Dementia MOOC. The concept of the e-learning design lifecycle described in Phillips et al. (2012) guided our project plan. A learning design has a life cycle from conceptualisation to maturity and is best conducted as an iterative process in which each phase of development is underpinned by data collection to evaluate and refine the design until it is considered mature. This process includes a baseline analysis, pilot phase and delivery phases that are evaluated to inform refinement of the design and enable measurement of effectiveness. The baseline analysis for the MOOC (the analysis that precedes the first phase in a design lifecycle) included online learning design principles and recommendations from publications such as those referenced in the preceding discussion about MOOCs, target audiences as well as Wicking Centre knowledge and expertise. The pilot was completed in June 2013 and the outcomes of the evaluation data fed into the subsequent design.

2.3.3 Baseline Analysis

The baseline analysis was important to establish the nature and extent of the education problem that the Wicking Centre was seeking to address and the expectations of potential and identified stakeholders, including the target audience. This analysis informed decisions on the learning design of the MOOC and also provides the benchmark against which the learning outcomes and other effects of the MOOC will be identified and measured. For example, outcomes relate to the project goals including enhancing the reputation of the University, generating income, improving (online) learning and teaching practice, and the dissemination of Wicking Centre’s expertise.

2.3.4 Intended Outcomes and Audience

The goal of the Understanding Dementia MOOC was to provide a foundation-level course that would increase evidence-based knowledge about dementia, internationally. The target audience was deliberately broader than the Wicking Centre’s existing Associate Degree in Dementia Care. It was accessible to:

- Those in Australia interested in dementia who might not be prepared to enrol in a fee-paying course;
- Those carers and others across the world who wished to access quality, evidence based information to assist in understanding dementia.

However, identifying the target cohort was initially problematic. It was clear that dementia knowledge could be of general interest to anyone and it was tempting to take a generalist approach: provide a ‘wikipedia’ on dementia, in the interests of being broadly appealing or non-exclusive. Initial investigations showed that many organisations were delivering high-quality general dementia information online (Pittman et al., 2012). However, no integrated course was available that provided the crucial links between neuroscience and dementia care, with the additional capacity to inform on the key aspects of a palliative approach. We chose to tailor the learning to those for whom this knowledge would have the biggest impact in terms of translation to practice, to drive evidence based dementia care, and to facilitate a broad recognition of the life-limiting nature of the condition. Identification of the target audience (health professionals, aged care workers, personal carers, people with dementia and their families) was key to informing the design and structure of the course. Furthermore, expanding the target audience internationally raised the potential for cross-cultural sharing of
dementia care practices. A well-designed MOOC presented an opportunity to share those different perspectives among course participants, thereby increasing and enriching global understanding about dementia.

3. Design of the e-Learning Environment

The e-learning environment was designed taking into consideration Laurillard’s “Types of Learning and the Different Types of Conventional and Digital Learning Technologies that Serve Them” (2012, Table 6.3, p. 96). For the context of a MOOC, it was decided to prioritise ‘learning though Acquisition’ with elements of learning by Practice, Production and Discussion. Table 2 sets out the Learning focus, MOOC technology platform functions and Desired Learning Outcome in relation to the selected Learning Types.

The design of the MOOC balanced considerations of the target audience characteristics and expertise and MOOC platforms to decide on the MOOC style (xMOOC with cMOOC characteristics). Once the MOOC style was settled, other elements of the design were considered: the curriculum (what was to be taught), the learning design (how it was to be taught), the technical platform to be used, and the expertise available (both technical and domain-specific). Each combination of design elements was evaluated for its ability to meet the goals of the project: to provide international access to quality dementia education, raise awareness of dementia as a life-limiting disease of the brain requiring a care response including palliation, and to support the Wicking Centre’s ongoing research efforts. A core team of six part-time staff (consisting of a project coordinator/manager, three technical staff, and two media personnel) developed the learning design. Content experts, who contributed material and provided advice on their particular areas of expertise, supported this team. The project coordinator/manager was also involved in all content development, ensuring a consistent approach to material delivery, and alignment of unit objectives with learning activities.

Having identified the broad range of material possible to deliver, we progressively refined the basic content design for the MOOC into three primary themes: ‘the brain’, ‘the diseases’ and ‘the person’. Within each theme, content expertise was digested and translated into a presentation format that would enable participants to reflect on and apply in their local context. A guiding principle for each module was to inform students of the theory, encourage them to reflect on the theory in their local context, and to feed back their reflections to all MOOC participants. The themes were developed into separate modules, where each module contained several parts. Each part was designed as a single, scrollable HTML page, with several components:

- Video clips of up to thirty minutes in combined duration;
- One or more reflective questions, to be entered into a ‘journal’;
- A quiz about video content;
- One or more questions to guide forum discussion;
- Other supporting materials.

Discussion questions and thought trees were interspersed throughout the modules. Thought trees were used when asking people to reflect upon big concepts. Discussion questions were used for sharing experiences, resources and research. An interactive anatomy program, Body Central, was also used to support learning about brain and neuron structure, as a foundation for understanding the pathology (abnormal anatomy) of the diseases that cause dementia.

<table>
<thead>
<tr>
<th>Learning through</th>
<th>Learning focus</th>
<th>MOOC platform technology functions</th>
<th>Desired Learning Outcome:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acquisition</td>
<td>Expert knowledge transmission (brain, disease, person)</td>
<td>Video interviews of experts accompanied by text transcripts; content summaries</td>
<td>Modulate own concept, observe teacher’s practice</td>
</tr>
<tr>
<td>Practice</td>
<td>Student practicing knowledge</td>
<td>Body Central software, quizzes, learning activities (eg. scenarios/case studies) with hints and instant feedback</td>
<td>Apply core concepts learned and respond to feedback to improve actions (theory into practice)</td>
</tr>
<tr>
<td>Production</td>
<td>Student knowledge codified</td>
<td>Completing the final scene within MOOC family scenarios; recording notes in a reflective journal</td>
<td>Consolidate learning via articulating their conceptual understanding and how they have put it into practice</td>
</tr>
<tr>
<td>Discussion</td>
<td>Student sharing individual knowledge and perspectives</td>
<td>Thought tree responses to sentence stems. Discussion forums encouraging sharing of experiences, resources and research</td>
<td>Modulate own ideas and generate further ideas and questions</td>
</tr>
</tbody>
</table>

Table 2: Laurillard’s (2012) Learning Types as designed into the Understanding Dementia MOOC
The individual components of the learning design are discussed in the following sections.

3.1.1 Video elements

In many xMOOCs, a single academic expert presents the content. The diversity of content here meant that a single academic or even a small group of experts would be insufficient to present the range of information required. Accordingly, we sought the input of 11 experts, locally and nationally, including scientists, clinicians, health care professionals, educators, people with dementia and carers. By including content experts with the capacity to speak on dementia from a wide variety of perspectives, we were able to integrate information across laboratory based research, as well as care practices, otherwise known as a ‘bench to bedside’ approach.

Online courses and MOOCs have adopted a range of content delivery styles, ranging from the use of graphics tablets, to PowerPoint or Prezi presentations, to paper-based and white-board explanations. Our baseline analysis of the target audience informed the decision to deliver the majority of content as interview-style video clips. Of the diversity of styles currently available on the Internet, two particular approaches inspired the format of our video clips: the Khan Academy uses image annotation and diagrams, with interview-style voiceovers (Khan Academy 2011), and mathematician, Dr Keith Devlin’s MOOCtalk blog (2014) describes his use of paper-based illustration of examples, captured using an overhead camera. The key to Devlin’s approach is the presence of hands, which convey important aspects of non-verbal communication. However, the delivery of content via an interview, in the Khan example, encourages an engaging conversational discourse that enables clarification of difficult concepts as one person takes on the role of the participant. Employing the strengths of these two approaches, we chose to use the interview format for most clips, with the addition of an iPad, graphics tablet or widescreen computer monitor for demonstrating images, drawing diagrams, or presenting text to enhance the explanation of certain content. The interviewer adopted the position of the MOOC participant to contextualize the content and regulate its complexity. Two cameras were used in all videos to add editing flexibility and viewing interest.

3.1.2 User interface elements

In line with the e-learning project management literature, organizations like Open Universities Australia and the University of Phoenix have adopted a standardised curriculum and instruction method to ensure consistent quality and to lower costs (Norton, 2013). However, it became evident early in the process of Understanding Dementia MOOC development that this approach lacked the flexibility required to accommodate our diverse content. Rather, content delivery was determined by the particular professional discipline of the presenter, their delivery style, the types of supporting resources and the nature of the material. For example, one content expert used role playing to communicate content, another used hand-drawn graphs on an iPad, and yet another used images presented on a wide-screen computer monitor. Our learning design balanced standardisation with flexibility, accommodating diversity of presentation approaches to ensure that the primary focus was on communication effectiveness, whilst maintaining a coherent curriculum.

3.1.3 Interactive elements

There is increasing evidence to support the efficacy of games as learning tools (Grimley et al., 2012, Muntean, 2011) and we followed this approach by developing the interactive anatomy program, Body Central. This software, originally designed by the Understanding Dementia project coordinator to assist first year nursing and paramedic students to study Bioscience, was adapted for the MOOC to assist participants to learn the basic anatomy of the nervous system. This software was readily configurable by the content developer, with an image uploader, question database, progression editor and mini-games to test knowledge and retention. In a recent trial, the software was demonstrated to improve quiz scores by 80% compared with conventional paper-based study methods (unpublished data).

3.1.4 Reflective elements

The course was structured to encourage participants to assume the role of reflective practitioners (Schön, 1983). The content, presented by experts in their particular fields, was deliberately non-exhaustive to encourage discussion and debate. Dementia is a contentious and emotive area, with divergent opinions on
such issues as diagnosis, stigma, rights and care practices. The learning design included a function enabling participants to record their own reflections about case studies and scenarios, while discussion questions were deliberately structured to enable participants to consider divergent approaches, share their own experiences or to research and share, for example, their local circumstances. Furthermore, rather than being a didactic or prescriptive experience, the intention was for the course to provide a ‘melting pot’ for international perspectives on dementia knowledge and practices.

4. Content and Copyright issues

The issue of copyright was a major concern and the project team sought expert advice to ensure content design decisions were legally compliant and aligned with the Open Education principles to which the Wicking Centre subscribed. Australian Universities are subject to more restrictive copyright laws than, for example, those in the United States (Norton, 2013). Teaching resources were, thus, restricted to those already owned by the content developers, those that could be obtained under open licences or those that could be created specifically for the course. This both added to the development cost of the project, and drastically limited the diversity of resources that could be presented. An additional consideration was the Intellectual Property implications of making available Wicking Centre/University of Tasmania content, including potential loss of income opportunity. Nevertheless, a decision was made to release content developed as part of the Understanding Dementia MOOC under a Creative Commons Attribution, Non-Commercial, Share-Alike license. This decision allowed for the development of openly accessible content that supported our intended cMOOC approach. However, the approach taken was at odds with the xMOOC aspects of our learning design, as many xMOOCs do not provide content that can be, for example, reused, remixed or repurposed.

5. MOOC platform and course design

The open instance platform available to the project was largely untried for large scale course delivery. The instance was primarily designed for use as an open educational repository, with limited functionality as a learning environment. This posed significant challenges for the Understanding Dementia MOOC design. However, positively, it forced the team to start with pedagogy, and adapt existing tools, rather than defaulting to a design approach that used online technologies because they were available, without clear pedagogical justification. In addition, our cohort-centric approach meant that we could not presume a particular level of prior education or any level of technical proficiency.

The learning styles underpinning Laurillard’s (2012) Conversational Framework and the digital technologies that serve them (p96) informed design choices to focus on learning through acquisition, practice, production and discussion. Learning through acquisition was prioritized because of a design assumption of low threshold learning capabilities of target student cohort (technical and academic literacy) coupled with the high value of expert content that we wished to make available.

In terms of the interface with students, courses hosted on the closed instance of the platform were structured as a sequential list of content links that were designed to be progressively navigated by students. A decision was made to style the interface using html programming such that content was embedded in the familiar surroundings of a scrollable web page design. Colour-coded backgrounds and activity icons were implemented as visual standards to organise the content, while the distinct course units were arranged into separate pages with navigation arrows at the top and bottom of each page to facilitate progression. Each module within a unit could be downloaded as a stand-alone HTML document, with which students can interact offline.

6. Understanding Dementia Pilot

In line with the e-learning design-based process (Phillips et al., 2012), a pilot was used as the first phase in the design life cycle. The absence of any other courses on the open instance platform allowed us to implement a restricted release with opportunities to test and identify improvements to the platform, as well as refinements to the design.

A 3-week version of the full 11-week course was trialed April-June 2013 as a soft launch with 184 participants, 128 of whom were active in the course. The pilot was particularly useful in identifying a suite of recurring issues relating predominantly to the registration process, site navigation and technical problems. Many of the issues were resolved during the course of the pilot, while others are being negotiated with the commercial provider as part of platform development. Participants suggested a variety of improvements, including the...
incorporation of bullet-point summaries of video clips, and task completion checklists, both of which will be implemented in the full release. Twenty-seven participants completed the final feedback survey, which gathered a broad range of data relating to course design, structure, content, accessibility and navigability. Our approach to content delivery was rated highly by the majority of participants:

“The range of presenters and presentation styles, e.g. case histories as well as professionals, gave breadth to the course.” (Pilot participant feedback)

“The in-house videos are exceptionally good ... both in content and quality.” (Pilot participant feedback).

92% of respondents rated the course as either good or excellent (top two options), while 88% stated that they would be interested in completing the full course based upon their pilot experience.

“This is a fantastic learning opportunity for professionals and families and sufferers of Dementia. It is well put together and easy to understand.” (Pilot participant feedback)

The pilot data was not intended to mirror our likely audience for the full-release, as participants were primarily recruited from Wicking Centre, School of Medicine and School of Nursing and Midwifery academics and their networks. Interestingly, word of mouth and social media recruited participants from all over Australia, from a diversity of backgrounds and motivations for learning about dementia. These additional participants potentially reflected the anticipated general level of interest and attraction of the Understanding Dementia MOOC. The pilot also demonstrated that a range of qualitative and quantitative data can be collected, validating the tradeoff between cost of delivery and benefit to Wicking Centre research.

Several key design elements evolved from the Pilot and were incorporated into the Full Release, reported in Kelder et al. (2013). In summary, the full release learning design introduced:

- glossary of terms;
- course overview, profiles page and orientation modules;
- content summary slides at the end of each video clip delivering new content;
- ‘thought trees’ to enable students to contribute to discussion forums in a less threatening environment and anonymously;
- MOOC family cartoon scenarios to present case studies in a more engaging manner;
- questions designed to facilitate review of the content, separated to facilitate navigation;
- hints and instant feedback for each question to enable students to evaluate their own learning.

7. Conclusions

This paper has presented an education design project undertaken by the Wicking Dementia Research and Education Centre to develop the Understanding Dementia MOOC.

Several conclusions can be drawn from the outcomes of the Understanding Dementia MOOC development project.

- Value of a theoretical underpinning to the learning design – guiding choice of digital technology elements and providing criteria for evaluating their effectiveness
- Value of a design-based research approach to the learning design – iterative and incremental data collection and analysis directed toward improving the design with opportunity for measuring effectiveness and impact in later design phases
- Importance of resourcing a design-based approach that is evidence based

The baseline analysis, including of the Wicking Centre’s research expertise and the target audience, resulted in the decision that the transmissionist, xMOOC style was broadly appropriate, with features of cMOOC incorporated to facilitate and leverage student engagement. The intention was to share the Wicking Centre’s knowledge, and encourage participants to apply that knowledge to their own contexts. At the same time, the Understanding Dementia MOOC was designed to provide an opportunity to contribute to international approaches to dementia care, through providing a forum for participants to share their experiences within different contexts. This added a connectivist element to the Understanding Dementia MOOC design.

Laurillard’s (2012) framework connecting learning styles with digital technologies provided a starting point and guidance for decision-making around the structure and processes built into the learning design.
affordances (and limitations) of the technology platform available to deliver a fully online, open access course meant that we could develop a design that focused on enabling individual learning through acquisition. We were further able to design in opportunities for learning through practice, production and discussion to a limited extent. The framework also provided criteria for analysing the effectiveness of the design.

An important driver for developing the MOOC was to leverage the data which could be generated through its delivery. This included supporting discipline research into international perspectives on dementia care in general, and evaluating the impact of the Wicking Centre’s expert content. In addition, the data collected was intended to support research into the scholarship of learning and teaching in the MOOC context. The inclusion of research as an output of the MOOC was agreed with the understanding that this would imply and require a higher contribution of staff time to manage interactions and viewpoints than is usual in xMOOCs. A purposeful tradeoff was thus made between unfunded teaching costs and the potential research outputs.

Of the four effective uses of MOOCs identified by Norton et al. (2013), the Understanding Dementia MOOC was initially designed to achieve vocational knowledge and knowledge for its own sake. However, the course has recently been incorporated into a pathway for formal credentials and evidence of achievement, via articulation with an elective unit in the Wicking Centre’s fully online Bachelor Degree in Dementia Care. Evidence of the success of our design approach is demonstrated by the high rate of MOOC completion (39% of registrants) and subsequent transition of 273 participants into the Bachelor of Dementia Care course.

References


Use of Adaptive Study Material in Education in E-learning Environment

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Abstract: Personalised education is a topical matter today and the impact of ICT on education has been covered extensively. The adaptation of education to various types of student is an issue of a vast number of papers presented at diverse conferences. The topic incorporates the fields of information technologies and eLearning, but in no small part also the field of pedagogy. By interconnecting eLearning with the requirement for personalized education, we obtain a new term – automatic adaptive learning. We asked ourselves a question if the process of automatic adaptive learning (i.e. going through the electronic study course which suits student’s preferences and learning style) can be modeled. The optimal adaptive process will respect students’ differences based on determined learning styles and with regard to their knowledge and skills as changed during the course. On the basis of identification of their personal characteristics and qualities, students will be presented with a study material which suits them the most. One of the basic building blocks of adaptive education is the storage of study materials. In order to be able to prepare tailored education for every type of student, study material must be prepared in many different variants, in different form. This form should be different from the classic form of text-books. This article presents the issues connected with the creation of study materials suitable for adaptive education in more detail; the basis for this is the pedagogical analysis of the starting prerequisites applicable in eLearning. In conclusion, a particular way of use of such created study material in electronic adaptive education will be outlined.

Keywords: study material, adaptation, learning style, creation of methodology, e-learning, personalization of education, theory of adaptive e-learning

1. Topic introduction and current status

Computers entered the education process in 1960s. Wave of modernisation brought the so-called programmed learning to education. The idea of managing teaching as process has been introduced, spawning a number of theoretical researches and practical experiments (Gagné, 1975). Many principles of informatics are often used for building education and teaching (e.g. linear programming, alternative programming, forked programming, adaptive programming, etc.) (Kolb, 1984; Tollingerová, 1966).

At the Department of Information and Communication Technologies (ICT) of the Pedagogical Faculty of University of Ostrava, under the research on education with the support of ICT (one of the main research directions of the University of Ostrava) we focused on the personalised education with ICT support.

There is increased interest in personalised education or education tailored exactly to one’s needs, not only in lifelong learning (for extending or improving one’s qualification, or simply out of interest), but also in all levels of school education (almost all pupils can access education through computer).

Publications (Průcha, 2002; Kalhous, Obst, 2009; Gardner, 1999) contain various recommendations, rules or theories that aim to improve and make learning easier. These generalizations, however, obscure the individualities of students. By interconnecting eLearning with the requirement of personalisation we arrive at the term adaptive education; i.e. education adapted to the current requirements, abilities and skills of the students.

Bibliographic search in Czech and foreign information sources (Brusilovsky, 2003a, 2003b; Özpolar 2009; Peters, 2009) shows that the field of adaptive education is a current topic, but has only been worked on in partial tasks (adaptive navigation, adaptive presentation, creation of universal student’s profile for various systems, adaptive selection of test questions, etc.). Besides purely pedagogical perspective, adaptive education is often mentioned in connection with information technologies. It is these technologies that take personalisation one step further and help in its practical execution.
New model of learning that should suit the individual needs of students is based on a new paradigm – personalisation of the education environment. The environment takes into account students’ personal characteristics, their abilities and current knowledge, their learning style, etc. (Chang, 2009; Jeong, 2012).

2. Basic principles of adaptive education

In order for education to be adapted to specific student’s characteristics, these characteristics must be known (diagnosis of static characteristics of the student) and have a suitably structured study material. Only then can the actual process of managed teaching begin. The whole system can be divided into three basic modules – Student module, Study Material module and Managing module. In the education process, these modules can be substituted by the student, study material and the teacher (Kostolányová, 2011a, 2011 b).

![Diagram of adaptive education](image)

**Figure 1:** Theoretical model of adaptive education

To implement the idea mentioned above, a self-contained theory of individualised education must be created; one that includes the definition of the aggregate of typical independent students’ characteristics (that impact the learning process), definition of the aggregate of teaching methods and styles (that can be used to react to specific characteristics of the student) and can assign optimum learning procedure for each learning characteristic.

The series of pedagogical-didactic principles, rules, and theories as well as practical experience from informatics became theoretical solutions for formulating the new theory of adaptive education, which influenced systematic view of individual parts of adaptive learning (Kostolányová, 2012). These principles are:

- Komenský’s approach to teaching;
- Gagné’s approach of eventful teaching;
- Bloom’s taxonomy of educational objectives;
- theory of programmed learning;
- adaptive hypermedium systems.

