BOOK OF ABSTRACTS

The First Nordic Symposium on Technology Enhanced Learning

NORDITEL 2010
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NORDITEL 2010 Preface

The large penetration of information and communication technologies (ICT) in different sectors of our society poses new challenges and demands for education. One of the objectives of the field of “Technology-Enhanced Learning” (TEL) is to better understand how sound pedagogical principles can be used to guide the design of interactive technologies and tools in support of teaching and learning. In this field of research, Nordic scholars have gained international reputation in areas such as the development of technologies and applications for supporting mobile learning, studies about self-regulated learning and socially shared learning in technology-based environments, human computer interaction and participatory design.

In the fall 2008, a group of researchers from Sweden, Finland, Norway and Denmark decided to establish a Nordic research network in order to advance the knowledge in the field of TEL and to promote an interdisciplinary view on those aspects connected to teaching and learning supported by ICT. One of the objectives of this initiative is to establish a solid scientific ground in order to consolidate research and training efforts in the field of TEL through the creation of a Nordic research network of senior scientists, young researchers and PhD students. The First Nordic Symposium on Technology Enhanced Learning, NORDITEL 2010, is one specific result of these efforts. NORDITEL 2010 aims at creating and generating an interdisciplinary forum of discussion for both Nordic educational practitioners and academic scholars interested in conceptualizing, designing and evaluating teaching and learning in emerging technology enhanced learning landscapes.

NORDITEL 2010 does not intend to be a traditional conference, but an interactive event aiming to stimulate ongoing and future efforts in the field of technology enhanced learning. One of the aims of this symposium is to discuss, try to find answers and reflect upon to the questions below related to some of the challenges the educational community will certainly be facing in the near future:

- How does the digital culture of children and young people affect schools and teaching and learning practices?
- How can schools and universities take advantage of these latest advances in mobile communication and social media?
- How to design learning activities that support innovative educational practices?
- Which are the most appropriate methods to rely upon while assessing learning in these emerging learning landscapes?
• Which skills are needed from teachers and teacher students in order to face these new conditions for teaching and learning?

This book of abstracts brings together all the contributions submitted by authors that have been invited to participate in the symposium. The authors come from Sweden, Finland, Norway, Denmark, United Kingdom, Austria, Israel, Singapore, Taiwan and Chile. The papers presented in this publication have not been peer-reviewed.

We strongly believe that this symposium will be thought provoking for the participants and will play a key role in fostering a larger community of Nordic researchers and practitioners in the next years.

We specially thank NordForsk, The Swedish Research Council, Linnaeus University and project Young Communication which kindly provided us with financial support to organize the First Nordic Symposium on Technology-Enhanced Learning.

Marcelo Milrad, Teresa Cerratto-Pargman & Sanna Järvelä
Symposium Chairs
How Should the Higher Education Workforce Adapt to Advancements in Technology for Teaching and Learning?

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Abstract
In a time of change, higher education is adapting to external conditions created by advancements in technology such as social media, social networking services and mobile technologies. In this paper, we take the view that adaptation is necessary and will be beneficial in many ways; consequently, we focus on how the workforce needs to adapt. Our position with regard to academic staff (faculty) development is that there must be opportunities for concrete experiences capable of generating a personal conviction that a given technology is worth using. We examine approaches to educational professional development at The Open University and elsewhere, reflecting on what can be learnt from these cases and aiming to construct a staff development strategy for the future.

Keywords: academic staff development, faculty development, new technologies, mobile learning

INTRODUCTION
“A time of change” has become a familiar refrain in discourse concerning higher education. In April 2009 the Association of American Colleges and Universities asked participants in its conference to consider what is at stake in a time of “increased splintering of roles, contingency of status, and workload demand” (AACU, 2009). A February 2010 report on the higher education workforce by the Higher Education Funding Council for England poses the question: “How can the sector become more flexible at a time of change while maximising the talent and commitment of its people?” (HEFCE, 2010). The report identifies technology advances as a major aspect of the context in which the sector operates; it is argued that advancing technologies and technology-based services will change public experiences and expectations when it comes to accessing and sharing knowledge. Higher education institutions will need to respond by providing more online learning, online content and more effective tools to find and use this content. The report recognizes the continuing need for updated skills and ICT capacity.

This paper considers how universities are adapting to the new external conditions which impact on activity within the academy, and in particular, advancements in technology such as social media, social networking services and mobile technologies. Increasingly, the changes are not just external but are at work within the walls of the academy (physical walls or virtual) and are breaking down traditional barriers separating academic research and study from work contexts and informal learning. Academic research has identified that a new generation of technology-savvy students is entering higher education (e.g. Prensky, 2001), although research by Jones et al. (2010) demonstrates that students in advanced industrial countries are far from homogenous in their response to new technologies. Mature learners will keep returning to study to update their skills and for career advancement, bringing with them a different set of experiences and expectations.

A pressing issue is whether the higher education workforce needs to adapt to the conditions created by a world which is fast becoming saturated with personal technologies, and if so, how it should adapt. In this paper, we take the view that adaptation is necessary and will be beneficial in many ways. Consequently, we will focus on how the workforce needs to adapt, with special reference to those who are responsible for curriculum design and teaching delivery. Our investigation of this issue draws partly on a case study of educational professional development at The Open University in relation to new technologies for teaching and learning, including mobile learning.
POSITION STATEMENT

Our current position with regard to academic staff (faculty) development is that we have to provide opportunities for concrete experiences capable of generating a personal conviction that a given technology is worth using. The technology use can be educational but not necessarily – it could be a technology-enhanced experience in another area of life or work, but with the possibility of subsequent application in teaching and learning.

The Open University has a firm commitment to offering educational professional development to its academic staff, including development opportunities related to the use of new technologies. There is an annual conference on new technologies, an annual ‘Learn About’ Fair for exhibits and informal networking, workshops and seminars throughout the year, Technology Coffee Mornings, an innovative online social networking environment (Cloudworks, http://cloudworks.ac.uk/), and a thriving eLearning Community which holds regular events and discussions that are open to all staff. There are many opportunities to learn, but still there is a concern that a considerable proportion of academic staff do not participate in these events and communities.

Fisher, Higgins, & Loveless (2006) found that little research had focused on how teachers learn with digital technologies, but rather there was research on how they learn about technologies, or how they use them to teach. Based on our work at The