For effective and successful learning process it is necessary to follow basic principles formulated by J.A. Komenský (Komenský, 2004; Kalista, 2009) – orderliness, systematic approach, continuous explanation, adequacy and permanency of knowledge and skills. The process of education can be viewed as succession of elementary steps of education for which there is a defined order (Gagné, 1975). The succession of events should have the following order: gain attention, formulate aims, pick up on previous knowledge, present new subject matter, guide and encourage students, give feedback, evaluate students’ performance and ensure their remembering of what was learned. The hierarchy of partial activities, through which a student goes in the learning process and which are graded by level of difficulty, comprehension, demand factor, and requirements
of the studied subject matter, was created by D. Bloom (Tollingerová, 1966). The following six degrees of knowledge are mentioned most often: remember, understand, apply, analyze, synthesize and evaluate information (Kostoláňová, Šrmanová, Takács, 2009a, 2009b; Kostoláňová, 2012).

The basic idea of the theory of programmed learning (Tollingerová, 1966) has been adopted: dividing the subject matter into smaller units, evaluation of these small units and the reaction of the educational system to student’s understanding of the subject matter. In programmed learning the system reacts only to student’s correct or incorrect answers. According to students’ answers, the author-teacher controls (programs) education by branching the process of education into different directions. Observation of the student (education process logging will be described below) and giving feedback is adopted from the idea of adaptive hypermedial systems (AHS) (Brusilovský 2003a, 2003b), which are based on the retroactive reaction to user’s behavior and movement in the system. Out of several kinds of adaptation (Kostoláňová, Šrmanová, Takács, 2011b), the model described by the submitted inaugural dissertation deals with adaptation of the content of education – particularly with adaptation of study material according to students’ individual needs.

Nowadays, it is common to use electronic environment in education. The abovementioned basic ideas, transformed to a new form – adaptive education – will be realized exactly with regard to this form of educational environment – adaptive eLearning environment. Any computer-controlled education is communication between the computer and the student, which makes such communication individual. A student who studies using a computer can be perceived as an individual so the education itself can then be prepared according to his/her individual qualities. However, it is not possible to apply this approach in the “normal” classroom with classic full-time study program. In the end, the suggested adaptive system should ensure and enable completely individual and personalized education of any number of students according to their knowledge and personal qualities.

Besides functional adaptive LMS (learning management system), a study material that can be adapted is necessary for practical execution of this idea. This study material is the core of the Author Module.

3. Adaptive study material

Author Module is intended for the creation, storing and maintaining of adaptive study materials. When creating the adaptive teaching aid, we can use the general method of dividing textbooks into chapters and subchapters – or in case of eLearning into lectures.

We divide the lectures into thematically united elementary parts, education steps. These individual education steps in the education process represent the sequence of elementary steps of learning. They create certain order in the sense of progress: beginning of the lesson, instruction, exercises, examination, completion. To be able to use this principle in the field of adaptive education, we describe the education process according to R. Gagné. This principle presents events that should be part of any educational unit (course, lecture, class).

When formulating the goals of the instruction we follow the revised Bloom’s Taxonomy of Educational Objectives. When creating learning exercises, simple or group, authors of study aids follow the recommendations and taxonomy of learning exercises by Tollingerová (1966).

When contemplating the adaptability options of study materials we also used the methodology of the creation of distant-study materials. This is where the idea of dividing the study material into partial, smaller units, comes from. We divided the curriculum of one subject into chapters and subchapters. In subchapters, the thematically united elementary parts are called frames. Frame is an elementary education unit that explains one partial topic. It is the frame that is the main object of our focus when structuring the adaptive textbook, with several variants of instruction. For example the frame can deal with a newly introduced term (motivation for its acceptance, definition, explanation, application, example, test questions and tasks for solving). Formally speaking, the frame usually corresponds with the lowest level of numbered or otherwise marked paragraphs, or one internet page including multimedia elements.

To be able to adapt to different personalities of students, the managing teaching programme (Virtual Teacher) must have the teaching curriculum available in many different forms – similar to an experienced teacher reacting to different levels of knowledge, different talent and approach to learning, reactions, habits and other characteristics of each student.
Table 1: The nine events of instruction

<table>
<thead>
<tr>
<th>Event</th>
<th>Procedure, Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gain Attention</td>
<td>Introduce a problem or a new situation. Tell a story. Demonstrate a situation. Present a problem that needs solving. Show something in a wrong way (education will then show the correct execution). Emphasise importance, meaning.</td>
</tr>
<tr>
<td>Inform Pupils about the Goals</td>
<td>Allows pupils to organise their minds and prepare for listening, observation or demonstration/doing. Describe the aims of the lecture, define what they will achieve, show them how they can use it and benefit in future.</td>
</tr>
<tr>
<td>Stimulate Recall of Prior Learning</td>
<td>Enables pupils to build on their previously gained knowledge and skills, build relations. Remind pupils of their existing knowledge relevant to this lecture. Create context for things, it facilitates learning and retention.</td>
</tr>
<tr>
<td>Present the Material</td>
<td>Divide information into small parts; avoid memory overload. Use teaching strategies and tasks. Specify difficulty levels.</td>
</tr>
<tr>
<td>Guide through Learning</td>
<td>Formulate orders on how to learn. Use varying channels and media, explain the know-how to pupils. Learning effectiveness increases, because pupils do not lose time finding the way.</td>
</tr>
<tr>
<td>Initiate and Elicit Performance</td>
<td>Practice by letting pupils do the tasks on their own using the newly gained behavior, abilities and knowledge.</td>
</tr>
<tr>
<td>Provide Feedback</td>
<td>Show pupils the correct answers and analyse their reactions. You can use test, quiz or a comment. Feedback must be specific, not simply “you did good”. Tell pupils why they did well, provide guidance through their answers.</td>
</tr>
<tr>
<td>Assess Performance</td>
<td>Test to know whether pupils learned new things.</td>
</tr>
<tr>
<td>Enhance Retention and Transfer to Other Contexts</td>
<td>Inform pupils about similar situations, provide options of further exercises, introduce situations for transfer, revise the lecture.</td>
</tr>
</tbody>
</table>

Of course all types of instruction must be created by a real teacher – author. This will be a multiple times more demanding work than creating a distant-study textbook and the author must be experienced and creative, able to empathise with different types of students. Teachers also have their own teaching styles. Someone presents complete, continuous lecture, describes and explains everything, applies it in exercises, and then lets students revise the knowledge and apply it. Another teacher trusts their students’ creative input and starts with introducing simple exercises on the given topic. They help students with the solving, guide them and continue with more and more demanding exercises until together they come to the general validity of the learned experience. The aim is for the students to accept the given theory more naturally and remember it better. However, in mass education there will be students who like this approach, and others who do not. For our intelligent, adaptive education, the virtual teacher must have all styles of instruction at hand to be able to choose the best one for a specific student.

Teaching aids must therefore be structured to the minute details, to allow adaptation to the student by selecting the right variants of instruction and the right sequence of its components.

4. Principle of creating adaptive study material

The most prominent characteristic of a learning style is the sensory perception type, second most prominent is the quality of understanding of the instruction. We chose these two basic criteria to create frames in different variants – form of instruction for the given type of student’s preferred sensory perception and depth for the level of detail of instruction.

Therefore every frame must have sensory variants: one with a high prominence of text (for the verbal type of student); with many pictures, graphs, charts and animations (for the visual type); with spoken word, audio
recordings, communication and discussions (for the auditive type) or creative exercises, constructions, etc. (for the kinaesthetic type).

The second criterion is the division of variants by the depth of instruction. Study materials will be created in the “universal depth”. This will be used as the primary depth. Students unable to comprehend the instruction formulated in this depth will have available a variant of modified instruction (more detailed, from different point of view, etc.) and students motivated by the given topic will have access to interesting facts and specifics of the given topic.

Author of the study material will be creating individual frames in four sensory variants with three different depth variants – 12 variants of one frame in total.

![Frame variants diagram]

**Figure 2:** Frame variants

Variants that only differ in form and depth of instruction would not cover all required differences in the style of instruction. Instruction must react to other differences in personality characteristics of students. By analysing these student characteristics we concluded that instruction also differs in the sequence of partial components of the instruction and continuous testing, or organisation of information.

Adaptation of the instruction style of the frame is possible by dividing the frame into partial components – layers. **Layer** is such part of the frame that is homogenous from the point of view of the education process (theory (T), explanation (S), reinforcement (F), knowledge assessment (K), motivation (M), instruction management (N)) (Kostolányová, Šramanová, Takács, 2011a).

We have designated these types of layers:

- **Instructional** – group of layers including the actual instruction of the subject matter (theoretical layer), instruction layer (semantic), revision (fixation layer), layer of theoretical school and real life exercises.
- **Testing** – group of layers for continuous testing of gained knowledge, consisting of questions, school exercises and practical (real-life) exercises.
- **Other** – such as goals, motivation layer, navigation layer, supporting material layer.

Information on the form and depth of instruction and type of layer must be recorded in metadata. With the use of metadata, the system can choose and manage the right way of teaching.

The instruction style of the frame can be changed by changing the sequence of individual layers, to be in accordance with a specific student’s characteristics. With this type of adaptation, the frame does not lose its general instruction value. **Instruction management** is done by choosing the sensory variant and by changing the order and depth of layers. Using this approach, the teaching aid can be adapted freely.

### 5. Methodology for creating adaptive study aids

The creation of an adaptive textbook is much more demanding than the creation of a classic eLearning textbook. We tested this authorial work on several lectures of various types of subjects (technical, informational, language, natural science) and based on the experience of all authors we came up with a
methodology which will hopefully make the creation of adaptive study materials at least partially easier for future authors.

For the authorial work on adaptive textbook, it is wise to use an existing classic textbook, which is used in present lectures, for example. Afterward the following algorithm is advised:

1. For the selected subject create goals, define level of the subject, prepare the curriculum – contents, list of chapters.
2. Divide the chapters and subchapters into parts that correspond, in their scope, with the hourly classes (lectures), and name them.
3. Create goals and the content and level of each lecture; divide the lecture into elementary units (frames), and name them. Frames are the basic framework, starting point of further work. So far, this is a common procedure, suitable for the creation of any textbook.
4. Divide each basic frame into layers for classic instruction in the depth level of 2, “classic” execution, mostly in verbal form:
   - define goals of the frame,
   - define contents of the frame,
   - divide frame instruction into layers, i.e. separate theory (definition of new terms and arguments, new rules, procedures, etc.), theory explanation, fixation layer (different formulation of the instruction, putting new information in context of previous knowledge, etc.),
   - add layers with solved examples and real-life examples,
   - add control questions to test new knowledge – or a group of questions,
   - add tasks to be solved to test new abilities – or a group of tasks,
   - contemplate and add motivation layer,
   - contemplate and add navigational layer,
   - add publications, if needed.

6. When the division of the basic frame into layers in depth 2 is ready, similarly create variants for depth 3 and depth 1.

To be able to focus on these tasks and not deal with how to write the teaching aid down, we created a form for the authors to facilitate their authorial work on a structured aid (Kostolányová, Šarmanová, Takács, 2011b). Authors put their teaching texts into it and fill out necessary metadata that are required for the formulation of adaptive algorithms (Kostolányová, Czeczotková, Šarmanová, 2010).

7. Use of adaptive study material in personalized education

To control adaptive eLearning education, besides psychological-pedagogical knowledge (e.g. theoretical solutions of adaptive education), based on which the detailed plan of the education process is compiled, we also need a structured study material and adaptive rules. These rules determine which type of study material will be assigned to which student. This way the optimal learning style for a particular student will be designed; and the optimal way of going through a study material will be suggested.

Adaptive rules will assign appropriately structured and created material, which stems from student’s learning style, to a particular student. These rules must reflect student’s preferred sensory perception (verbal, visual, auditory, kinaesthetic) and at the same time they must accord with student’s characteristic qualities that define his/her learning style. Learning style is determined by the following qualities (their values can be used in the eLearning environment):

Today, the following “static” qualities that determine learning style are being tested, filed and used for education control:

- Affective aspect = motivation to study
- Social preferences (prefers to study alone – in pair – in group)
Learning tactics (orderliness, how he/she processes information)
Approach to study: deep – strategic – on the surface
Autoregulation: the amount of ability to control his/her own study

During the course of study the “dynamic” quality that reflects “the amount of understanding” of the subject matter is being filed.
In the rules for the assignment of study material we follow student’s defined learning characteristics to which we will assign suitable learning style. The rules can be formulated as follows:

- If the student has the Understanding quality = 3, for explanatory and testing layers use depth 2 first, then depth 3.
- If the student has the Understanding quality = 1, for explanatory and testing layers use depth 2 first, then depth 1.
- If the student has the Approach quality = 75 (Deep type), then use depth 2 first and then depth 1 in the order determined by the remaining rules.
- If the student has the Motivation quality = -50 (highly unmotivated), then use the motivation layer from depth 3 first (detailed motivation explaining practical contribution of this knowledge).
- If the student has the Motivation quality = 75 (highly motivated), then use the motivation layer of depth 1; if it is not available, leave it out completely.
- If the student has the Autoregulation quality = -50 (highly dependent), then use the navigation layer of depth 3 (introduction of detailed pedagogical study advice).
- If the student has the Theorist quality = 75 and Experimentalist = 25 (Theorist type), then use the following order of layers: theoretical – present theory with its interpretation, testing – test the theory, practical examples – add practical use and experience examples – test their use.

- Etc.

Formulation of these basic rules was proposed on the basis of experts’ pedagogical experience. The rules are the basis for the creation and formulation of other rules which will stem from successive analyses, evaluation of education and continuous student-testing mechanisms. Those rules will include defined principles and conditions of a proper learning style which would make students with incorrect learning habits use more appropriate methods and ways of learning that are offered to them.

Based on specific characteristics of the students and using properly formulated rules for the adaptive algorithm we can assign specific study material to specific students in a given sequence, thus creating their individual style of instruction. Instruction management is firstly done through choosing a sensory form and then depth of instruction and sequence of individual layers. This way the potential of the multiple-variant study aids can be used to full by matching the preferred characteristics of individual students.

Personal sensory variant of the student is defined by their most distinct type of sensory perception. For other characteristics, general elementary rules are formulated:

if the student’s characteristics V1=a and at the same time V2=b,
then use the sequence of layers and depth X, Y, Z, ...
where: X, Y, Z ... individual layers (theoretical, semantic, ...)  
V1, V2 ... characteristics of learning style (motivation, self-regulation, ...)  
a, b, ... are the values of the given characteristics.

Rules assigning the sequence and depth of the selected layer are expert rules defined by an expert – pedagogue and expert on adaptive education. There are many “elementary” rules – for every value of every rule and their combinations (Kostolányová, Šarmanová, Takács, 2011b).

These rules cannot be fine-tuned in real education – at this moment there are not enough adaptive study materials (their creation is much more complicated than the creation of regular distance textbooks) and not all types of students will always be present in actual education. For this reason a separate module was created that is part of the adaptive LMS being developed and that will allow education modelling without actual
teaching aids/materials. Teaching is simulated for all types of students. Correct formulation of elementary rules is verified as well as the algorithm for obtaining the so-called personal learning style, i.e. the sequence of layers and depths of a study material.

8. Management and Modelling of Optimal Education Process

Information on the learning style of the student (values of each characteristics that determine the learning style) and information on the structure of the study material (metadata on individual parts of the study material) serves as the inputs of the management teaching programme called the Virtual Teacher (VT). The Virtual Teacher is a type of expert system that includes basic pedagogical rules and uses these elementary rules to create optimal teaching style for the given student and optimal progress the given teaching material. The process of education management is complicated yet invisible for the author, teacher and student. Modelling the process is crucial to verify the correctness of designed adaptation rules.

To fine-tune basic functions of the virtual teacher (model and a subsequent simulation of recommended teaching) we need to define all basic types of virtual teachers and all variants and layers of the teaching aid.

Virtual students are assigned learning characteristics. The learning characteristics of students are given certain values. By combining the values (each characteristic has 2–4 values) we obtain around 2000 possible types of students. We simulate the teaching for each individual student or groups of students with identical one or several values. The virtual teaching aid is modelled only by defining its metadata.

For testing purposes, the modelling tool itself uses the expert rules and the mentioned algorithms to determine the personal education style (PES = determining the optimal sequence of layers of the teaching aid) and actual education style (AES = determining the actual sequence of layers using those that are available; had been created by the author). The tool can visualise the progress of different types of students through the study material, which allows examining their learning styles. It also serves as the basis for the analyses of how many times a student went through the individual parts of the teaching aid. The special method of visualisation of the results of PES and AES displays the pattern of all theoretical variants of one frame (sensory type and depth of instruction) with all possible layers. Into this pattern, it draws the learning progress as proposed by the virtual teacher – seen as a connecting line of individual layers in the given sequence and depth (Fig. 3). We call this diagram a trace of the adaptive education process, in short: education trace. Each trace mirrors one learning style of one type of student. The tool can draw more education traces with one common parameter (the parameter consists of different individual characteristics of the learning style).

![Figure 3: Trace of the Adaptive Education Process](image_url)

(layers: theory (T), explanation (S), reinforcement (F), knowledge assessment *, motivation (M), instruction management (N), goals (C), examples (X), literature (L), homework (U), question (O))
9. Implementing the Module for Simulated Adaptive Learning

Modelling the process of adaptive education will take place in two phases. The first phase will test the correctness of designed elementary and complex rules for assigning teaching material in an ideal teaching aid (one that contains all variants of all layers). This will identify any possible errors during the creation of PES. The second phase will model the AES, i.e. the study aid will not be complete – some variants of layers will be missing (Kostoláňová, 2012).

The first phase of the education process modelling will test elementary rules at first; for this reason individual characteristics of students are incorporated gradually, not all at once. Characteristics selected for the testing included motivation, notion of learning, depth of learning, self-regulation and success rate. Values of individual characteristics are usually set to three whole values (0, 50, 100 or -100, 0, 100): minimum, average and maximum.

To model the functionality and correctness of all elementary rules, we use complete study aid (represented by its metadata) – with no variants or layers missing.

Process of modelling individual elementary rules:

- Simulation of education with “average” student in all characteristics (their PES should be the “classic” one that is usually used in text-books);
- Simulation of education with the change of the value of the tested characteristic to high and low and a check on the functionality and correctness of designed expert rules. This approach is used for one student at first, then a group of students with the given value of the monitored characteristic and other characteristics being average;
- If the diagram does not correspond with the expert’s notion of the expected PES, we note down the error (incorrectly formulated expert rule, or erroneous function of the PES algorithm) (Kostoláňová, 2013).

The same modelling tool will serve to verify if the rules are designed correctly for the case when several rules must be combined, which corresponds with various characteristics of the student. Combinations of two, three and four characteristics in all possible variants were chosen for the modelling. Example of two characteristics – motivation and self-regulation: combinations of average motivation and self-regulation was used; combination of low motivation and high self-regulation; high motivation and low self-regulation, etc.

During the modelling of elementary expert rules and complex rules, no errors in the rules or the PES algorithm were found. Problems arose with the combination of two specific characteristics: depth of learning and success rate of student. This situation was not sufficiently and properly analysed; from the pedagogical perspective the formulation of rules by preferred concept of learning in connection with the student’s success rate are inadequate. After pedagogical discussion and consideration, rules were reformulated and given priorities over each other.

The second phase of modelling tested the functionality and correctness of the AEStyl algorithm. In real education, the Virtual Teacher does not have ideal study material at its disposal (i.e. with all layers in all variants of the curriculum). This part of the modelling focused on the use of correct variants and layers of the study material, if the study aid is incomplete.

The AEStyl choosing algorithm had to analyse the existing variants and layers and in case some of them were absent provide solution: substitute the missing layer with its “closest” replacement, if that exists, or simply leave it out if it does not exist in any other version.

The pattern will show missing parts with a small black dot; larger dot (the modelling tools uses colour distinction for 4 senses) represents the existing variants of corresponding variants (see Fig. 4).
Figure 4: Progress of the Ed. Process with an Incomplete Aid

(layers: theory (T), explanation (S), reinforcement (F), knowledge assessment (K), motivation (M), instruction management (N), goals (C), examples (X), literature (L), homework (U), question (O))

Experiments verified a number of correctly executed substitutions or omissions of layers except for the following:

- missing layers were incorrectly duplicated instead of being omitted and replaced by their substitutes,
- in case the preferred sensory variant was missing it was replaced by other sensory variant instead of the second best preferred variant.

Discovered errors were corrected by a duplicate layer check that removes the duplicated layer from the AES. The AES algorithm was modified to substitute the missing sensory variant with the second preferred sensory variant. In connection to this, the situation with identical values of sensory preferences of students was also solved: the substitution is being looked for from “left to right”, that is in the sequence of verbal → visual → auditory → kinaesthetic. (Kostolányová, Takács, 2013)

10. Conclusion

Theoretical model of adaptive learning, the suggested methodology for creating study materials and groups of suggested rules are being tested by using modeling and simulation of individual cases – for different virtual students and different virtual study materials (with all possible variants of interpretation and testing).

Given the character of the process, Learning Management System (LMS) appears to be the best choice. Besides functions of the common LMS, the newly developed system must enable:

- testing of learning styles of students and recording them,
- saving of finely structured teaching aids into lectures, frames, variants and layers,
- manipulating these layers in order to be able to provide different students with different ways of instruction.

The development of such adaptive LMS has been under way as part of the research focus of the Department of Information and Communication Technologies (ICT) of the Pedagogical Faculty of University of Ostrava for four years. This system – Barborka – will have many other functions that are related to the complete education
process. It includes the function of Virtual Teacher, i.e. intelligent system that manages the teaching/learning process in accordance with the described principles. Record of the whole education process will serve as valuable feedback. It will enable the correction of characteristics of real life and virtual students and therefore the correction of the assigned teaching style. It will discover erroneous or unsuitably formulated instructional and testing parts of the study aids. Finally it will enable discovery of unsuitably defined principles of assigning a teaching style to a corresponding learning style. (Kostolányová, Šarmanová, 2013). The tool for modeling and simulation of the suggested optimal passing of individual students through the education process is now being implemented into the system. The modeling tool visualizes passing through the study environment on the basis of student’s learning style and a study material, which is available (in adaptable structure and form) for the given subject matter. Evaluation of the individual simulations leads to uncovering of the possible incorrectly proposed rules, their preferences, and if need be to correcting of the mistakes in adaptive algorithms.

References


Blending the Community of Inquiry Framework with Learning by Design: Towards a Synthesis for Blended Learning in Teacher Training

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Abstract: As e-learning is evolving into a mainstream, widespread practice, adopted by higher education institutions worldwide, much effort is geared towards the articulation of models and strategies for implementing e-learning in formal education settings. In the field of pre-service teacher education, a rising challenge is to equip the “21st century teacher” with the necessary toolset of skills and competencies to grapple with the idiosyncrasies of the new generation of “millenials”. To this purpose, what still remains an open issue is the degree of innovation afforded by specific e-learning designs, in a field where traditional teacher training pedagogies co-exist with e-learning-specific ones. This article proposes a synthesis of two models, the Community of Inquiry (COI) model, based on the Practical Inquiry model introduced by Garrison, Anderson, & Archer (2000) and the Learning by Design framework (LbyD), based on the conceptualization of ‘New Learning’, articulated by Kalantzis & Cope (2012). Both models were invented with new learning styles and circumstances in mind. The proposed synthesis guided the design of the six-month introductory course in Technology Enhanced Learning by the School of Pedagogical and Technological Education (ASPETE) research team (located in Athens) and implemented with 18 pre-service student-teachers at the Higher Education Technological Institute (TEI) of Lamia, located in another geographical area of Greece. In this context, elements of the COI framework were employed as tools both for designing and for evaluating the contents, structure and activities of the e-learning course. Two elements of the framework, teaching and cognitive presence were the axes supporting the course structure, whilst the kinds of activities most promoted were discussion, collaboration and reflection. The LbyD framework functioned as an awareness enhancement mechanism for trainee teachers to formulate, collaboratively negotiate and finally articulate and support pedagogical scenarios integrating the meaningful use of technology. The discussion of this experience is supported by a dataset including students’ answers to a COI-based survey, free-text student feedback and asynchronous discussion transcripts, providing evidence about the potential of the approach and pointing out issues that need to be improved.

Keywords: Community of Inquiry, blended learning, learning design, online teacher training, course design

1. Introduction / background

Innovation in higher education has been promoted as an imperative, some of the challenges accentuating the urgency of change being the evolution of sophisticated Internet technologies, the new generation of learners, the demands of the global knowledge economy, and the shock of the current economic crisis.

With current advances in technology, the change of paradigm becomes more feasible in more fundamental ways. E-learning in its various forms has been promoted as a catalyst for change in higher education, on the ground of a range of arguments of socio-economic nature (Bates, 2005). In this line of action, almost the totality of higher education institutions have adopted Learning Management Systems (LMSs), digital platforms used for pedagogical and administrative purposes which offer a standard ‘one size fits all’ e-learning solution at most universities (Steel & Levy, 2009). However, research on LMS use over the past 20 years has pinpointed the fact that they replicate the dominant paradigm of industrial e-learning, a model characterising the first stages of e-learning development, imposing an inherently hierarchical structure that is based on a top-down, uni-directional flow of power and communication on the educational environment. This approach has been characterised by Tony Bates, a pioneer educator and e-learning systems designer as the «black box educational philosophy» (Bates, 1986, p. 432).

An alternative to the «black box» metaphor is the «network» metaphor (Harasim et al, 1995), representative of a completely different educational rationale. The computer, under this lens, is a channel of communication.
between the tutor and the students through which the orchestration of learning is mediated. (Bates, ibid., p. 45).

A technological solution supporting the «network metaphor» is the integration of participatory web technologies (Web 2.0) into existing organisational infrastructure. It is argued that Web 2.0 could enable universities to “reinvent” themselves through more collaborative and learner-centred approaches to learning, innovations in teaching practices, and improved quality of student learning (Conole & Alevizou, 2010).

A pedagogical solution supporting a more open metaphor for online learning is based on the notion of communities. Communities fully or partially supported by digital tools have found fertile ground in the field of teacher education, either as components of broader training mechanisms, or as means of delivery of distance education per se (Najafi & Clarke, 2008). Their development has been related from the early 90s with effective professional development and substantial professional discourse (Darling-Hammond & Ball, 1997). The added value of communities – based on a review of 14 in service programmes by Zhao & Rop (2001) and another of 24 academic and in service programmes by Barnett (2002) - lies in:

- the modulation of teacher isolation
- the exchange of ideas and experiences
- the dissemination of innovative practices and teacher support throughout their implementation
- the development of interest groups around pedagogical issues
- the facilitation of reflective dialogue around teaching

In a nutshell, rhetoric related to the infusion of innovation in higher education brings to the forefront notions such as collaboration, communication and reflection in communities.

The scope of the research presented in this article relates to the aforementioned issues by proposing a synthesis of perspectives for the purpose of designing and implementing a blended learning approach in teacher training. Adopting Garrison and Vaughan’s (2008) definition of blended learning as an “organic integration of thoughtfully selected and complementary face-to-face and online approaches and technologies”, we attempt to articulate a framework including elements from the Community of Inquiry framework for meaningful online learning (COI), (Garrison et al, 2001) and the “Learning by Design” approach to designing learning activities (Kalantzis & Cope, 2012). Based on this approach, the six-month introductory course in Technology Enhanced Learning was designed by the School of Pedagogical and Technological Education (ASPETE) research team, located in Athens and implemented with 18 students of Informatics at the Higher Education Technological Institute (TEI) of Lamia, located in another geographical area of Greece. The discussion of this experience is supported by a dataset including students’ answers to a COI-based questionnaire and asynchronous discussion transcripts, providing evidence about the potential of the approach and pointing out issues that need to be improved.

2. Towards a synthetic framework for blended learning

2.1 Pre service teachers as designers

Today’s generation of young teachers are digital natives (Prensky, 2001), used to communicating with peers on a regular basis through multiple Internet technologies, cell phones, and other handheld tools. They have also been raised and educated in the modern western world where a common contemporary image of professionalism is collaborative group work: professionals sharing their experience, knowledge and expertise to solve complex problems.

New teachers are expected to adopt fundamental changes in the way they carry out their professional duties, many of which relate to the integration of digital technology in their teaching (Beetham, 2008). The management of technology-supported classroom investigations is logistically difficult, compounding the already existing challenges posed to teachers by student-driven classroom work, e.g. task management, providing individual guidance to several students simultaneously, and coordinating students who work at different paces (Edelson, 1998). A paradox, however,impeding smooth integration of already acquired ICT skills in teachers’ practices lies in the fact that, though studies in OECD (Organisation for Economic Co-operation and Development) countries place teachers amongst the most skilled technology users, they appear...
unable to take advantage of their competence and apply it to the way they teach (OECD, 2008). Especially with regards to Web 2.0 tools, it is striking to note that, despite their proliferation of their added value in educational literature (Redecker, 2009), there is very little work that examines how educators might make sense of the wide range of Web 2.0 tools available in the context of learning design, so that they can appropriately select and apply Web 2.0 tools that match the learning requirements of their curriculum (Bower et al, 2011).

As suggested by Beetham (ibid.), the integration of ICT fosters a more ‘planful’ and even ‘design-like’ attitude on behalf of practitioners, who suddenly have to make explicit many aspects of their practice that would emerge ad hoc in a live learning environment. Inline with this view and gaining momentum from a training standpoint are approaches centering on teachers’ design practices. A characteristic of design-based teacher training activities is the acknowledgement of the importance of “pedagogical design capacity” (PDC), a term used by Brown (2009), to describe “teachers’ capacity to perceive and mobilize existing resources in order to craft instructional contexts”. A promising framework focusing on PDC and acknowledging the complexity of design tasks is the Technological Pedagogical Content Knowledge (TPACK) framework (Mishra & Koehler, 2006). TPACK, apart from clearly defining the elements of teacher knowledge (T=technological, P=pedagogical, C=content) also promotes and values the very specialized form of teacher knowledge, which lies at the intersection of pedagogy, content and technology and is paramount when grappling with design tasks. This integrated construct offers new options for looking at the complex phenomenon of technology integration inways, that are amenable to analysis and development (Jimoyannis, 2010).

The move to design-based activities has implications for trainee-teachers, as well as instructors (Mishra & Koehler, 2006).

With regards to trainees, they have to engage in the construction of artefacts, which is often located in the interplay between theory and practice, between constraints and trade-offs, between designer and materials and between designer and audience (Mishra & Koehler, 2003). Trainees actively engage in practices of inquiry, research and design, in collaborative groups to design tangible, meaningful artefacts as end products of the learning process (Blumenfeld et al., 1991). The actual process of design is the anchor around which learning unfolds. This evolving artefact is also the test of the viability of individual and collective understandings, conceptions and ideas of the learning design project undertaken by the class.

With regards to teacher educators, design cannot be taught in conventional ways: design is experienced in activity, design depends on recognition of design quality, it entails a creative process, it is understood in dialogue and action, and involves reflection in action (Mishra, Zhao, & Tan, 1999; Schon, 1987).

2.2 The Community of Inquiry framework as a means to organise virtual classroom communication

The Community of Inquiry framework (COI, Garrison et al, 2001), based on John Dewey’s progressive understanding of education is a process model of online learning which addresses the online educational experience as a result of the interaction of three presences – social presence, cognitive presence, and teaching presence (Swan, Garrison, & Richardson, 2009). Participation in a COI involves the (re) construction of experience and knowledge through the critical analysis of subject matter, questioning and challenging of assumptions. This definition is based on the premise that an educational learning experience is both collaborative and reflective.

The COI instrument consists of three separate coding schemes to identify each kind of social, cognitive, and teaching presences in textual discourse.

In particular, social presence is the ability of the participants in the COI to project their personal characteristics into the community, thereby presenting themselves to the other participants as ‘real people’ (Garrison et al., 2000, p. 94). Social presence is a support for cognitive presence. The social presence coding scheme has three categories: affective, open communication and group cohesion. These categories are defined “in terms of the participants identifying with the community, communicating purposefully in a trusting environment and developing interpersonal relationships” (Garrison, Anderson, & Archer, 2001, p. 7).
Cognitive presence "is the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse in a critical community of inquiry" (Garrison, Anderson, & Archer, 2001, p. 5). The scheme has four categories: triggering event; exploration; integration; and resolution. They represent the phases of an inquiry process in a collaborative learning environment. Triggering event is the initiation phase of a critical inquiry where an issue, dilemma or problem is identified or recognized. The next phase is exploration, where learners tend to grasp the nature of the problem and move to explore relevant information. In the integration phase learners construct meaning from the ideas generated in the exploratory phase. The last phase of the critical inquiry model is resolution, which indicates a resolution of the dilemma or problem that caused the triggering event.

Teaching presence comprises of "the design, facilitation and direction of cognitive and social processes for the purpose of realizing personally meaningful and educationally worthwhile learning outcomes" (Anderson et al., 2001, p. 5). The scheme has three categories: The first category, “design and organization” represents one of the three core teaching responsibilities: establishing curriculum content, learning activities and timelines. The second category, “facilitating discourse” relates to the monitoring and management of purposeful collaboration and reflection. Finally, the third category, “direct instruction” ensures that the community reaches the intended learning outcomes by diagnosing needs and providing timely information and direction (Garrison, Cleveland-Innes & Fung, 2010).

The COI is a generic theoretical framework that must be viewed as a means to study collaborative constructivist educational transactions – be they in online, blended or face-to-face environments. The validation of this framework would also suggest that it can also be used as a rubric to test for functioning communities of inquiry (Garrison, 2011). Recent research has also employed the COI framework as an informing design rationale for online instructional design of educational experiences (Fusco et al, 2011; Shea & Bidjerano, 2009). For the purposes of our research, the COI framework is used both as a design tool, and as a mechanism for evaluating the effectiveness of an online blended course addressed to student-teachers.

2.3 Using the LbD framework as a pedagogical design tool

To cultivate a “design-like attitude” in our audience of pre-service teachers, focusing, at the same time, in their PDC and TPACK knowledge, we employed the Learning by Design framework (LbyD, Kalantzis & Cope, 2012) as a pedagogical design tool for teachers. Its function was that of a common language among teachers, so as to enable communication through the co-construction of learning environments enhanced with technology. The framework introduces eight ‘knowledge processes’ (i.e. types of activities) (Kalantzis & Cope, 2012): (i) Experiencing the known, (ii) Experiencing the new, (iii) Conceptualizing by naming, (iv) Conceptualizing with theory, (v) Analyzing functionally, (vi) Analyzing critically, (vii) Applying appropriately, and (viii) Applying creatively. The mindful and appropriate deployment of the range of Knowledge Processes through a course is intended to foster higher order thinking skills and deeper learning for students. For student-teachers, the mapping of these processes to specific activities and digital tools functions as a design awareness enhancement mechanism, aiding the meaningful integration of ICT in their learning designs. For example, a lesson design including the use of a Web 2.0 tool should also include at least one knowledge process pursued by the use of the a Web 2.0 tool, realized through a suitable activity. Thus, a student-teacher’s design should include: a Web 2.0 tool (e.g. a wiki), used in a respective activity (e.g. collaborative writing) promoting one or more knowledge processes (e.g. analyzing critically): for example: students use a wiki to collaboratively compose an essay, in order to critically analyze, through group discussion and negotiation of the essay contents, the effects of global warming.

3. Research design

In the design rationale proposed in this section for training pre-service teachers on Technology Enhanced Learning, we adopt a view of teachers as designers of innovative content working individually and collaboratively, discussing and interacting with the instructors and their peers, both online and in face to face (f2f) settings. This rationale guided a six-month pre-service teacher-training course on Technology Enhanced Learning, provided by ASPETE in collaboration with TEI of Lamia, in the context of the graduate program in Informatics, taking place in Lamia. The course took place between September 2012 and January 2013 with 18 pre-service student-teachers as participants. The course builds on participants’ content knowledge, considered a prerequisite, as it is their third year of specialisation in Informatics. It is based on the concept of learning design throughout its duration, this translating in practice in the process of collaborative work towards the
development of a tangible and usable learning design in their field of expertise, properly addressing their future students. Adopting a project-based approach, this final group deliverable would be in the form of a WebQuest. The following sections (3.1-3.4) refer to specific ways participants’ co-construction of learning designs was supported throughout the course.

3.1 Structure of WebQuests/learning designs

The design template participants were provided with is the WebQuest scheme (Dodge, 1995). Underlying the WebQuest strategy is a central inquiry-oriented activity that is described in a web-based format (Abbit & Ophus, 2008). The content of a WebQuest activity is divided into several sections, including: (a) Introduction, (b) Task, (c) Process, (d) Evaluation, and (e) Conclusion. Core elements that form a part of every WebQuest are a scaffolding structure that encourages student motivation and facilitates advanced thinking with integration of an enriched set of learning resources (March, 2007).

3.2 Pedagogy underlying WebQuests/learning designs

The Learning by Design framework (LbyD, see section 1.1, Kalantzis & Cope, 2012) is used as a common language among teachers to enable communication and co-construction of learning environments enhanced with technology.

3.3 Technology integration in WebQuests/learning designs

Two representative categories of Web 2.0 tools are used by trainees as objects to be integrated in their WebQuest learning designs. These are a) representation tools, such as timelines, wordclouds and concept mapping tools and b) digital storytelling tools, such as comics and interactive posters.

3.4 Orchestration of teacher training activities on the basis of cognitive and teaching presence

Moodle is used as the main technological infrastructure where the learning experience sits on. Throughout 12 weeks, participants complete individual assignments, form small (3-member) groups and work in collaborative assignments, participate in online asynchronous discussions and teleconferencing sessions, as well as in f2f workshops inbetween. The online discussions take place in parallel to the f2f workshops and teleconferencing sessions, at specified times. F2f workshops were under the responsibility of the TEI of Lamia staff, whilst online discussions and teleconferencing sessions were led by ASPETE staff.

With regards to cognitive presence, the course is organised on the basis of the hypothesis that a learning design experience can align with the same cognitive process described by Garrison et al (2001). Specifically, the triggering event is the design problem posed to participants during the first two weeks of the course. There follows a quite extended period of exploring ideas and studying digital and pedagogical tools and resources, in order to craft an instructional rationale around the chosen theme of their WebQuest. Integration is expected to start manifesting towards the final weeks of the course, when participants have produced a first draft of their designs and are in the process of synthesizing their complementary expertise in order to reach a final product, represented by the resolution phase, during the final two weeks of the course. Table 1 maps course topics to respective activities.

With regards to teaching presence, we view it as supporting the process of design and the respective cognitive process dictated by the COI model in the ways shown in Table 1. Specifically with regards to the first two weeks, the dominant teaching presence category was that of design and organisation: participants were introduced to the Moodle platform, created their online profiles, engaged in an introductory conversation about their expectations from the course and were also acquainted with the course syllabus and activities. Design and organisation co-existed with the triggering event stage of cognitive presence. During the core weeks of course (weeks 3 – 8), teaching presence focused on a synthetic effort both to facilitate discourse and to directly instruct. The latter is manifested through presentations in f2f workshops and in teleconferencing sessions, whilst the first was a continuous input in online discussions taking place in parallel to the f2f meetings. Finally, during the final weeks of the course (9-12), we believe teaching presence mostly facilitated discourse: prompted discussion, reinforced student contributions, sought consensus / understanding, clarified ambiguities and resolved issues.
Social presence was encouraged mostly through the f2f workshops, from the moment participants were introduced to the course tasks and rationale, to the moment they were split into small groups and finally, to the moment they delivered their final learning designs as WebQuests. However, as some of the participants didn’t know each other, the first discussion lasting for the first two weeks was an opportunity for them to socialize online and get to know each other, while they were becoming familiar with the online environment.

**Table 1: Mapping of teaching and cognitive presence to course items**

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Learning Activity</th>
<th>Cognitive presence stage</th>
<th>Teaching Presence categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Presentation of the Moodle environment</td>
<td>Teleconferencing session</td>
<td>Triggering event</td>
<td>Design and organisation</td>
</tr>
<tr>
<td></td>
<td>Presentation of the WebQuest structure and WebQuest examples</td>
<td>Online: students introduce themselves and talk about their expectations from the course</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Building a website for the WebQuest</td>
<td>F2F workshop</td>
<td>Triggering event</td>
<td>Design and organisation</td>
</tr>
<tr>
<td>3,4,5</td>
<td>Web 2.0 tools: 1) graphical representations (word clouds, timelines, concept maps) 2) digital story telling (comics, interactive posters)</td>
<td>3 F2F Workshops</td>
<td>Exploration</td>
<td>Direct instruction, Facilitating discourse</td>
</tr>
<tr>
<td></td>
<td>Students work on specific mini-deliverables, i.e. artefacts constructed with selected Web 2.0 tools</td>
<td>Online: discussion on the usefulness and appropriateness of the pedagogical use of various Web 2.0 tools for students’ discipline</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Choosing a topic (curriculum-based, from school textbooks or interdisciplinary)</td>
<td>F2F Workshop</td>
<td>Exploration</td>
<td>Direct instruction, Facilitating discourse</td>
</tr>
<tr>
<td></td>
<td>Students search specific sites (e.g. search for curriculum standards at the Ministry of Education or browse teacher community sites) and deliver a first draft of their design, including the theme of their WebQuests and baseline information on their design rationale.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Designing activities for their WebQuest, based on the Learning by Design framework</td>
<td>Teleconferencing session</td>
<td>Exploration</td>
<td>Direct instruction, Facilitating discourse</td>
</tr>
<tr>
<td></td>
<td>Online: discussion on mapping specific learning activities (according to the LbD framework) to Web 2.0 tools</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Searching for appropriate Web material (sources) for their WebQuest</td>
<td>Students explore learning object repositories and selected educational sites (national &amp; international)</td>
<td>Exploration/Integration</td>
<td>Facilitating discourse</td>
</tr>
<tr>
<td></td>
<td>Online: posting at least two web resources they consider useful and pedagogically appropriate and commenting on them</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Editing multimedia materials (images and sound) for their Webquests</td>
<td>F2F Workshop</td>
<td>Integration</td>
<td>Facilitating discourse</td>
</tr>
</tbody>
</table>
4. Research questions and scope

Using the metaphor of a “learning ecology” introduced by Cobb et al (2003), our research adopts the rationale of the Design Research paradigm. According to Cobb et al (:9, ibid.):

“Elements of a learning ecology typically include the tasks or problems that students are asked to solve, the kinds of discourse that are encouraged, the norms of participation that are established, the tools and related material means provided, and the practical means by which classroom teachers can orchestrate relations among these elements”.

After organising the above elements in a time continuum and translating them into a coherent syllabus, the research questions articulated were:

- What is the nature of online discussions evolving around complex design tasks addressed to pre service teachers?
- Can the COI analytical framework support course design? Which of its elements can be best employed as course design tools?

5. Data collection and analysis

Data collected include asynchronous discussion transcripts, students’ answers to a COI-based questionnaire, free-text student feedback, and final students’ products in the form of learning designs/WebQuests, integrating the use of technology. In this article we focus on asynchronous discussion transcripts and students’ answers to the COI-based questionnaire.

In particular, we collected all the messages posted to the 5 discussions organized throughout the course and attempted to categorize them in relation to the phases of cognitive presence, i.e. triggering event, exploration, integration, and resolution, although some of them could belong to more than one phases. This was the first analytical instrument used, to identify and evaluate the degree of higher order thinking taking place while participants collaboratively design, using pedagogical and technological tools.

The themes of the discussions were the following:

- 1st discussion: introductory activity (who I am and what I expect from the course)
- 2nd discussion: which Web 2.0 tools (from a range of two broader categories) seem useful and appropriate for pedagogical use in our discipline?
- 3rd discussion: our first learning design/WebQuest draft: our theme and design rationale: inter and intra-group discussion and feedback from tutors and peers
- 4th discussion: posting at least two web resources considered useful and appropriate from a pedagogical point of view and commenting on them
- 5th discussion: our final learning design/WebQuest draft: our full WebQuest, containing activities integrating Web 2.0 tools and knowledge processes: inter and intra-group discussion and feedback from tutors and peers.

We also used the COI evaluation instrument, a survey tool designed to measure student perceptions of each of the three presences (Swan et al., 2008; Swan et al, 2012). The 34-item COI survey instrument was employed to evaluate the contents, the structure and the activities of the course, under the elements of the COI construct: teaching, social and cognitive presence.
The survey consists of 34 items, 13 for teaching presence, 9 for social and 12 for cognitive presence. Responses to the items were to be provided on a five-point Likert type scale ranging from 1=strongly disagree; 5=strongly agree. Fourteen out of eighteen students completed the particular questionnaire. In the analysis phase we calculated percentage scores for each item.

6. Findings and discussion

6.1 On the nature of online discussions evolving around complex design tasks addressed to pre-service teachers

In order to approach the first research question, we examined the progression of cognitive presence based on discussion transcripts. In particular, cognitive presence in online discussions was first examined through mapping the quantity of participants' comments to the five respective discussions throughout the course (figure 1).

![Figure 1: Mapping comments to course discussions](image)

A total of 83 contributions (messages and posts) were published during the 12 weeks of the course. The 13 posts to the helpdesk related to technical issues such as platform use, uploading of assignments, embedding learning objects, etc.

The triggering event was posed to the class on the day of their first f2f workshop. There followed the first online discussion, which lasted for the following two weeks. The first 22 participants’ posts in the first discussion were mostly of a social nature, representing participants’ need to acquaint themselves both with the medium of communication and with each other and the tutors.

The second, third and fourth discussion forums were in operation during the core weeks (3-9) of the course. Written transcripts from this period were expected to indicate elements of exploration, gradually leading to integration. However, these three forums weren’t densely populated, as shown by the scarce comments during the respective weeks and the nature of the posts they hosted was in most cases exploratory. Indicative, of the exploratory character of most posts during the middle weeks of course (discussions 2, 3 and 4), are the following posts:

“How exactly are we to integrate Web 2.0 tools with specific knowledge processes? They don’t fit with our design”

“Here is a web link we found useful for our students”.
The first post brings to the front a pedagogical issue troubling the group, whilst the second one is in fact a statement of something the group did. Neither posts received feedback other than that of the tutor’s and both belong to what has been referred to in the literature as “serial monologues”.

The final discussion took place within each group, expected to coincide with the resolution phase of the cognitive presence process. However, integration seems to have been achieved only to a certain extent during weeks 10-12. Indicative of the integration phase is the following comment from the final discussion, 7th in a thread of 8 comments, 4 by the tutor and 4 by the student group. The comment is a reply to the tutor’s prompt to articulate which knowledge processes are activated in the group’s WebQuest, and which Web 2.0 tools are used towards this purpose:

“We thought we had finished our WebQuest at the second lesson when we developed the WebQuest site with all its sections, but that was before the session about Learning by Design and knowledge processes. After this lesson, we tried to change the WebQuest so as to include as much knowledge processes as possible, with respective Web 2.0 tools. For example, by getting students to use the timeline, we think we activate the “conceptualising with theory” process. And by getting them to publish their presentations on Slideshare, we activate the “applying appropriately” process. Finally, we put a chat, with which we think we activate the “analysing critically” process, but we aren’t sure we’ll keep this”.

The above comment from the 5th discussion indicates the end of a long exploration towards integrating all members’ opinions and ideas to the purpose of a final proposal. Another group’s comment from the 5th discussion, 3rd in a thread of 4 comments, is of a more exploratory nature, approaching, however, integration:

“I agree with [name], because after a lot of debate, we tried to fit more activities in our WebQuest fields. But I still don’t agree about the use of a blog. I think classroom discussion would be much more interesting for the pupils”.

The group participants, in this message, seem overwhelmed by the effort to match educational goals to specific Web 2.0 tools and indicate this by declaring the main point of a disagreement within the group. The comment below was posted during week 11 and is declarative of the final design decisions of the group. It appeared after tutor feedback related to enriching the Webquest with student-centred activities such as chat and forum discussions.

“We, too, think that the wordcloud, the comic and the digital poster are not sufficient. So we added a chat after the “Introduction” of the Webquest, to allow students to absorb through discussion the new information they are given with the word cloud. We also added one forum for each group of students in the “Process” field of the Webquest, to enable them to collaborate online, and us to monitor their work”.

This message indicates that the group members had already grappled with the design challenge of integrating three basic Web 2.0 tools (a comic, a wordcloud and a digital poster) into their Webquest and were, at this point, ready to expand their design so as to include more student-centred interactions, such as an asynchronous activity (forum) and a synchronous one (chat).

results from students’ answers to the COI evaluation instrument are presented and discussed in this section.

6.1.1 Teaching Presence

Below are the 13 first items of the survey representing the different facets of teaching presence from the students’ point of view. The average score of the 14 participants’ answers is 4 (agree). Students seem to be satisfied from teacher involvement with a slight difference in timely feedback. We could suppose that when students use asynchronous forums for learning they prefer not just timely but immediate support.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>The instructor clearly communicated important course topics.</td>
<td>4</td>
</tr>
<tr>
<td>The instructor clearly communicated important course goals.</td>
<td>4</td>
</tr>
<tr>
<td>The instructor provided clear instructions on how to participate in course learning activities.</td>
<td>4</td>
</tr>
<tr>
<td>The instructor clearly communicated important due dates/time frames for learning activities.</td>
<td>4</td>
</tr>
<tr>
<td>The instructor was helpful in identifying areas of agreement and disagreement on course</td>
<td>4</td>
</tr>
</tbody>
</table>
Katerina Makri, Kyparisia Papanikolaou, Athanasia Tsakiri et al

### Table 2: Teaching Presence items and average of participants' answers

<table>
<thead>
<tr>
<th>Item</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>The instructor was helpful in guiding the class towards understanding course topics in a way that helped me clarify my thinking.</td>
<td>4</td>
</tr>
<tr>
<td>The instructor helped keep course participants engaged and participating in productive dialogue.</td>
<td>4</td>
</tr>
<tr>
<td>The instructor helped keep the course participants on task in a way that helped me to learn.</td>
<td>4</td>
</tr>
<tr>
<td>The instructor encouraged course participants to explore new concepts in this course.</td>
<td>4</td>
</tr>
<tr>
<td>Instructor actions reinforced the development of a sense of community among course participants.</td>
<td>4</td>
</tr>
<tr>
<td>The instructor helped to focus discussion on relevant issues in a way that helped me to learn.</td>
<td>4</td>
</tr>
<tr>
<td>The instructor provided feedback that helped me understand my strengths and weaknesses relative to the course's goals and objectives.</td>
<td>4</td>
</tr>
<tr>
<td>The instructor provided feedback in a timely fashion.</td>
<td>3.6</td>
</tr>
</tbody>
</table>

### 6.1.2 Social Presence

The following 9 items of the survey related to social presence are presented in Table 3. The average is again 4. However, the participants don’t seem to fully embrace the view that the online medium was excellent to the purpose of social interaction. There is also an expressed doubt related to the sense of trust and the expression of disagreement. Both findings can be interpreted on the basis of the blended character of the course. Though teacher trainees used the online facilities, they only did so systematically at the beginning and towards the end of the course. This is due to the fact that many issues were resolved in face-to-face settings, during the workshops. Another characteristic of the course design probably empeding the development of online social presence was the intensive rhythm of the group activities, as well as the demanding deliverables expected by the groups.

### Table 3: Social presence and average of participants' answers

<table>
<thead>
<tr>
<th>Item</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Getting to know other course participants gave me a sense of belonging in the course.</td>
<td>4</td>
</tr>
<tr>
<td>I was able to form distinct impressions of some course participants.</td>
<td>4</td>
</tr>
<tr>
<td>Online or web-based communication is an excellent medium for social interaction.</td>
<td>3</td>
</tr>
<tr>
<td>I felt comfortable conversing through the online medium.</td>
<td>4</td>
</tr>
<tr>
<td>I felt comfortable participating in the course discussions.</td>
<td>4</td>
</tr>
<tr>
<td>I felt comfortable interacting with other course participants.</td>
<td>4</td>
</tr>
<tr>
<td>I felt comfortable disagreeing with other course participants while still maintaining a sense of trust.</td>
<td>3</td>
</tr>
<tr>
<td>I felt that my point of view was acknowledged by other course participants.</td>
<td>4</td>
</tr>
<tr>
<td>Online discussions help me to develop a sense of collaboration.</td>
<td>4</td>
</tr>
</tbody>
</table>

### 6.1.3 Cognitive Presence

The average of participants’ answers to the next 12 items of the COI survey representing the progression of cognitive presence is presented in Table 4 below. The finding derived from participants’ discussion transcripts, that cognitive presence didn’t culminate in the expected integration phase, but rather towards the end of the course, at the phase expected to be the resolution phase, is verified by participants’ average (3). This indicates uncertainty with regards to high level learning outcomes predicted at the final stages of the cognitive presence cycle. While participants seem to have been initially motivated by the triggering event (the project on collaboratively designing a WebQuest), as indicated by increased social presence and participation in the first online discussion, subsequent online activities seem to have discouraged students’ online expression. Students also acknowledge having gained useful practice-based knowledge (statement 34), though they don’t seem to equally value their final products (statement 33).

### Table 4: Cognitive Presence items and average of participants' answers

<table>
<thead>
<tr>
<th>Item</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problems posed increased my interest in course issues.</td>
<td>4</td>
</tr>
<tr>
<td>Course activities piqued my curiosity.</td>
<td>4</td>
</tr>
<tr>
<td>I felt motivated to explore content related questions.</td>
<td>3</td>
</tr>
<tr>
<td>I utilized a variety of information sources to explore problems posed in this course.</td>
<td>3</td>
</tr>
<tr>
<td>Brainstorming and finding relevant information helped me resolve content related questions.</td>
<td>3</td>
</tr>
</tbody>
</table>
Online discussions were valuable in helping me appreciate different perspectives. 3
Combining new information helped me answer questions raised in course activities. 3
Learning activities helped me construct explanations/solutions. 3
Reflection on course content and discussions helped me understand fundamental concepts in this class. 4
I can describe ways to test and apply the knowledge created in this course. 3
I have developed solutions to course problems that can be applied in practice. 3
I can apply the knowledge created in this course to my work or other non-class related activities. 4

Table 4: Cognitive Presence and average of participants’ answers

7. In conclusion

Our findings pinpoint a recurring issue in the literature of asynchronous online communication, that inquiry invariably has great difficulty moving beyond the exploration phase (Garrison, 2007; Diaz, Swan & Ice, 2010). No significant difference from this finding emerged from our findings, despite the focus on a complex design task. One of the impediments to reaching integration at an earlier level has to do, we believe, with the themes of the discussions taking place during the core weeks of the course. As these were not directly related to the product in progress, participants avoided to participate, preferring, instead, to work in groups during f2f workshops.

Redesigning the course for the next academic year is currently in progress, and so is another similar course taking place at the moment in ASPETE. The preliminary findings reported in this paper point to changing the nature of tasks during weeks 3-8 (“exploration and integration phases” and infusing more asynchronous conversation and respective moderation strategies. Boosting online discussions can be achieved by directing participants towards more design-like tasks, i.e. activities that are directly related to the deliverable they are collaboratively preparing, like, for example, posting separate “drafts” of their learning designs and receiving feedback from the tutors and peers.

With regards to teaching presence, facilitating discourse will (during weeks 3-8) in some instances, be prioritised over direct instruction, as some of the tasks have proven too restrictive for the students to allow them room for opinion sharing and discussion. Another parameter considered is social presence. This hasn’t been a design guideline so far, on the premise that the course already accounted for participants’ social accounts during f2f meetings. However, elements in trainees’ discussions in all threads indicate a tendency for online socialization, worthy of further investigation.

Acknowledgements

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References

A Cross-Modal Analysis of Learning Experience from a Learner’s Perspective

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Abstract: Learning experience has been one of the most debated aspects of Massive Open Online Courses (MOOCs). Various perceptions on learning experience offered by MOOCs have led to many claims about the quality of these courses and their potential impact on higher education in both developed and developing countries. This paper discusses, from a learner’s perspective, learning experience across four modes of learning: face-to-face, self-guided/radio, online and MOOCs. My own educational experience expanded across the first three modes of learning. To gain similar first-hand experience in MOOCs, I enrolled in one cMOOC and twelve xMOOCs and studied these courses alongside other engaged learners. I conducted a cross-case analysis of the four modes of learning and identified strengths and limitations of each mode. Then I organised recurring patterns across the four learning modes into five themes: openness, availability, diversity, flexibility and interactivity. I found that each of these learning modes can help learners achieve a significant milestone in learning, and accomplishment in one mode can bridge across to a different learning mode. I argue that a combination of learning modes, where applicable, can lead to better learning experience than an exclusive use of a single mode. I also argue that each of these modes can contribute enormously to learners’ educational, socio-economic, and cross-cultural migration as well as to their geographical mobility. Each of these modes can also contribute to bridging an educational divide if stakeholders in education capitalize on the target learners’ strengths, on existing access to media and on openness in terms of content, assessment and accreditation. This paper is likely to benefit educational stakeholders who want to open up access to education and to reach learners in underprivileged settings, and those who are interested in cross-cultural education development.

Keywords: learning experience, face-to-face learning, self-guided/radio learning, online learning, learning from MOOCs, cross-cultural education

1. Introduction

Massive Open Online Courses (MOOCs) have recently dominated the debate in education. The popularity of these courses has catalyzed dispute about, for example, the learning experience they offer, their quality, their reach and their completion rates. On the one hand, MOOCs are hailed for their fit within a knowledge society (Levy and Schrire n.d.). According to Koller (2012) MOOCs provide learners with opportunities to personalise their learning. At Stanford University, students preferred taking Artificial Intelligence as a MOOC rather than face-to-face (Thrun 2012). The potential of MOOCs and the MOOC model to open access to education for learners in developing countries has also been noted (Koller 2012, Thrun 2012, Nkuyubwatsi 2013). The World Bank has linked up with Coursera to develop MOOCs for learners in developing countries (World Bank 2013). On the other hand, MOOCs are criticised for their assessment methods that lack constructive feedback (Daniel 2012, Armstrong 2012) and for being difficult to understand (Mazoue 2013, Edmundson 2012). The lack of critical, creative and original thinking in MOOCs (Bates 2012) and their students’ low completion rates (Daniel 2012) have also been noted. Equally, the potential of MOOCs to improve quality of, and open up access to higher education in developing countries is doubted (Bates 2012 and Daniel 2012, Young 2013; Sharma 2013). Liyanagunawarderna et al. (2013) argue that the high resolution videos in xMOOCs provide positive learning experiences to students with high quality connectivity but this contribute to excluding students with poor connectivity because the higher the resolution is, the more difficult to download with low bandwidth. These different views on MOOCs and their potential reflect a diversity of learning settings that needs to be considered.

The acronym MOOC (Massive Open Online Course) was created in 2007 by Dave Cormier and Bryan Alexander to define Connectivism and Connective Knowledge, the open online course developed at the University of Manitoba by George Siemens and Stephen Downes (Daniel 2012). Anderson (2013) explores the four aspects of the acronym: massiveness, openness, the online nature and course features. He notes that MOOCs’ massiveness refers more to their scalability than to a specific number of students. He acknowledges the massiveness in terms of numbers of students, but recommends a careful use of students’ numbers at the registration, course start, first assignment/quiz completion and course completion phases in the discussion of MOOCs’ completion rates. Anderson (2013) also identifies six types of openness:

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expansion of education beyond geographical barriers,
- freedom of speech,
- removal of restrictions on the learning content,
- enrolment without prerequisite,
- the freedom to determine the learning pace,
- the provision of a course free of charge.

Concerning the online aspect, he points out that MOOCs are not necessarily entirely online since some students in the same geographical location can meet face-to-face for mutual support and ‘meet-ups’ are encouraged in some courses. Face-to-face meetings are often required for formal students who want to get credit for studying a MOOC (Blom et al. 2013). As for the course aspect, he highlights that MOOCs run for a specific time (p.3). Based on Anderson’s (2013) work, MOOCs have been defined as “online, non-selective and tuition-free courses that are usually addressed to a global audience of students” (Nkuyubwatsi 2013, P. 341). MOOCs have been broadly classified into two categories: Connectivist MOOCs (cMOOCs) and Extension MOOCs (xMOOCs). Connectivist MOOCs are based on many, if not all, of Siemens’ (2005) connectivist learning principles:
- Learning and knowledge rests in diversity of opinions.
- Learning is a process of connecting specialized nodes or information sources.
- Learning may reside in non-human appliances.
- Capacity to know more is more critical than what is currently known
- Nurturing and maintaining connections is needed to facilitate continual learning.
- Ability to see connections between fields, ideas, and concepts is a core skill.
- Currency (accurate, up-to-date knowledge) is the intent of all connectivist learning activities.
- Decision-making is itself a learning process. Choosing what to learn and the meaning of incoming information is seen through the lens of a shifting reality.

As for extension MOOCs, they are essentially based on a didactic pedagogy. They are characterised by high student-multimedia content and student-student interactions, but student-teacher interaction is very low. As the name perhaps suggests, the goal of these MOOCs is to expand higher education beyond universities’ physical campuses. Many universities involved in the xMOOC movement hope to attract students to their fee-bearing courses through MOOCs. For this reason, xMOOCs resemble, in many respects, university courses offered for various qualifications. A statement of accomplishment is awarded to students who successfully complete many xMOOCs. These MOOCs are criticised for relying on either cognitive-behaviourism (Rodriguez 2012) or behaviourism (Daniel 2012, Bates 2012). As Conole (2013) argues, however, these criticisms do not reflect the diversity in these MOOCs and how students engage with them. Therefore, the cMOOCs/ xMOOCs categorization does not necessarily means that MOOCs in the same category look the same.

The popularity of MOOCs grew enormously from 2011 onward; when the first three xMOOCs were offered at Stanford University. Artificial Intelligence, Machine Learning and Introduction to Databases ran concurrently (Rodriguez 2012). The Artificial Intelligence MOOC enrolled more students than the other two MOOCs, and became more famous, because of its instructor’s post-course reaction. After co-tutoring the course with Peter Norvig and graduating 20,000 students from 160,000 enrollees, Professor Sebastian Thrun resigned from Stanford. In January 2012, he launched Udacity (https://www.udacity.com/), a private MOOC provider. This move triggered a response from his colleagues, Daphne Koller and Andrew Ng, who co-founded Coursera (https://www.coursera.org/) in April 2012. Unlike Udacity, Coursera focused on working in partnership with prestigious universities. This enabled Coursera to become one of the biggest MOOC platforms in terms of number of students, number of courses, partner institutions, diversity of fields of study and languages of learning. By the end of 2013, Coursera had already enrolled over 5,856,000 students. Its website listed 557 courses and 107 partners. Courses were available in 25 fields of study and 12 languages: English, Chinese, French, Russian, Spanish, Portuguese, Turkish, Arabic, German, Ukrainian, Italian, and Japanese. A few weeks after Coursera started, Harvard and MIT co-financed the MITx platform, which changed its name to edX (https://www.edx.org/). Competition in the MOOCs industry was already intense.
The United States of America monopolized the xMOOC market for only a few months before reactions appeared in other countries. In December 2012, a partnership of British institutions to provide MOOCs via the FutureLearn platform ([http://futurelearn.com/about/](http://futurelearn.com/about/)) was revealed. In December 2013, 26 higher education institutions, mostly British universities, the British Library, the British Council and the British Museum were partners in FutureLearn. Non-British partner universities included the University of Auckland (New Zealand) and Monash University (Australia). In March 2013, Open2Study ([https://www.open2study.com/](https://www.open2study.com/)), an Australia MOOC platform was launched. This platform was quickly followed by the OpenUpEd ([http://www.openuped.eu/](http://www.openuped.eu/)), a pan-European MOOC initiative launched in April 2013. OpenUpEd is unique in being committed to open licensing of the MOOC content, with Creative Common Attribution (CC-BY) and Creative Common Attribution Share Alike (CC-BY-SA) as the most desirable licences (OpenUpEd 2013). This open licensing of MOOC materials will enable cultural translation, a sound practice that is often hindered by prohibitive licences (Nkuyubwatsi upcoming). Other MOOC platforms include, but are not limited to, NovoEd ([http://novoed.com/](http://novoed.com/)) based at Stanford University, Iversity ([https://iversity.org/](https://iversity.org/)) which is a German MOOC platform, Veduca ([http://www.veduca.com.br/](http://www.veduca.com.br/)) based in Brazil and eWant ([http://www.ewant.org/MOOC/Home/Default.aspx](http://www.ewant.org/MOOC/Home/Default.aspx)) based in China. The number of MOOC platforms has expanded quickly across the globe in the last two years.

### 2. The controversy around MOOCs

The debate on MOOCs was polarized after the surge of xMOOCs. The founders of xMOOC platforms claim that MOOCs are high quality courses provided free to learners all over the world (Koller 2012, Shaw 2012, Thrun 2012, FutureLearn 2013,). Equally, Ripley (2012) commends opportunities opened by xMOOCs to learners who are unable to attend higher education in existing systems. Although the quality of xMOOCs’ content is controversial, some universities have made agreements with Coursera to use its courses for their accredited programmes (Kolowich 2012). Moreover, the recent partnership between Coursera and the World Bank mentioned earlier (World Bank 2013) indicates that xMOOCs have gained some trust. However, xMOOCs are criticized for relying on a traditional learning approach (Daniel 2012) and cMOOCs do not enable meaningful connectedness and interactivity (Mackness et al. 2010 p. 272). In their survey on Connectivism and Connective Knowledge, Mackness et al. (2010) found both positive and negative reactions from participants (p. 267). They also noted that the number of participants was so overwhelming that it hindered meaningful connectedness and interactivity.

It is important to recognize that both MOOC advocacy and criticism are coupled with the promotion of learning perspectives, many of which do not make sense universally. Some perspectives, for instance, tend to overemphasize the teacher’s presence and seem to underestimate the role of the learner’s investment and learning that occurs in settings where there is a shortage of teachers. A different approach that recognizes multiple perspectives of learning and the merits as well as limitations of a diversity of modes of learning is needed. As Kandiko (2013) argues, there is no universal student experience because of enormous diversity (p.4) and there is no universal way of learning. Having a diverse mindset vis-à-vis perspectives on learning and various modes of learning would help educational stakeholders understand better learning across settings.

MOOCs are also criticized for their low completion rates (Daniel 2012). However, Anderson (2013) argues against basing these rates on figures that include enrollees who are not interested in completing the course. Likewise, Fini (2009) contends that using the conventional concepts of attrition and drop out for such students is inappropriate. Moreover, the MOOC completion rate looks low when the viewer is interested in percentage. However, when attention shifts to the course reach, MOOCs’ superiority stands out. For instance, the Stanford University Artificial Intelligence MOOC that had a low completion percentage (about 12.5 percent) graduated 20,000 students. Courses whose professors pride themselves for 100 percent of completion have not accomplished a 20,000 graduation in a single cohort. It would indeed take more than a professor’s life period to graduate 20,000 students with 100 percent of completion rate in the non-MOOC system. To reach 100 percent of completion, traditional universities exercise selective filters, and this ends up excluding a lot of learners. The consequence of using such selective filters on non selected individuals is the self-perception as being not good enough for higher education, which is a tipping point of social disempowerment (Lane 2009, p. 9 and Lane and Van Dorp 2011). Such feeling inhibit disempowered individuals’ efforts because they think they cannot upgrade their competences to the level required for higher education. Hence, the cost of prioritising percentages in calculations of completion rates is the disempowering selection which inhibits effort and development of potential talents of people who are not included.
Another source of dispute about MOOCs is their potential to improve access to higher education in developing countries. While Thrun (2012) and Koller (2012) are optimistic about this contribution, Bates (2012) and Daniel (2012) see such optimism as unjustified: they argue that widening participation in developing countries depends on both the provision of free courses and the accreditation of the learning achieved. The need to link learning, certification and accreditation also emerged in the First International Conference of the African Virtual University held in Nairobi in November 2013. According to the African Development Bank (2013), the conference delegates agreed that certification as evidence of learning achievement is important in all countries and especially in Africa. In a different direction, Ostrow (2013) argues that MOOCs are beneficial to students who are rich and those who already have degrees. This is similar to Liyanagunawardena et al.'s (2013) and Sharma's (2013) contentions that the current MOOC model is not compatible with many learning settings in the developing countries. MOOCs still need to be adjusted to suit learning in underprivileged settings.

A good way to position MOOC learning experience vis-à-vis learning experience through other modes of delivery is by exploring in each the possible types of interactions that enable meaningful learning. Moore (1989) identified three types of interaction: student-teacher, student-student and student-content. The fourth type of interaction, learner-interface interaction in which the student interact with a computer, was added by Hillman et al. (1994). In his interactivity theorem, Anderson (2003, p. 4) argues that as long as at least one of Moore’s three types of interaction is maximised, deep and meaningful learning occurs. In this paper, I describe and discuss a cross-modal learning experience that enabled my migration across the four types of interaction. This experience occurred through face-to-face, self-guided/radio, online and MOOC modes of learning.

3. Methodology

The research was designed as a case study that analyses and discusses learning experience across four cases: face-to-face learning, self-guided/radio learning, online learning and learning from MOOCs. Face-to-face learning covers my education at both the National University of Rwanda (NUR) and Eastern Michigan University (EMU). The programme at NUR was at undergraduate level and the one at EMU was at postgraduate level. My self-guided and radio learning experience was enabled by reading various resources, mostly hand-written, and by listening to the British Broadcasting Corporation (BBC) and the Voice of America (VOA). This learning enabled me to prepare for my national examinations, which I had to take to compete for a place and student loan for public higher education, and to prepare for my undergraduate education afterwards. In my learning from radio, I listened regularly to various English language courses, debates, and other broadcasts. Radio courses included, but were not limited to, *Leçon d’ Anglais par Radio* which was offered by “BBC Afrique”, as well as *New Dynamic English and Functioning in Business* which were broadcast by the VOA Special English. Debates included the BBC’s *Have your Say* and the VOA’s *Straight Talk Africa*. As for other broadcasts, they included news from both radios as well as programmes of the VOA Special English, mainly *Exploration, Science in the News, Agriculture Report, Education Report, Economics Report*, etc. The third case, online learning experience, consisted of learning with both the UK Open University (OU) and the e-Academy, an eLearning platform run by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ). The UKOU programme was at MA level and focused on theories, research and practices in online and distance education. It had several modules whose sizes varied between 300 and 600 hours: 30 and 60 credits respectively in the British credit system. As for the e-Academy programme, it focused more on the development of hands-on skills in planning, implementing, managing and tutoring eLearning courses. It consisted of six modules of roughly 30 to 40 hours of workload. This programme was implemented by the University of The Philippines Open University (UPOU). As for my MOOCs learning experience, it consisted of learning from one cMOOC and 12 xMOOCs. The cMOOC was *Open Content Licensing for Educator (OCL4Ed)* which was offered by the Open Educational Resources Foundation (OERF) in partnership with the Commonwealth of Learning (COL) chair in OER at Otago Polytechnic, the UNESCO-COL chair in OER at Athabasca University and the Creative Commons Aotearoa New Zealand. As for the xMOOCs, I took them from Coursera between January and December 2013. These MOOCs were offered by Universities in three Countries: USA, UK and Germany (see Table 3.1).

In the first three cases, I was simply a learner, but my role in the MOOCs was mainly as a researcher. My enrollment in these MOOCs was informed by my interest in the courses: most students choose courses because they are interested in the content and this helps them to engage with their learning. In each MOOC, my goal was to complete all learning activities that were required and add a manageable number of optional...
activities. In this way, I was a participant observer. Yin (2009) defines participant-observation as a mode in which the observer assumes various roles in the case study situation and actively participates in the phenomenon that is being studied (p. 111). He argues that such participation helps the researchers to see the reality from the point of view of someone who is inside the case study rather than external to it (p. 112). Hence, participating in MOOCs and engaging in learning activities as other MOOC students gave me a broad and deep understanding of these courses from a learner’s perspective. It also enabled me to engage with learning from these MOOCs, just as I was engaged in the other courses that make up the three other cases analysed in this study.

Given that this study is a multiple-case study, I conducted a cross-case comparison of learning experience. Firstly, I identified strengths and limitations of each case and recurring patterns across learning enablers offered by the four cases. Secondly, I organised those patterns into five themes: openness, availability, diversity, flexibility and interactivity. Then, I established a chain of evidence related to the five themes across the four cases. In discussing findings, I linked pieces of evidence to the related literature and the following research questions:

- What were the strengths in each of the four learning modes?
- What were the limitations in each of the four learning modes?

Table 1: Coursera xMOOCs used in this study

<table>
<thead>
<tr>
<th>xMOOC</th>
<th>University</th>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Artificial Intelligence Planning (AIP)</td>
<td>University of Edinburgh</td>
<td>28 January-03 March 2013</td>
</tr>
<tr>
<td>Internet History, Technology and Security (IHTS)</td>
<td>University of Michigan</td>
<td>1 March-28 May 2013</td>
</tr>
<tr>
<td>Leading Strategic Innovations in Organisations (LSIO)</td>
<td>Vanderbilt University</td>
<td>5 March-06 May 2013</td>
</tr>
<tr>
<td>Inspiring Leadership through Emotional Intelligence (ILTEI)</td>
<td>Case Western Reserve University</td>
<td>1 May-12 June 2013</td>
</tr>
<tr>
<td>Developing Innovative Ideas for New Companies: The 1st Step in Entrepreneurship (DIINC)</td>
<td>University of Maryland</td>
<td>20 May-1 July 2013</td>
</tr>
<tr>
<td>Competitive Strategy (CS)</td>
<td>Ludwig-Maximilians-Universität München</td>
<td>1 July-11 August 2013</td>
</tr>
<tr>
<td>New Model of Business in Society (NMBS)</td>
<td>University of Virginia</td>
<td>2 September-7 October 2013</td>
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<tr>
<td>Creativity, Innovation, and Change (CIC)</td>
<td>Pennsylvania State University</td>
<td>1 September-27 October 2013</td>
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<tr>
<td>Online Games: Literature, New Media, and Narrative (OGLNMN)</td>
<td>Vanderbilt University</td>
<td>9 September-21 October 2013</td>
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<td>Law and the Entrepreneur (LE)</td>
<td>North Western University</td>
<td>23 October-4 December 2013</td>
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<td>E-learning and Digital Cultures (EDC)</td>
<td>University of Edinburgh</td>
<td>4 November-9 December 2013</td>
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<td>Design Thinking for Business Innovation (DTBI)</td>
<td>University of Virginia</td>
<td>4 November-9 December 2013</td>
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4. Results

This section presents learning experience that revolves around openness, availability, diversity, flexibility and interactivity in each of the four cases.

4.1 Learning experience in the face-to-face mode

Face-to-face programmes I attended at both NUR and EMU were not open in terms of removal of restriction on learning content and freedom to determine the learning pace. Entry to both programmes was highly selective and the learners’ freedom to choose their field of study was limited at NUR. In terms of availability, the NUR programme was marked by two major access challenges: the difficulty to access adequate learning resources and the shortage of competent teachers. To borrow books from the library, students had to make a list of the books they wanted and pass the list to a librarian who went to the shelves to find the books. In many cases, the librarian came back without the books, because the few copies the library had were on loan. Consequently, a significant amount of time was wasted trying to access reading resources. This difficulty made reliance on teachers’ notes high, but teachers were hard to meet on a regular basis. Many times, we went to
classrooms and waited for a teacher for about an hour, and then the class ended up being cancelled because the teacher could arrive. These irregularities were mainly caused by sharing the few available teachers between institutions, the unreliable transportation system and an inadequate communication system and infrastructure. By contrast, my face-to-face experience at EMU was marked by over-abundance in terms of access to learning resources and teachers and communication systems. I had access to the library 24 hours a day, seven days a week. In addition to plenty of print materials, I could access online resources anytime and from anywhere. Professors had office hours in which they expected students to visit them and discuss their progress.

Diversity in terms of content and participants was limited at NUR. However, this programme was diverse in terms of settings from which the required learning content came. As for the programme at EMU, it was diverse in terms of the content that was accessible to students and participants. However, the required resources in some classes were limited to research and practices in North America. In terms of interactivity, student-content, student-teacher and student-student types of interactions were limited at NUR. While student-content and student-teacher types of interaction were hindered by inadequate access to resources and shortage of teachers, the student-student interaction was limited by the learning culture which was dominated by individual learning. The three types of interaction were more enabled at EMU by access to plenty of resources, a learning culture that valued discussion and the small size of the classes.

4.2 Learning experience in the self-guided/radio mode

The self-guided learning mode, especially the one based on written materials, was not open. Finding relevant resources was difficult since open licensing was not yet adopted. Radio learning was based on open course and other broadcasts were open in terms of expansion beyond geographical barriers, freedom of speech, no requirement to enroll and access free of charge. I had to take notes as I was listening. Although listeners did not necessarily have freedom of speech, this freedom was reflected in BBC and VOA debates that apparently offered an equal chance of expression to all contenders. However, the availability of the programmes was limited, and the scheduling was not flexible at all. I had to be tuned in at the specific times the programmes were broadcast. Otherwise, I missed them because I had no means to neither download nor record them. In terms of diversity, these programmes covered topics from a diversity of settings. Most of the broadcasts were addressed to audiences beyond the UK and USA respectively. The hosts covered stories, practices and cases from a diversity of settings. Self-guided learning lacked interactivity. However, engaging with this mode of learning was a must for me to secure a place and funds for formal undergraduate education.

4.3 Learning experience in the tutored online mode

When I started my online learning experience, my computer literacy was rudimental and my English language proficiency was still far below the level of native speakers. Equally importantly, the British education system was unfamiliar. Aware of these disadvantages, I was not intimidated. I had already gained access to formal higher education through the self-guided learning mode and my strategy was to build on self-discipline, self-management and resilience that I had already developed. My only worry was that the programme might be inaccessible to me, but I was able to leverage both online and offline learning successfully. Everything was perfect with the first module thanks to my regular access to the Internet. There were a few interruptions caused by connectivity failure and electricity outages, but I was able to cope. With the second module, however, the Internet at my workplace collapsed. I had to take a three-hour weekend bus trip to access the Internet. Each weekend, I downloaded and copied and pasted all the materials for the coming week, contributed to the forum discussion and watched or listened to video or audio materials that were only available through the Internet. Fortunately, most of the materials were articles, and book chapters that could be used offline. During work days, I read the materials and completed all activities that could be done offline. The Internet failure certainly affected the level of success I wanted to achieve, but I could maintain my performance above the course requirements thanks to this strategy. I further addressed the issue by seeking a full time scholarship in a setting where I could have access to consistent connectivity. That is how I ended up at EMU. After completing the programme at the UKOU, I took the e-Academy’s eLearning courses. This professional programme, consisted of six short courses. Similar to the UKOU programme, learning was mainly based on reading material that could be downloaded and read offline. Access to the Internet was mandatory only for participating in and facilitating discussion in the forum and chat sessions. Both the UKOU and e-Academy programmes required some prerequisites and were not free of charge. The course contents were also not openly licensed. Tutorial support was availability and all queries received responses within 48 hours.
The learning contents were diverse in that they covered research, practices and cases from a diversity of settings, not just one country. Participants were also from a diversity of settings. The three types of interaction were all available and the frequency was high for participants who were interested in taking the best from these programmes.

4.4 Learning experience in the MOOCs mode

I started my MOOC learning experience with OCL4Ed in June 2012. However, after noticing that the amount of time required to engage in meaningful learning was far beyond what was announced in the course information, I dropped out. I re-enrolled in this cMOOC in the following offering of December 2012. Aware of the amount of time needed to learn from this course, I had planned enough time for the December 2012 offering. Learning was based on a few reading materials and micro-blogging that was conducted using WENotes on WikiEducator, identi.ca or Twitter. I had to follow the flow of micro-blogs to feel I had taken the best from the course. Overall, I found this cMOOC more beneficial to highly educated people interested in sharing than to inexperienced learners who wanted to learn new concepts.

Unlike OCL4Ed which was loosely structured, most xMOOCs are structured to facilitate the learning for different levels as long as learners engage seriously with the course. These MOOCs vary enormously in terms of depth, rigour, mode of assessment and course structure. Some of them such as NMBS and CIC are at the introductory level while others such as LSIO and ILTEI are more advanced. NMBS and CS are simply based on lecture videos, optional forum discussion and quizzes while EDC is more structured like cMOOCs. However, EDC offered more readings, including academic publications, than OCL4Ed. EDC also relied heavily on social learning that takes place in the discussion forum, or via Facebook and Twitter. The course had no quizzes and certificates were awarded based on a digital artifact submitted for peer grading at the end of the course. Participation in the forum discussion was required in LSIO, ILTEI and DTBI while it was optional in other xMOOCs.

With regards to openness, availability, diversity, flexibility and interactivity, MOOCs share some similarities but they differ in many aspects as well. All the MOOCs I took had no entry requirement other than access to the Internet. They were provided free of charge and learners had a say in the learning pace. However, they were not openly licensed except OCL4Ed. Most of xMOOCs were mainly based on lecture videos, and accessing them required good connectivity. Similar to other online courses, MOOCs were available 24 hours, seven days a week, during their run period. All the MOOCs attracted participants from a diversity of background. However, diversity in terms of content varied from MOOC to MOOC. While some MOOCs’ content covered practices and research from various settings, others were restricted to research and practices in North America. Diversity in terms of learning and assessment activities also varied. While some MOOCs such as NMBS and CS were based on lecture videos, forum discussion and weekly quizzes, other MOOCs such as LSIO and ILTEI additionally had reading materials, reflection activities, team project or practical activities that required working with people. As for interactivity, student-teacher interaction was minimal in MOOCs. However, student-student interaction occurred in the discussion forum and/or socio-media for those students who were interested. Student-content interaction can also be maximized in MOOCs that provide plenty of high quality content. The type of interaction that is unique to Coursera MOOCs is student-interface interaction: the platform offers tools for students to personalize their learning. Students can stop videos any time, repeat them as much as they like, slow down the speech rate and add sub-titles.

5. Discussion

The four modes of learning share a precondition for learning: access to the learning opportunity and learning content. Whenever this precondition was met, it has been possible for learners to capitalize on resources they have access to. The learner’s strengths, the media the learner has access to, and open assessment and accreditation can all make a difference to the learner’s educational accomplishment. Each of the four learning modes has its own strengths and limitations, which are discussed below:

5.1 What were the strengths in each of the four learning modes?

Face-to-face learning’s strengths relied on the shared knowledge and understanding of the learning setting. In the face-to-face programmes at both NUR and EMU, opportunities and challenges were, to some extent, shared by students and teachers. As Edmundson (2012) argues, the face-to-face mode enables the teacher to understand where learners are as people and start from there. Another advantage of the face-to-face mode of
learning was the presence of a tutor/teacher who could answer students’ queries on the spot. This mode of learning is critical for learners who are inexperienced and those who have not yet reached sufficient maturity to manage their own learning. In places where there are enough teachers, the face-to-face mode can provide an enjoyable learning experience to mature students as well as novices. The face-to-face mode also offers students better opportunities to build social relationship beyond the academic life.

Self-guided learning, based on written materials or radio broadcasts, is more powerful in terms of geographical reach. This mode enabled my learning from an isolated setting, without electricity or Internet connectivity. My achievement from this mode of learning enabled me to move to formal higher education, this time, in a setting with access to electricity and limited access to Internet. Considering the current statistics on Internet penetration globally (Miniwatts Marketing Group 2012), self-guided and radio learning seem to be the most scalable modes of learning. This mode has the potential to provide the most inclusive education if Bates’ (2012), Daniel’s (2012) and African Development Bank’s (2013) argument on linking learning and accreditation is considered.

Online learning is unique in its flexibility coupled with tutorial support. Students can access the content anytime and anywhere. This flexibility makes it possible for individual learners to learn at their own pace and convenient times: this invalidates claims that “Online education is a one-size-fits-all endeavor” (Edmundson 2012 paragraph 11). Through this learning mode, I developed multiple skills that are needed in the digital age such as communication in a digital environment, self-management, etc. Online learning requires high motivation to learn as Edmundson (2012) argues. However, high motivation is a desirable attribute for good students. Briefly, the online learning mode is strong in terms of flexibility and opportunity for multiple skill development for students who engage with their learning. As with tutored online learning, MOOCs are flexible and accessible anytime and anywhere there is Internet connectivity, and they provide opportunity for multiple skills development. Skills that can be learned from MOOCs include, but are not limited to, cross-cultural communication which can be learned from both cMOOCs and xMOOCs, providing peer-feedback, and being receptive to critical feedback learned from xMOOCs. These skills were additional to what I learned from the MOOCs content parse. Unlike any other mode of learning, the Coursera platform offered tools to personalise learning (Koller 2012). These tools enabled students to stop lecture video anytime, repeat them as much as they want, slow down the speech rate and add subtitles.

To sum up, each of the four modes of learning makes a unique contribution to learning experience. Face-to-face learning is crucial for inexperienced learners and enables the departure from the learners’ setting. Self-directed learning, based on radio or written materials, helps learners in remote settings. Online learning is unique in offering flexibility, with the possibility to learn anytime and anywhere, and opportunity to develop multiple skills, advantages that are coupled with tutorial support. As for MOOCs, they offer students tools to personalise their learning in addition to most of the advantages offered by online learning.

5.2 What were the limitations of each mode of learning?

The drawbacks of face-to-face learning include, but are not limited to, cost in terms of time and money, socio-disempowerment and lack of flexibility. Face-to-face learning requires expensive infrastructure. In settings where there is a shortage of teachers and difficulty to access learning resources, face-to-face learning incurs the waste of time that could be invested in learning. This is especially the case when teachers’ availability is quite difficult to predict. As earlier discussed, students at NUR wasted significant amounts of time when they went to classes that were eventually cancelled and when they waited in a queue to get library resources. Equally, most face-to-face programmes are selective, which cause excluded individuals to see themselves as not being good enough, an indicator of social disempowerment (Lane 2009, Lan and Van-Dorp 2011). In terms of flexibility, face-to-face courses require all students to attend classes or lectures at a specific time, regardless of inconvenience to them as participants. It is probably this lack of flexibility that led to most of Stanford University’s Artificial Intelligence students’ preference of the MOOC mode rather than the face-to-face one (Thrun 2012). Although some face-to-face sessions are fruitful when students discuss the course-related topic or materials, such discussion can also occur online. Briefly, the face-to-face mode is not the right choice for expanding access to education with limited resources.

Self-directed learning is weak in its lack of support to the learner. Although I achieved my goal through this mode, I could not get support I needed. The self-guided mode enabled by radio is probably the least flexible
mode of learning. I had to be tuned in at the time of broadcasts or miss the sessions. Equally, it was challenging to listen to the radio and take notes at the same time. Bates’ (2012) and Daniel’s (2012) criticism of learning based on transmission of knowledge applies particularly to radio learning. Self-directed learning is also the least interactive mode when it comes to Anderson’s (2003) interactivity theorem. In this mode, learners suffer isolation, and they have to be exceptionally committed to carry on. Hence, self-directed and radio learning modes are probably to be used only as the last resort. Online learners can also feel isolated to a certain extent, although this feeling can be alleviated by participation in the forum discussions. In my case, this feeling was exacerbated by the Internet difficulties, especially when I thought I was lagging behind. The flexibility of online education comes with a high level of responsibility. Successful online learners are self-disciplined and good at self-management. In addition, a high level of motivation is required for successful online learning (Edmundson 2012). Another disadvantage of online education is that its reach is limited. With less than 50 percent of people having access to the Internet globally (Miniwatts Marketing Group 2012), online learning still cannot help reach many people, perhaps the majority. Briefly, online learning can be a negative experience and its reach is limited.

Despite the weaknesses of these four learning modes, each of them brought a unique contribution to my educational, socio-economic and geographical migration. Self guided and radio learning enabled me to migrate from non-formal learning to formal higher education. Thanks to this mode, I was able to secure a place (and a student loan) in public higher education. The independence and high motivation that I had developed through self-guided learning was transferred to face-to-face undergraduate education, and this enabled me to complete this level with results that gained me an academic position. This marked my most significant socio-economic migration: crossing the poverty line to the upper position. Coupled with my previous learning accomplishments, working in academia was critical for gaining a place at the UKOU, which enabled me to migrate into an online and collaborative learning experience. Working in higher education also led to my winning a place and funding for the EMU graduate programme and migration to the USA. More important than this physical movement, I have been able to learn through institutions in Rwanda, UK, USA, Germany, the Philippines and New Zealand. This learning experience, expanding to the five continents, was enabled by all the four modes of learning, each one building on accomplishments enabled by its predecessor(s).

The complex migration discussed above indicates that by capitalizing on specific learners’ strengths, existing access to media and open assessment and accreditation practices, it is possible to build an inclusive education system that can make a difference in learners’ lives and help them migrate across learning modes. This is an important message to pioneers who want to use MOOCs to open up access to higher education in developing countries. If related initiatives do not capitalize on existing access to media, local learners’ strengths and openness in terms of content, assessment and accreditation, they will end up creating an exclusive education for the local rich. It has already been discussed that the current MOOCs model is beneficial to rich learners (Ostrow 2013). The failure to consider local learners’ needs and access to media and open assessment and accreditation practices, it is possible to build an inclusive education system that can make a difference in learners’ lives and help them migrate across learning modes. This is an important message to pioneers who want to use MOOCs to open up access to higher education in developing countries. If related initiatives do not capitalize on existing access to media, local learners’ strengths and openness in terms of content, assessment and accreditation, they will end up creating an exclusive education for the local rich. It has already been discussed that the current MOOCs model is beneficial to rich learners (Ostrow 2013). The failure to consider local learners’ needs and access to media risks deepening the existing socio-economic and educational divides rather than bridging them.

It is also worth noting that learning experience is unique and varies from student to student, and a combination of learning modes might lead to a better learning experience. As Kandiko (2013) highlighted, there is no universal learning experience because of the diversity of learners and learning settings. In my own learning experience, the high level of engagement and investment in these four modes of learning shaped my gain and therefore contributed to my positive learning experience. Learning through multiple modes is likely to lead to a more positive learning experience since strengths of those modes can be leveraged. It is normal for learners to prefer some mode of learning over others (I personally prefer online and MOOC modes). However,
other modes contribute enormously to learning and skill development as well. Therefore, each of the four modes can help engaged learners accomplish a great deal in their learning.

6. Conclusion

In this paper, I have attempted to compare and contrast face-to-face, self-guided/radio, online and MOOC learning experience. Face-to-face learning provides a shared understanding of the learners’ setting and is critical for inexperienced learners but it is expensive and becomes socially disempowering when it is selective. Self-directed learning, by radio or otherwise, helps reach learners in remote places but it leads to isolation and is quite difficult if the learners are not highly motivated. Online learning is flexible and helps develop multiple skills for the digital age, but its reach is limited by the digital divide. As for learning from MOOCs, especially those on the Coursera platform, they enable personalised learning, are flexible and enable multiple skill development. However, they lack accreditation and are only beneficial to learners with high quality connectivity. MOOCs, especially xMOOCs, were found to be diverse in nature: the xMOOC categorization does not mean that they are all similar. Despite the limitations, each of these learning modes can lead to remarkable learning achievement that can transfer to other modes of learning and bridge the educational, digital and socio-economic divides. Learning through a combination of learning modes, where possible, can lead to better learning experiences than an exclusive use of one mode. The findings in this study, especially the ones on learning experience, should not be generalized. Learning experience is unique and depends on multiple factors including the number of options available to the learners, the learner’s investment and the learning goal. This study can help stakeholders in education who are interested in expanding education to disadvantaged settings to capitalize on learners’ strengths, available access to media and open practices. Doing so can help provide an inclusive education for learners’ development, education that impacts positively on learners’ lives.

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E-Learning in Poly-Topic Settings

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Abstract: In e-learning settings, technology plays several crucial roles in the teaching. In addition to enabling students to gain remote access to teaching, it can also change the way time, space and presence are perceived by students and teachers. This paper attempts to analyse and discuss the consequences of the transparency or visibility of e-learning technology inside and outside the classroom and highlight its opportunities of multiplying the learning spaces. In order to be able to differentiate between learning that occurs in the same place and learning that occurs in more places at the same time across virtual and physical spaces, the paper therefore introduces the concepts of idiotopic and polytopic learning settings. Furthermore, it argues that the development of polytopic learning designs could help address a potential e-learning demand for teaching presences in more places at the same time.

Keywords: e-learning, social presence, physiotherapy education, desktop videoconferencing, idiotopic and polytopic learning designs

1. Introduction

To be present in a classroom can be enacted and described in several ways; however, it is not necessarily the same thing as being physically present. Short et al. (Short, Williams, & Christie, 1976) defined social presence in the context of telecommunications as ‘the degree of salience of the other person in the interaction and the consequent salience of interpersonal relationships...’ (p. 65). Here salience meant the degree to which a person is perceived as a real person in the context of mediated communication (Pugsley, 2010). Furthermore, Short et al. argued that the medium itself establishes a social presence according to its ability to transmit nonverbal social cues. However, this distinction changed quickly after the advent of the Internet age; social presence became less about the objective qualities of the medium and more about perception (Borup, West, & Graham, 2012). As a result, the concept of social presence and its relation to teaching and learning has been further developed (Garrison, 2011). Several researchers have put forth definitions of social presence as the feeling of belonging to a group (Swan & Shih, 2005) and being able to interact with other students (Dziuban & Moskal, 2001). Some research is concerned with the fact that students are also more satisfied with their online courses if they feel they belong there and can interact with the teacher and with the other students (Hartman & Truman-Davis, 2001), and others suggest that the use of technology is balanced with the human touch of a real person (Borup et al., 2012). However, studies also find that students express satisfaction with web-based lectures even without an opportunity for interaction (Gosper et al., 2007); that social presence is not always related to learning outcomes (Beaudoin, 2002) and that increased social cues can be a hindrance for learning, particularly for students with low technological efficacy (Lyons, Reysen, & Pierce, 2012).

Since the social presence of the teacher/instructor is found to have a larger impact than students’ social presence on, for example, perceived learning, it has been suggested that research could be extended further in the area concerning the teachers’ social presence (Lowenthall & Lowenthal, 2010). In e-learning settings, the teacher’s academic identity is found to be changing (Hanson, 2009). Although teachers might not be quite ready to embrace the ‘disembodiment’ or ‘re-positioning’ required by e-learning (Hanson, 2009; Spencer, 2011), some suggest that they have to become accustomed to ‘(dis)embodiment’ in order to deepen their understanding of student learning in e-learning settings (Taylor, Lopez, & Quadrelli, 1996). These aspects are at stake in the hybrid synchronous classroom and in blended learning settings and will be addressed in this paper in order to investigate the research question concerning the role of technology in relation to time, space and presence.

1.1 The physiotherapy e-learning case

When e-learning is introduced in professional bachelor programmes with a strong tradition of mixing dialogues and physical and practical exercises with the classroom lectures, the role of the teacher and the opportunities for the students to participate actively in the teaching slowly change. That is to say, students are no longer only young people sitting in the classroom with the teacher; but they can also be invisibly located at home in front of a computer screen, and represented by a steady camera in the classroom as was the case in the physiotherapy e-learning program in Denmark.
In this physiotherapy case, e-learning is understood as the part of the teaching that takes place when the students are away from campus and studying at home. E-learning is considered one component of the blended learning design that consists of on-campus and online teaching. In this paper, the definition of e-learning reflects this understanding and it is therefore close to Laurillard's definition of e-learning as the use of any digital technology or applications in the service of learning (Laurillard, 2006: 72). The definitions of e-learning and technology enhanced learning therefore overlap in this paper. The e-learning students in the physiotherapy programme could choose to participate synchronously in the teaching while it being recorded live, or they could choose to watch the video-recorded lecture asynchronously afterwards, i.e. after it had been edited by the teacher. Thus, both physically present students and students attending the class virtually were present in the classroom. This learning design and examples of others will be discussed in this paper.

The empirical basis of the paper is a PhD project’s findings during 1.5 years of fieldwork in the context of professional bachelor programme in physiotherapy in Denmark when e-learning (or, more accurately, blended learning) was just being introduced for the first time in this programme. The qualitative data was constructed through participant observation in the teaching on campus and online in the hybrid synchronous classrooms; through learning design workshops with the teachers; through interviews with e-learning students in five focus groups and through semi structured interviews with their five teachers. All of the interviews revolved around the experiences related to and the thoughts underlying the learning designs in the e-learning settings.

2. Embodiment of technology

The e-learning students in the professional bachelor programme in physiotherapy are often older than the average student. Furthermore, they have a family and a job beside their studies, and often they do not live near campus. Thus, e-learning affords a way for the students to become physiotherapists despite the various obstacles and time constraints they face. Many of the e-learning students agreed with the following statement: ‘Without this opportunity of e-learning where I get the lectures without showing up on campus, I would be unable to become a physiotherapist!’ They therefore found that e-learning technology made the impossible possible.

Although a blind man can make use of a cane to ‘see’ the world, to notice doorways, staircases and chairs, he does not necessarily pay attention to the cane, nor is he interested in it as such. Rather, he uses it to come into contact with the world and gather information about his surroundings. Technology is said to be embodied (Ihde, 2010) when it mediates one’s perception of the world, as is the case when a visually impaired man uses technology (glasses) as an enhancement of bodily perception, or when a previously impossible bodily perception or action is made possible due to technology. With respect to the embodiment relation, Don Ihde observed that ‘I take the technologies into my experiencing in a particular way by way of perceiving through such technologies and through the reflexive transformation of my perceptual and body sense.’ (Ihde, 2010:135). And the blind man sees the world.

The e-learning students in physiotherapy used e-learning – and in this case the desktop videoconference tool Adobe Connect in particular – to enter the classroom where the lecture was taking place and to come into contact with the teacher. They embodied the digital technology by letting the camera and microphone replace their eyes and ears; furthermore, the Adobe Connect chat functionality became their voice in the classroom. The students were physically present at home but virtually and socially present on campus. Therefore, the e-learning student could interact with the teaching by using the technology. Following Ihde (ibid.), the relation can be visualised as follows:

\[
\begin{align*}
\text{Student – technology} & \quad \text{– teaching} \\
\end{align*}
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Thus, technology becomes part of the way the students experience the teaching, but this embodied human-technology relation requires the transparency of technology: ‘The interface of a telepresence system is highly mediated and yet is supposed to be transparent, in the sense that it should transmit a view to the human operator and allow the operator to interact ‘naturally’ with what she sees’ (Bolter & Grusin, 1999). Similarly, Lombard and Ditton (Lombard & Ditton, 1997) defined presence as the perceptual ‘illusion of nonmediation’. This ‘illusion’ occurs when a person fails to perceive or acknowledge the existence of a medium in his/her communication environment and responds as he/she would if the medium were not there (Picciano, 2002). Only when the sound or the picture suddenly went missing, the e-learning students’ focus shifted from the content of the teacher’s lecture to the mediation of the lecture. Bruno Latour describes it as follows (1999: 183): ‘Take, for instance, an overhead projector. It is a point in a sequence of action (in a lecture, say), a silent
and mute intermediary, taken for granted, completely determined by its function. Now suppose the projector breaks down. The crisis reminds us of the projector’s existence. Likewise, the technological breakdown also reminded the teacher in the classroom of the e-learning students’ existence: ‘Kenneth, we can’t hear you!!!’ and ‘Now where’s the sound again?’ are the types of sayings that popped up immediately in the chat every time the sound disappeared. Due to technical problems, the e-learning students were occasionally excluded for several minutes until the technology was fixed, slipped back into transparency and let the teaching continue. These technological problems caused a lot of frustration among the e-learning students, so instead of participating in the lecture synchronously, many of them preferred to watch the recorded version of the lecture, i.e. the version of the lecture in which pauses, breakdowns and time for group work had already been edited out.

To sum up, when technology worked and was transparent, the lecture in the classroom could take place almost as if there were no e-learning students participating. When, for example, a lecture about theory concerning physiotherapy was presented, the e-learning students sitting at home could participate by listening and looking at the teacher. They also had the opportunity to ask or answer questions as if they were sitting in the same room (albeit only written questions). Nevertheless, the findings in the study showed that the e-learning students did not interact actively in the teaching. Very often the chat was silent, and although technology was a way for the students to access the classroom, it also excluded them when the chat was not visible on the screen in the classroom or the teacher did not notice the missing sound. But when it broke down – and it did very often during the fieldwork period – the transparency of the e-learning technology ceased. The e-learning students’ experience of embodiment of technology likewise ceased, and the teacher was clearly reminded of the presence of his e-learning students.

3. Technological transformation of teaching

In traditional classroom teaching, the teacher and the students are in the same physical place at the same time; what takes place is a process that is not meant to be repeated, and the activities are often evaluated immediately. Similarly, the teacher’s and the students’ actions and interactions are normally coordinated; not only are they able to see each other, but they also perceive themselves in the room and they are seen by others. Thus, the body is present both as perceived and perceiving. This reversibility of perception (Merleau-Ponty, 1969) is a feature of shared physical spaces, and the experience of being perceived by others is much less marked in virtual spaces, including online desktop videoconference teaching. In the hybrid synchronous classrooms, the e-learning student’s body is only perceived as a name on the screen, and it is non-existent in the video-recorded version of the teaching. Although the e-learning student perceives the teacher, he/she is not perceived by others because he/she only watches the lesson later without participating in it. Thus, when the e-learning student watched the video-recorded version, his/her experience of the learning situation changed completely: the teacher was in another room and the e-learning student was unable to interact with him or with the other students in the classroom whom he/she could not see.

The question then is how the e-learning student construes a situation where he/she is not physically present; where the reversibility of perception is missing and where immediate interaction is impossible. As a student in one of the focus groups puts it, ‘it is difficult. That teeny tiny picture dedicated to the teacher and the big picture of the PowerPoint… I would really like it the other way around.’ Another student added: ‘and you can’t just ask the guy next to you if you don’t get it. I would prefer to be there while it was being recorded’.

Ihde (2010) gives an example of a man sitting inside his living room while looking at a thermometer which shows that it is very cold outside. By interpreting the information he receives from technology (but without the bodily experience of the cold), he now knows that it is cold outside as if he had been outside and felt the cold. The video-recorded version of the physiotherapy teaching provides similar things: Without physically sitting in the classroom and experiencing the atmosphere and the presence of the others, and without the opportunities one has in traditional classroom settings to ‘just ask the guy next to you’ or the teacher, the e-learning student has to interpret the recorded version of the teaching as a part of his own teaching. Instead of asking the other students when something is difficult to understand, the student can replay certain sections of the recording or fast forward the recording if it is too easy. The findings in the study showed, that all the e-learning students watched the recorded lectures; furthermore, they felt that they learned a lot from these lectures (c.f. Borup, West, & Graham, 2012; Gosper et al., 2007; Jones, 2011).
Thus, the e-learning student has access to the classroom teaching and can interact with technology but not with the teaching that is taking place. If we follow Ihde again, it can be visualised as follows:

Student –[technology – teaching]

However, not only does technology cause the students to translate the teaching, technology also transforms it. The findings in the fieldwork showed that the students compare the video-recorded teaching to the reading of texts (as artefacts) instead of comparing it to teaching as an interactive process: ‘It [to watch the video-recorded lecture] is better than reading the texts yourself’, while another said that, ‘The [subjects] that aren’t as important as, for example, pathology, you could put it on the net and then read it yourself’.

The video-recorded lecture is a storable artefact that allows the e-learning student to interact with its technical attributes including the teacher’s speaking pace or volume. Technology is therefore more visible as such than in the above-discussed synchronous videoconference teaching. As a result of the possibility of interacting with the content via technology in the video-recording, the e-learning students still find that they are able to learn in this setting.

Technology affects many parameters in different ways in the settings concerning live videoconference teaching and recorded videoconference teaching. These are summed up in Table 1 below:

<table>
<thead>
<tr>
<th>Videoconference teaching, live</th>
<th>Recorded videoconference teaching</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participation</td>
<td>By listening, asking/answering questions</td>
</tr>
<tr>
<td>Transparency of technology</td>
<td>Yes, preferably</td>
</tr>
<tr>
<td>Reversibility of perception</td>
<td>Partly; the student is perceived as a name (in this case) or as a face</td>
</tr>
<tr>
<td>Interaction with</td>
<td>Teaching</td>
</tr>
<tr>
<td>Time</td>
<td>Synchronous</td>
</tr>
<tr>
<td>Storable</td>
<td>No</td>
</tr>
<tr>
<td>Function as</td>
<td>Process</td>
</tr>
<tr>
<td>Resemblance to</td>
<td>Classroom lecture</td>
</tr>
</tbody>
</table>

Table 1: Comparison of live and recorded video conference teaching

However, the visibility of the e-learning technology in the hybrid synchronous classroom affects the teacher differently than it does the students.

4. Disembodied presence of the teacher in the hybrid synchronous classroom

Especially when e-learning was first introduced in the physiotherapy programme, the lack of the traditional reversibility of perception seemed to be confusing to the teachers.

‘I’m still not used to seeing myself on video’ a teacher said, and later he elaborated: ‘[…] In the beginning, I taught differently because of the camera, but I don’t anymore; I think I have got used to it standing there. In the beginning I was very aware of the technology, including the way I sat and spoke […]’.

What seemed to be more or less transparent from the e-learning students’ points of view is very visible from the teacher’s perspective. The camera is placed right in front of the him, and especially when the teacher is new to e-learning, he pays a lot of attention to it (c.f. Pugsley, 2010). However, in order to ensure that it does not disturb the traditional teaching where the teacher addresses the students sitting with him in the classroom, the teacher tries to keep his focus in the room. He looks at the students that are physically in the classroom with him. He is also aware of their response to his teaching and knows that they are in the midst of perceiving him. One teacher observed as follows:

I don’t communicate with them [the e-learning students at home] with my face, because it would take the focus away from the students sitting there [in the classroom]… But I am very aware of them so that they don’t feel as if they are just sitting on the side-lines.

Thus, the teacher makes an effort to not let his conscious awareness of the e-learning students be noticed by the students in the classroom, and by the same token, he thinks that he must be aware not to pay too much
attention to the technology standing in front of him. However, in order to make the technology as transparent as possible for the e-learning students and to the students on campus, he also has to be aware of the presence of the camera because it represents the e-learning students’ eyes and ears in the classroom.

You really need big reserves of energy to be present both in the classroom with the students and pay attention to the chat and to answer the e-learning students without making the on-campus students think: ‘Well, now I’m just wasting my time…’ So I think it’s really – to be present in the classroom and for the e-learning students – I think it’s really difficult; I haven’t been able to do it.

The general feeling among the teachers was that the more social presence they invested in the e-learning students, the less they seemed present on campus, and vice versa.

Thus, the role of the teacher and his/her perception of the situation changed from a traditional focused physical presence in the classroom, i.e. switching between monologues and dialogues with the students in the classroom, to what might be called a disembodied presence. The teacher is present in two places at the same time without really being present anywhere (Gosper et al., 2010; Hanson, 2009). One of the teachers said:

‘It’s damn hard! You live in two worlds!’ And one of her colleagues said that: ‘It feels like sitting between two chairs! [...] It’s a compromise but nobody is really happy.’

When the teachers speak of presence in two worlds, they are of course aware that they are physically present only in the classroom; however, they experience a presence in the virtual space as well. In order to categorise and further analyse the teacher experience of these two worlds, we will introduce the concept of topos – which is Greek and means ‘place’ or ‘location’. The teachers feel that they are present in two or more toposes at the same time without really being present in either one of them, and this experience of disembodied presence in the online synchronous classroom resulted in an interest among the teachers in creating technology enhanced learning designs that focused on activities taking place in only one topos.

5. Experience of disembodiment as a point of departure for new designs for learning

Some of the teachers separated their teaching toposes by focusing on one group and one learning place at a time. When the camera was turned off, they lectured in the traditional way in the classroom. Moreover, they could shift between lectures, dialogues and practical exercises when needed as they had always done and preferred to do. In order then to teach the e-learning students, one teacher made special podcast lectures after the on-campus teaching. In the podcasts, she spoke directly to the e-learning students and presented the content of the lesson, albeit in a shorter and more compressed way.

The students can, you know, repeat it, if it’s a bit too compressed [...] But I just do it for the sake of their bright eyes. I don’t get extra hours for the extra work [...] But I cannot in decency do otherwise.

Another learning design focused on the fact that the e-learning students and the teacher were located at different physical places, which resulted in the teacher inviting these e-learning students to group counselling in Adobe Connect at several occasions. In this way, the teacher focused more on engaging in dialogue than on delivering a monologue; the point of departure for these dialogues was often rooted in the students’ problems, interests and chosen focus. In this learning design, the teacher tried to keep the technology
transparent and thematised the embodiment relation in the telepresence meeting. Because he only had to focus on one group of students at a time, he could be present with them in the same topos.

Yet another example of learning design experiments considered the opportunity of a doubled reversibility of perception in e-learning as an advantage. In this case, the teacher encouraged the students to video record their transfer of patients, and afterwards they were to examine both their own and their fellow students’ videos in order to discuss different perspectives and for example good and bad practices (Tripp & Rich, 2012). In this learning design, the recorded phenomenological body (Merleau-Ponty, 1969) is then transformed into an objective and acting body that can be seen and reflected upon by all the students in the classroom. Thus, if technology is made visible by using it consciously in a learning design, the objectification of one’s own body is possible. This is very desirable particularly in professional programmes like physiotherapy where knowledge about one’s own acting body is very important. In this learning design, the student has an opportunity to see him/herself as an acting and actively perceiving body as with the eyes of another (Cooley, 1992).

6. Teaching in virtual and physical places: idiotopic and polytopic learning designs

A closer examination of the abovementioned learning designs will enable us to see that the visibility of technology affects the learning topos in different ways. In the first example, the teacher produced the podcast at home or in her office, and the learning was planned to take place elsewhere including, for example, when the student was at home, on the train, etc. The activities that were related to the podcast were therefore located in one place at a time. Similarly, in the group counselling, although the teacher and the students were not in the same physical room, they talked about their meeting place as if it were happening in the same place:

‘Where would you like to meet?’
‘In Adobe Connect like last time?’
‘Yeah, you won’t find me on Skype, I don’t like it there anymore, ’cause I won’t pay for it!’

Finally, in the last example we saw that although the videos were produced at home or in a clinic during placement, the primary learning activity was designed to take place in a single topos, namely in the classroom on campus.

In order to be able to analyse these learning toposes across virtual and physical locations, we will use the concept of idiotopos. Idio is Greek and means ‘the same’ or ‘the specific’, while topos means ‘place’ or ‘location’. Using this concept allows us to group the on-line and off-line learning activities and discuss these according to time and the experience of presence.

Some of the activities in blended learning happen while the students are together at the same time. In physiotherapy education, these synchronous idiotopic activities take place when the e-learning students and the on-campus students are together in the classroom with the teacher on campus. In this setting, the teacher usually controls the learning goals, activities, content, progression, collaboration between students and evaluation of the learning. However, idiotopic activities also take place asynchronously. This is the case when the students watch and listen to the recorded versions of the class lectures, when they prepare for class or when they write assignments and download or upload documents in the Learning Management System (LMS).

‘We don’t really like Fronter, because it’s so ugly, but it’s a great advantage that it keeps everything in one place’, a teacher said during field work. The e-learning students were sometimes encouraged to write assignments in GoogleDocs, which was directly connected to Fronter in order to ‘let the students work in only one place’. These asynchronous e-learning activities were also deliberately designed idiotopically, because the idiotopic setting let the teacher maintain the control over learning goals, progression, content and so on.

If we take the use of the concept of idiotopos a step further, we can look deeper into what happens to the classroom when digital technology expands the room via Adobe Connect software, cameras and microphones. Although the well-known traditional teaching synchronicity is maintained in this setting, from the teacher’s perspective, the teaching topos doubles. In order to refer to this setting, we will introduce the final concept of this paper, which is the polytopic e-learning setting. Poly is Greek and means ‘more’ or ‘multi’; and, as mentioned above, topos means ‘place’ or ‘location’. A polytopic e-learning setting exists when the teacher and/or the students are synchronously or asynchronously present in more than one virtual or physical place. In the physiotherapy case, the polytopic learning settings were found in the on-campus classroom; however, they
were also found in asynchronous settings, when the students were present in more virtual spaces and worked independently.

7. Poly-topic and idiotopic e-learning designs

During the interviews and the participant observations conducted in the context of on-line classes and clinical placement, findings showed that the students were very aware of the opportunity that e-learning created for them in relation to flexibility in time and toposes.

'To me, e-learning has something to do with flexibility. I can be where I need to be'.

'Yes, you can control it yourself. You don't need to be there from this time to that time. Yeah, it's the flexibility again that I like'. ('Oliver' and 'Maya', focus group 1, spring 2013)

'I thought it would be more flexible. It's fine that we're supposed to be here [on campus] three days every second week, of course: It's physiotherapy, but when we're then suddenly told that we must be here some of the other days too, it makes no sense to call it e-learning. It's not flexible!' ('Trine' focus group 3, spring 2013)

Because of digital technology and the nearly omnipresent access to the Internet, it is possible to be present in more toposes simultaneously. However, polytopic presence is also found in the on-campus teaching in the case where the students were both physically present in class and present online, for example, on Facebook. When the teacher was lecturing, the students were also very often present on different social media; they also occasionally sent text messages or even visited online stores. They therefore sometimes paid attention to the lecture 'from a distance', and they shifted rapidly between activities in the classroom and online. As a post on a student's Facebook wall said, 'By the way, why are you inhere? shouldn't you be in class today?' The student replied: 'I AM'.

The students liked to be able to shift between toposes, and by the same token, they would like their teachers to plan the teaching according to these polytopic opportunities:

'Group work can be organised so that you shift between online activities and physical meetings. But we're supposed to find out ourselves'. ('Karl', focus group 3, spring 2013)

Some of the students worked in more toposes on their own, and they searched for information and answers independently. A few of them kept blogs during clinical placement or used other online tools as a way of 'keeping track of what we learn and what I think'. In doing so, the students worked in polytopic settings and shifted between these settings as they pleased. However, all the e-learning students had jobs in addition to their studies, so it was difficult for some of them to find the time to explore additional virtual workplaces that were relevant to their studies beyond the ones chosen by the teachers.

During the field work period, it was clear to see that the idiotopic learning settings were chosen and designed for by the teachers and, furthermore, they felt inspired by this way of using e-learning technology. However, although polytopic e-learning settings took up a big part of the way e-learning was enacted in the physiotherapy programme, the teachers designed for this setting much less actively. Activities such as discussions, exercises and group work were designed to take place in the classroom, and the recorded and edited versions of the lectures, podcasts and other specially made course material were uploaded to the Fronter room. Furthermore, the e-learning students were expected to work independently with the material outside the classroom settings.
The e-learning activities can be categorised into groups concerning space and time as follows:

<table>
<thead>
<tr>
<th>Places</th>
<th>Synchronous</th>
<th>Asynchronous</th>
</tr>
</thead>
<tbody>
<tr>
<td>Idio topos (same physical or virtual place)</td>
<td>Participation in on-campus teaching and in clinical placement; online group counseling in e.g. Adobe Connect, Hangout</td>
<td>Upload and download of material in LMS, including recorded video lectures and assignments; collaboration in e.g. GoogleDocs</td>
</tr>
<tr>
<td>Poly topoi (more physical or virtual places)</td>
<td>Online video conferencing, texting, shopping. Active presence in social media in class</td>
<td>Keeping blogs, participating in discussion forums, watching videos, reading texts</td>
</tr>
</tbody>
</table>

Table 2: Examples of e-learning students' activities distributed at the same/not the same time (synchronicity/asynchronicity) and one/more than one place (idio topos/poly topoi)

To sum up, the learning designs in the polytopic setting were designed as if it were idiotopic. The asynchronous polytopic learning design therefore consisted of the students' own choices of learning spaces and independent work. By the same token, a lot of the e-learning students mentioned independence, discipline and the ability to structure their own learning as key words in e-learning in their education. They also emphasised flexibility and freedom as the central advantages and challenges in their experience of this programme.

Thus, the case findings showed that while the teachers created learning designs for idiotopic settings, the students also found great value and freedom in working in polytopic settings. Studying in e-learning settings asynchronously or synchronously is a great advantage for the students because they are able to combine their studies with their physical training, work and family life. However, learning designs for polytopic synchronous and asynchronous settings still need to be developed in the physiotherapy education case, particularly learning designs that consider the polytopic presences of both teachers and students.

8. Conclusion

The focus of this paper has been on the different ways technology affects the teaching in a hybrid synchronous classroom when a webcam is put in front of the teacher in order to broadcast and record his/her teaching. It has been argued that technology plays different roles depending on the following factors:

- Whether it is transparent and thereby establishes an embodied relation between student and technology, which can be the case in telepresence meetings or video conference teaching;
- Or whether technology seems less transparent, which is the case when the lecture is recorded. It can thus contribute to a transformation of the teaching from the traditional understanding of it as a process to a learning artefact that can be interacted with;
- Or whether technology is anything but transparent, which can be the case from the teacher’s perspective in the hybrid synchronous classroom. It can then cause an experience of disembodied presence that compels the teachers to experiment with different learning designs in order to try to overcome the challenge arising from the e-learning students' potentially invisible presence.
- It has also been discussed how e-learning enables multiplications of the traditional learning space and thereby makes it useful to differentiate between idiotopic and polytopic learning designs. The findings in the present study shows that in order to cope with the experience of disembodiment in the polytopic setting, the teachers are more inclined to create idiotopic learning designs, whereas the e-learning students tend to design for polytopic settings. This was found to be the case in both hybrid synchronous settings, in the on-campus teaching and when the e-learning students studied independently.

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The Global Classroom Model Simultaneous campus- and home-based education using videoconferencing

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Abstract: This paper presents and discusses findings about how students, teachers, and the organization experience a start-up-project applying videoconferences between campus and home. This is new territory for adult learning centers. The research is based on the Global Classroom Model as it is implemented and used at an adult learning center in Denmark, named VUC Storstrøm. After a couple of years of campus-to-campus video streaming, VUC Storstrøm started a fulltime day program in 2011 with the support of a hybrid campus and videoconference model. In this model the teachers and some of the students are present on campus in the classroom, while other students are participating simultaneously from their home using laptops. In this paper, the case and context of VUC Storstrøm, the research design chosen, and the literature that already exists in this area constitutes the backdrop for the analysis and discussion of the first activities in this long-term project. The research is based on interviews, on utterances in feedback sessions, and on the observed interaction taking place in the first six months of 2013 (i.e. 1½ year after the first program commenced). Evaluations show that the students are happy with the flexibility this model provides in their everyday life. However, findings also show several obstacles: Technical issues are at play, but also the learning design of the lessons, as well as general organizational and cultural issues. In this paper we focus on the students and teachers experiences and on the organizational issues related to the transition to the Global Classroom Model as well as provide outlines to the consequences these findings may have, for example in relation to the continued development of the teachers’ educational designs.

Keywords: Global Classroom, videoconferences, hybrid campus- and home-based education, adult education, competence development, teacher education

1. Introduction

This paper presents experiences from a long-term research study on how students, teachers, and the educational organization experience a videoconference start-up-project, where students attend class on campus and from home synchronously. This is a new field for adult learning centres, and as our literature study in relation to our analysis shows, the specific Global Classroom model is a new kind of setup that influences the pedagogic and learning design in different ways than what is known from the more well-established campus-to-campus or desktop videoconference settings.

1.1 Videoconferencing in education

Videoconferencing is a synchronous technology that allows for a direct and immersive learning experience for on-line students since it enables a simultaneous face-to-face interaction with both audio and video, giving a sense of connectedness and utilizing the premise that visual signals improve human interaction (Bower, 2012 and Lawson 2010). According to the literature videoconferencing has “promised benefits of real-time interaction, immediacy, motivation, and collaborative learning” (Gillies, 2008: 108). Though the literature gives examples of these benefits, many also points to technical problems, difficulties in adapting to new teacher roles and functions, and critical challenges to adapting and developing learning designs (e.g. Hedestig & Kapetilinin, 2005 and Kjær et al. 2010). Videoconferencing has developed into two main forms in education: The oldest is the parallel form that uses dedicated videoconference-hardware and is used for reaching one or multiple remote campuses, where the teacher and some of the students are in one location and other students are at another location. Today, other uses of this model exist for instance international guest lectures and virtual study trips (Lawson 2010). The newer desktop form uses personal devices as PC’s or tablets and is a software-solution. Students sit separately at home or together on campus, using live-streaming from everyone to everyone (Andrews and Klease, 1998; Freeman, 1998; Kjær et al, 2010; Roberts, 2009). The two videoconference forms both has a major impact on the learning design as the first one takes out-set in the classroom and the teachers’ physical location herein, and the second one uses a shared laptop space as the starting point of the educational activity. In a third videoconference studio-form, the teacher is in a studio by herself and the students either together at another campus or at home, and thereby hybrid versions emerge.

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1.2 VUC Storstrøms Global Classroom Model

*VUC Storstrøm* is our case organization. VUC is a generic abbreviation for adult learning centres in Denmark. When we refer to VUC, we only refer to our case organization and not VUC’s in general unless specifically noted. In the VUC a new hybrid videoconference form named the *Global Classroom Model* is used. The teacher and students on campus use dedicated hardware solutions (Polycom Realpresence), while the students at home sign-in to the classroom via a desktop-software solution. Unlike the literature describing technologies as Adobe Connect etc. (Kjær, 2010; Karabulut and Correia, 2008; Lawson 2010) this teaching process uses the classroom and the physical boards (digital smart boards) as reference point.

The teacher addresses the students in the physical classroom at the same time as the students online via representations on the projected screen on campus (see figure 1), this being two distinct modes of communication. The students have the choice to participate from campus or from home on a daily basis. Very few describes this hybrid form, and all are new pilot-like-studies (as Ellingson and Notbohm, 2012; Ørngreen et al, 2013) and this is why further research in the area is needed.

Global Classroom uses videoconference equipment that allows the teacher and students on campus to see and communicate synchronously with the students at home and vice versa. From the start the students could attend from home every other week, and every other week they were obliged to go to the campus. Today students generally can chose if they want to attend from campus or from home. The equipment in the class is situated in a way that enables 1) the teacher to see and hear the class at campus and at home at the same time, 2) the students to see the whiteboard in class and to see and hear the teacher in class and the students at home 3) the students at home to hear the classroom, to see the whiteboard as well as the teacher or the students at campus depending on which camera is used at campus (see figure 1). It is also possible to establish virtual-group rooms for group-assignments.

![Students working from home](image1.png)

![Teachers and students on campus](image2.png)

**Figure 1:** The global classroom set-up

In the school year 2010/11 VUC had approx. 5,500 students (VUC, 2013). HF-Global Classroom represents a very small proportion of this (two classes respectively 10 and 26 participants (1.3.2013)). Applying the Global Classroom Model to the HF education is the first initiative in a long-term strategy in a relatively low population
density area with long distances. One of the purposes is to ensure each citizen access to education regardless of time and place.

1.3 New demands for the adult learning teachers in the videoconference setting

VUC is an adult learning center and our research also fills a gap concerning the teachers, since there has been a decrease in the academic interest in “The roles, characteristics and capabilities of educators” (Harris and Morrison, 2011: 42). According to the review of the 50-years history of the Australian Journal of Adult Learning, papers on teachers in adult learning fell from 32% to 7% from 1960-2010. However, due to the increased demand of technology in education there is a continued interest in researching the roles, development of learning design, and general professional development for teachers using on-line technologies (Dede et al, 2009; Laurillard, 2011 and 2012; Beetham and Sharpe, 2013; Baran et al., 2011). Thus, there is a need to gain knowledge about how to enable the teachers and the organization to establish effective and engaging designs for learning in videoconference settings.

VUC is implementing the Global Classroom Model to the HF education. HF is a Higher Preparatory Examination Course (upper secondary general education program) that lasts 2 years. To teach at HF requires “a Master degree in at least one relevant subject and to have completed a Post-graduate teacher training course for upper secondary school teachers” (Milana, 2008: 7). However, it is a recent phenomenon that the majority of the teachers at VUC use technology in their teaching practice, such as sharing digital materials and using traditional learning management systems. The distributed videoconferencing will furthermore make technology constantly present during the teaching.

For the last 10 years, the Danish Government has focused on the implementation of IT in education, as a mean to increase the academic level and ensure that more people get an education. The argument is that IT provides better opportunities for differentiated and more flexible learning and evaluation forms (TDGME, 2012). However, teachers lack an established practice and support when navigating in the many new opportunities within IT (Riis, 2012; Laurillard, 2011), and there is a need to examine what it takes to achieve a well-functioning communication and decision-making flow between the organization and teachers (Henriksen et al, 2011).

2. Research objective and methodology

This is a joint research project between VUC Storstøm and Aalborg University (AAU). The overall research objective is to investigate: the design of innovative methods, practices and evaluation tools in relation to the use of IT in Global Classroom settings, with a focus on how to enable teachers to create motivating and qualified learning design for the students.

This paper deals with the first two phases of the cyclic action research process, namely diagnosing and action planning (Susman and Evered, 1978). Our understanding draws on the assumption that an innovative implementation of IT in formal learning situations takes place as an interaction between different actors, and that research of this kind needs to be grounded in mutual learning and dialogue. As such this is a participatory action research study.

This is done by means of a PhD study as well as a research-based competence development project with senior researchers. We have thus gained knowledge about the experiences, challenges, and potentials when teaching and learning within this hybrid videoconference model. Both studies are action research studies, and the PhD-study furthermore uses a Design Based Research approach to formulate empirical and user-driven theories relating to the Global Classroom Model.

The book Interaction Design applies Eason’s concepts about primary, secondary, and tertiary users (Rogers, Sharp and Preece 2011:333). Primary users often directly use a given system, in this VUC-case the teachers and the students at home using the videoconference. Secondary users do not directly use the system, but are influenced by other person’s use. Alternatively, they only use the system occasionally, as in the VUC case those students almost always attending class on campus. Tertiary users are affected by or have influence on the system, for example as administrators, managers, and it-support personnel. Interaction Design as a discipline argues that systems and technologies first and foremost need to be usable for the primary users, the end users. We agree to this, and furthermore we find that students and teachers are the most important to listen to in the evaluation processes. However, previous investigations also show that in learning technologies the
more organizational issues of tertiary users should not be neglected. This does not only mean being able to correct technical errors in the system, when they occur, but also to collaboratively further develop the system to support the intended learning processes and the learning culture of the organization (Ørngreen, Nielsen & Levinsen, 2004). This makes it important to exchange information and share knowledge between the three user levels. In the VUC case, the students at HF-Global Classroom had not yet been involved in or asked about the process. The teachers had received technical assistance in system use, but very little had been done to discuss pedagogical issues at stake, and the administrators, managers and IT-personnel knew little about how the actual teaching situation was carried out. We see knowledge sharing as a vital step in sustaining competence development processes and organizational learning. In these first phases, our units of analysis are primarily directed at understanding the primary and secondary users’ experiences, and thus identify steps to establish knowledge sharing and competence development processes.

The sub-questions for these particular phases become: Which teaching practices are sustained or emerge? How do the students perceive the learning situation and the motivational aspects? Can any guidelines and/or future steps be derived from these first experiences? The empirical material provides insight into these questions in the diagnoses and action-planning phases as listed in Table 1.

1 & 6) In the project both formal and scheduled meetings and more informal conversations were held, all of which were part of the getting to know each other.
2) The workshop with the teachers was inspired by the Personal approach to SWOT (strength, weaknesses, opportunities and threats) (SWOT 2013). We chose to organize it in three rounds: personal, team and plenary, all with pre-prepared question sheets to trigger reflection and dialogue.
3 & 4) The formal conversation took place via videoconference. The researchers had prior to the conversation received written input (from some teachers) to the perceived challenges and thoughts on future focus points.
5) The student evaluation workshop participants was the HF-class (N = 14) that started their education with the Global Classroom Model in August 2012. It was a four-hour workshop, and in the introduction the students were encouraged to be constructive in their criticism. Inspired by interaction design and appreciative inquiry, we argue that informants can be creative, and that by focusing on the areas that are working well, the informants can help to promote and develop these.
7 & 8) The purpose of the interviews with and observations of the teachers was to identify the experienced potentials and barriers in the Global Classroom Model, and to see if innovative approaches in their own learning designs had emerged. A particular focus was to identify motivating elements in the teaching situation.

Table 1: The material from the diagnose and action plan phases

<table>
<thead>
<tr>
<th>Phase</th>
<th>Description</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Meetings and on-going conversations with project owners, management and (TI) pedagogical consultants at VUC</td>
<td>From early Autumn 2012 to Spring 2013</td>
</tr>
<tr>
<td>2</td>
<td>Workshop with teachers, incl. project owners and pedagogical consultants</td>
<td>26 November 2012</td>
</tr>
<tr>
<td>3</td>
<td>Written input from teachers – on challenges and future plans</td>
<td>December 2012 and January 2013</td>
</tr>
<tr>
<td>4</td>
<td>Formal conversations between teachers and researchers – i.e. scheduled and planned activity</td>
<td>29 January 2013</td>
</tr>
<tr>
<td>5</td>
<td>Student evaluation workshop – a qualitative workshop, 14 participants</td>
<td>22 February 2013</td>
</tr>
<tr>
<td>6</td>
<td>Informal conversations with teachers</td>
<td>Spring 2013</td>
</tr>
<tr>
<td>7</td>
<td>Interviews with teachers – based on semi-structured interviews</td>
<td>15 April – 8 May 2013</td>
</tr>
<tr>
<td>8</td>
<td>Observation of Global Classroom teaching</td>
<td>Spring 2013</td>
</tr>
</tbody>
</table>

3. Learning and motivation theory

Since one of the inquiry points in the study focuses on how to create motivating and qualified learning design for the students, we briefly unfold relevant theories on motivation and learning in the following. In Knud Illeris renowned model on how learning takes place, he argues that the following three dimensions are involved in all learning: the inner psychological process of acquisition (content dimension), the interpersonal interaction dimension, and the willingness and desire to deal with what should be learned (the incentive dimension) (Illeris 2007). The first two dimensions involve the cognitive (content) learning and collaborative learning domains respectively which are important in teaching and learning. However, the motivational dimension is equally worth focusing on since VUC’s are considered as a “second chance”. Many (60%) students attending HF at VUC has at least one other discontinued education in their past, where lack of motivation is often mentioned as a key element (Pless and Hansen, 2010). Motivation can influence when we choose to learn,
what we learn and how we learn, and “motivated learners are more likely to undertake challenging activities, to be actively engaged, to enjoy and adopt a deep approach to learning, and to exhibit enhanced performance, persistence, and creativity” (Schunk according to Hartnett, George and Dron, 2011:21). The 3rd of Illeris’ dimensions, the driving-force-dimension, deals with the desire or the motivation to learn. Several relevant motivational theories deals with this matter in educational settings. The self-determination theory (Deci and Ryan, 2000), the ARCS model (Keller, 2008), and Flow Theory (Knoop 2004) are all theories offering basic principles on how to measure and apply motivational elements and practices to the different learning elements and situations. It is beyond the scope of this paper to describe these theories in detail, but they are relevant for the further development in the project; that is in the 3rd and 4th phases of the action research process as the experiments with the teachers and students are taking place in workshops and other design-based research approaches. However, we have already seen signs of the motivational elements in the Global Classroom Model in the findings among the students (see later), mainly related to the freedom this model provides for the students. This is supported by Jerome Bruner, who believes that our intrinsic motivation to learn consists of the three following underlying main driving forces: 1) Curiosity: the desire and freedom to explore things, and decide for yourself - a playful mood. 2) Achieving competence: the desire to show that we can do things and therefore are independent individuals. Mastering something creates joy and pride and is thus motivating. 3) Reciprocity: the desire to be an indispensable part of the community. People like to achieve goals with others, to be part of a “learning community”(Bruner according to Gärdenfors 2010). The argument is: if the learning is planned in a way that enables the student to achieve one or more of the three motives above, it will help the student to feel an inner motivation to learn (Gärdenfors, 2010).

That said, motivation is also complex, multifaceted, and influenced by both person and context. Motivation cannot be fully explained from the perspective of neither the effect of “learning environment design” nor the “learner characteristic”. Therefore, it is important to consider both the learning environment design as well as the relevance and interest from the learners perspective (Hartnett, George and Dron, 2011). In our study of the videoconference literature we have found little that relates the combination of the three perspectives of the acquisition, interaction and motivation of learning processes as presented in the Illeris learning model.

4. Theoretical and grounded analysis of the empirical data

Our analysis applied the above theoretical focus on learning and motivation, with the unit of analysis being the three user groups. Apart from this our primary objective was to be open to emerging themes in the eight activities (table 1), an approach inspired from grounded theory. When interpreting the themes we related them to the existing literature on the various identified videoconference forms.

4.1 The students

The Global Classroom Model consist of the videoconference as a mediated learning process, and also comprises the use of other forms of IT in education including digital materials, software, and processes because of the changed environment for the learning design. For example, all the instructional materials should be accessible online (Rice, 2011). In this way, the Global Classroom concept has inspired some of the teachers to implement new kinds of IT in their teaching practice. These new ways of involving IT in the teaching may, together with the Global Classroom concept, potentially help to create a more relevant and motivating learning for the students appealing to the students’ curiosity (Gärdenfors, 2010; Somekh, 2008).

According to the German professor of pedagogy Thomas Ziehe there has been a "de-conventionalisation" - a change in young people’s knowledge, behaviour, and motivation (Wiborg, 2009). Today, young people are choosing what they want to learn, and young people’s behaviour has changed because they have become major media consumers. The student’s motivation helps establishing interest in the subject matter and is therefore an important contributing factor to the learning process (Koster, 2005; Weitze and Ørngreen, 2012).

Motivational elements: In this study, the students explain that they find a number of aspects of the Global Classroom concept motivating; this is supported by other findings of the increased motivation for students in videoconference settings (Lawson, 2010). For example the students own choice of environment gives them the freedom to manage their family and everyday life by not always having to be present at school (Gärdenfors, 2010). Several students are also pleased with being able to vary their classroom environment during a day by changing geographical location, and when sitting at home they have the feeling that the school-day ends
sooner. These flexible possibilities can partly be seen as equivalent to the work-life flexibility practise known from many modern companies. Another equivalence is that the students also have to show up when needed at school; for instance, when they are conducting experiments at the lab. The format also creates a new “intermediate solution” for some students, when they feel “sluggish” and normally would have taken a sick-day. In this way, the concept contributes to their ability to complete their education, because they end up attending school more often during the year.

Technological-pedagogical issues: The students’ experienced technical problems and many of these problems were solved along the way. Problems were partly due to Global Classroom being a new concept developed through a bottom-up approach, and partly due to the fact that students and teachers, had to learn how to use the system from scratch. That said the experience remains that once in a while periods with more technical problems occur. For instance when the software in the systems are updated at some points in the “supply chain” and not updated synchronous at other points by the suppliers. This is a constant point of frustration for the students and the teachers.

The Global Classroom seems to provide a transparent experience (Dourish, 2001), giving the feeling that it is possible to simulate a traditional classroom. Therefore the teachers expect to be able to apply various educational activities equivalent to what takes place in a traditional classroom. But for instance it can be a problem to make the students at home engage in class conversation, because the technology sometimes, against the teachers expectations, causes noise in the class, or causes delay in audio and photo (Lawson, 2010; Allen et al. 2013). So because of the noise and delay the students at home often perceive it as a disturbance when they speak. In addition, the human ear cannot filter sounds in the same way in online space as in physical space; all sounds are mixed and more difficult to differentiate (voices, moving of chairs, coughing etc.). It has also proved difficult to create groups across home and campus because of technological problems and issues with too much noise in the class. Pure home-based-groups also have problems in detecting when to “return” to the classroom debate. We see a need for the teachers to experiment with various ways of working actively across the constellations of home and campus.

The students tell that they have been frustrated in relation to the communication with the technicians when something is wrong with the technology. Some problems are of so vital importance that the teacher or student should be able to get immediate technical assistance, as videoconferencing in its nature is very sensitive to the kind of technical breakdowns that stops transmission and has the effect that the teaching cannot be carried out (Gillies, 2008; Hedestig and Kaptelinin, 2005). Uncertainty about deadlines for repairs and corrective actions are inconvenient in everyday life and has also concerned the students.

Learning Design: The students’ experience that the teachers are very different in their approach when activating the students at home. Some teachers are very aware of home-students asking them very directly to participate in the debate, while other teachers hardly pay any attention to the students at home. This finding is well in line with previous findings in the videoconference and online learning literature, where one of the mayor emphasis and keys to success are on how the teachers has to develop strategies in their learning design for activating and creating collaboration with the online learners (Majid, 2006; Baran et al 2011; Bower 2001; Gillies, 2008; Kjær 2009; Lawson 2010; Laurillard, 2011). Some students find it difficult to make the teacher aware that they want to answer a question. This makes the students at home frustrated and uninvolved. Therefore, the students feel it is important for teachers to take this issue into consideration in the learning design and to be aware that the students at home would like to be invited more into the class activity. The students at home are using different strategies to solve this problem like writing to the campus-students on Facebook etc. In our dialogues with the teachers we have also found that the class from August 12 who participated in the qualitative student evaluation is very different from the class from August 11. In the 2011-class the students at home are always very active and also often the "diligent" ones in the class. Consequently, it might not be the teachers that ignore the students at home, it may also be that students at home are less active, hiding a bit and not so easy to activate (Lawson 2010).

Another consequence of the Global Classroom setting is that it is important for the students to have access to all instructional material as well as assignments on-line before the lesson begins. This gives the students a chance to participate actively in the current lesson by solving these assignments in spite of any technical difficulties that might arise (Rice, 2011).
Rules in Global Classroom: The students are satisfied with the rules of conduct in Global Classroom regarding the recommendations on behaving as in a traditional class, e.g. not to attend in pyjamas from bed, no smoking etc. These rules have been developed bottom-up as such situations did happen, and are changed regularly according to new experiences. One can, however, consider whether it also would be beneficial to develop pedagogical recommendations on for instance: active participation, working in groups etc.

Pedagogical Innovation: The students have been pleased with the new learning designs that involved working and interacting on the Internet, as this gave equal opportunities for students at home and on campus, as e.g. preparing multimedia presentations (Lawson, 2010; Bower 2011; Kjaer 2009). However, when inquiring about ideas for other initiatives the students had difficulties articulating new ideas. Thus, as for teachers it can be hard for students to think beyond the traditional educational culture. This calls for the development of a more innovative pedagogical culture and practise, if students and teachers are participating in further development of the learning design (Laurillard, 2011; Lawson 2010).

It is important to acknowledge that in spite of the many problems, in terms of technology, in relation to pedagogy, and mental stress issues, the students still perceive the videoconference as advantageous and want to continue within the Global Classroom concept.

4.2 The teachers

The teachers have not been employed specifically as Global Classroom teachers (Rice, 2011). Though they received initial training in the concept, it was, at first, difficult for them to imagine how it would be to work with. The IT-pedagogical project group chose different approaches to educate the teachers: short seminars, and later involving researchers conducting innovative workshops, but all the time also with a bottom-up/learning-while-doing approach. At times this was frustrating for the teachers, but considered necessary by the IT-pedagogical project group, since this was new terrain. Somekh stresses that adopting to change is learning and, “like students, teachers need to learn actively and have opportunities to try things out and evaluate the outcomes on the basis of evidence, with the support of strong leadership and a community of peers” (Somekh, 2008: 9; Baran 2011). What sometimes is regarded as “teachers resisting to be innovative in their pedagogical practice” is indeed a complex and cross organizational issue, since teachers, students, managers, and project groups in the organization are all embedded in an educational culture that at the same time supports and restrains its members. Pedagogical innovation does not only concern and involve the teachers but the entire learning organization.

Motivational elements: At the moment the teachers primarily regard Global Classroom as being beneficial for the students, and they appreciate that it makes it possible for some of the students to complete their education. The fact that the teachers themselves doesn’t yet find the Global Classroom Model motivating could be seen as a sign of the model not yet being sufficiently matured and developed. In a more matured model containing 5 levels related to online learning, it shows that it is often not until level 5 that the organization’s learning system have the ability to cater for motivation and engagement, after the other levels subjects are cared for. (Suzuki and Tada, 2009). At VUC, problems are still in the technological area (level 1) as well as in the learning design (level 4). The future development of the pedagogical aspects in the concept will hopefully also contribute to the teacher’s own motivational experiences within this frame.

Pedagogical-Technological issues: In the initial phase at VUC the teachers often had to spend a large part of their time and attention on making the videoconference technology work, experiencing that they wasted valuable teaching time. However, in our latest observations and interviews with the teachers, we note that several of the teachers tell that the technology now is running most days.

Cognitive demands: The teachers experience sudden interruptions in the middle of a sentence in class, when students at the videoconference cannot see or hear the teacher clearly and therefore interferes out of the teaching context. Students use different strategies to solve this problem as for instance writing to campus students on Facebook, since there are no chat facilities with the teacher in the current videoconference system. At the same time, the teachers experience mental overload due to the many media at play and the many points of attention. Many teachers experience an immense fatigue after a Global Classroom lesson. The student evaluation showed that it would be advantageous and less disruptive if the students used chat to submit information to the teacher during a lesson, but this is not necessarily the teacher’s desire. On the
contrary, many teachers expressed reservations about getting one more media to communicate in and keep an eye on, though a few forerunners seemed to have the energy to work with multiple media and students at 2 locations at the same time.

**Learning design and activity level:** Just like the students, the teachers find it possible to carry out teaching and learning in a traditional manner in the Global Classroom Model including the content-, interaction- and incentive- dimensions (Illeris, 2007), and they see this as an advantage. But there are communicative difficulties partly due to lack of the valuable flow and synergy experienced in the interaction in a traditional classroom discussion; these difficulties are due to sound delay and poor lighting from the students at home; and due to some students that deliberately choose a passive role (Gillies, 2008). Depending on where the most active students are, the "centre of gravity" in the activity level in the class or at home shifts. This is an interesting aspect in the debate since this highlights the importance of student engagement and study skills in general instead of only focusing on trouble with the technology (Illeris, 2007). As teachers are based on campus, and since some students are always there as well, it might be less obvious for the teachers to consider teaching strategies from entirely online teaching, as for example online discussion forums, online games etc. (Bower 2011; Lawson 2010; Laurillard, 2011; Beetham and Sharpe, 2013).

**Facial decoding and visual attendance:** Another problem occurs when the teacher cannot read students' facial expressions or they “disappear” from the screen. Sometimes the teacher can only see the student's silhouette if he sits with the light coming from behind. By reading facial expressions the teacher evaluate whether the student does not know the answer, or if he’s shy and the teacher just needs to ask. "They are all adults, and the moment you ask them a question and they don’t respond; then I can’t see any point in going on." a teacher utters, with reference to the students’ having to take responsibility of their own learning process (Illeris, 2007). Since it was more difficult to see the facial expressions of the students at home, he asked them less frequently, if he was in doubt that they were able to answer. Another problem is when a student at home "disappears" during a session (leaves the laptop, turns of web-cam or logs-off the system). There is an 80% attendance-rule. When a student cannot be seen on the screen, some teachers choose to ignore it, others comment on it. At the student evaluation, some of the students expressed that the teachers were violating their trust if they commented harshly on how often they walked away from the screen. These are stress-creating issues that underlie the teaching and runs as an additional point of focus for the teacher during the teaching.

**Pedagogical Innovation:** Research shows that apart from few enthusiasts, it is in general difficult for teachers to be innovative in their use of IT in the teaching. Teachers often settle for transferring their existing and inherent practice. This practice can certainly be really good, but according to the Danish Evaluation Institute teachers do not fully utilize the pedagogical and academic possibilities lying in front of them concerning the use of IT (EVA, 2012). This indicates that teachers need to learn to work with IT learning tools, but also that they need support for the process of innovation and for the development of innovative thinking (Darsø, 2011; Laurillard, 2011).

### 4.3 The organization

Conversations and meetings with the organization's project owners has, along with the other empirical activities, illuminated classical issues in the change processes in which project managers at times are well ahead of the rest of the organization since they already understand the ideas within the process that they themselves have developed. This was evident in the SWOT analysis with the teachers, where the teachers articulated that they had a fundamental lack of insight into and influence on the process, as well as a frustration with the basic challenges in technology, pedagogy, and the organizational setup. This was in contrast to the project owners’ first dissemination about the situation to us as researchers at the first meetings, and this indicates the potential in looking at the different stakeholders views and at the movement between topdown and participative management in the organization, and possible adjustments in the organizational change management processes (Jacobsen and Thorsvik, 2008).

**IT-pedagogical roles:** The IT-pedagogical project department at VUC has a tripartite role since they are 1) visionary designers for future learning, 2) helping with the actual implementation process in cooperation with the department managers and teachers, for example by participating in the organizing of training courses for teachers and 3) contributing to the evaluation and anchoring of the many IT-in-education-initiatives, e.g. by
Organizational challenges: The teachers get frustrated when they are faced with new challenges from the organization and asked to think in innovative ways in relation to the implementation of the new systems, not at least when technical issues are at play. The teachers feel that they are being asked to redefine their teaching role and thereby themselves. The literature supports the redefinition of the teachers’ role, recognizing that there is a need for new roles and competencies for teachers using technology in education (Lawson, 2010; Dede, 2009; Laurillard 2011, 2012). Furthermore the teachers miss that the organization decides, establishes, and announces a more general framework on “how we do Global Classroom”, rather than each teacher using a personal approach that needs to be negotiated with the students every time. Different views exist between teachers and technical staff in the assessment of the frequency and seriousness of the technical problems occurring. This calls for knowledge exchange between these groups.

5. Discussion and findings

Our analysis reveals these primary themes:

- That the students perceive Global Classroom as motivating because of the freedom/agency to select their own educational environment with the flexibility this provides in their everyday lives. And that it is important to develop motivating learning situations for the VUC audience.

- That the students were motivated when presented with technological tools that allowed them to work equally from campus and from home.

- That the teachers find that their teaching can be carried out in a fairly traditional way in the Global Classroom setup. At the same time they find it difficult to change the part of their teaching practices that could benefit from being changed. In the videoconferencing literature it is generally recommended to redesign student interaction and collaboration compared to traditional teaching, for instance with new kinds of interactive educational technologies as well as with asynchronous collaboration (Lawson, 2010; Kjær, 2009, Gillies, 2008).

- That the Global Classroom model is a hybrid model, always having the teacher and part of the students on campus. This situation – always having part of the class at campus - might contribute to a greater expectation of being able to teach in a traditional way, than in other forms of videoconferencing settings. Therefore, it might be a bigger leap in the teachers’ awareness of the need for a different design for learning when teaching in the Global Classroom Model. But “online teaching is different from face-to-face teaching and [...] as such, it requires the development of its own pedagogies” (Baran, 2011:425). The teachers in The Global Classroom Model will thus have to innovate and develop their own best practices to make the concept a success.

- That both students and teachers are experiencing communication difficulties and that some of the problems arise because the Global Classroom concept is so close to a traditional classroom that they consequently have high expectations to the communicative “flow” in the learning situation. This should also be taken into consideration when developing educational designs for learning.

- That after this start-up period there is a need for the organization in collaboration with teachers and students to elaborate a more detailed framework that defines and helps establishing a culture of “how we do Global Classroom at VUC”, while also providing room for a sandbox approach. A culture that works on revealing and disseminating the basics of teaching in the Global Classroom concept, on finding ways to establish clear and sufficient communication, and to build upon the good examples of innovative cooperation between the different agents in the educational institution. There should also be an openness to continue developing rules and best practices “bottom up” in order for the learning environment to work in an un-stressful way.

Certain characteristics of the VUC students make VUC particularly challenged by dropout issues (VUC, 2009; VUC, 2011; EVA, 2013). These issues make the findings of the students’ positive and motivating experiences of the Global Classroom concept essential.

For the students and the teachers the start-up process of the Global Classroom concept has involved so many technical problems that the quality of the teaching was affected. However, evidence from our observations shows that Global Classroom for most teachers today (spring / early summer 2013) operates with few technical problems in daily life, contrary to what the teachers expresses verbally which is perhaps sparked by
occasional problems leading to unpleasant loss of control during a lesson. This means that although the percentage of technical problems may have decreased, their influence on the learning situation is still severe, as it still takes valuable time to recover from such incidents.

There is an interesting paradox in the different views of the students and the teachers in relation to class activity. Many teachers express that this HF class has students who make a deliberate choice to be at home since this allows them to be somewhat passive in class. While the students suggest that teachers tend not to activate them at home. Both parties may well have the “right” perception of this experience, as this might be an example of self-reinforcing pedagogy built on assumptions about a specific group of students without it necessarily being an explicit and chosen pedagogy of the teaching staff.

6. Conclusions and future perspectives

VUC Storstrøms transition to the Global Classroom Model has been challenging and has contributed to the organizations consciousness of needed skills in supporting innovative developments, skills they are already taking new initiatives to develop. At the same time, the students have found the Global Classroom concept to have motivational aspects, because they have obtained freedom to design their own learning environment.

Although students who have chosen the HF-Global Classroom class to begin with want to continue with this model, there are still technical difficulties. Our study showed that one or more sessions between teachers, students and the technical staff would provide the technical staff with more knowledge about which pedagogical and learning design activities they particularly need to support.

It is essential that the teachers have the opportunity to innovate, develop and practice new designs in safe-zones to get a better sense of what it takes to create activity and motivational training in the Global Classroom concept. This requires an attention and willingness to schedule this from the management at VUC. The purpose of phase 3 and 4 of the action research process is to implement innovative pedagogical activities with workshops and design-based research approaches.

The Global Classroom Model differs from other videoconference models, using either solely hardware- or desktop based solutions, in a new combined model. The Global Classroom Model generally gives the students a freedom to choose if they want to attend school from campus or from home, giving the adult learners new freedom to create a work-life balance on a daily basis. Nevertheless, this at the same time calls for an increased awareness from the teachers on how to innovate and redesign the traditional education in a way that provides equal opportunities for the students on campus and at home.

Future perspectives: The use of more innovative IT-pedagogical elements inside the Global Classroom frame can provide further opportunities. Based on the analysis, we argue that play and gamification, and bodily activation with the purpose of motivating both the students and also the teachers are worth investigating. This could be explored through the use of learning games, students’ digital productions, role playing, or complex multimodal presentation forms etc. (Koster, 2005; Weitze and Ørngreen, 2012).

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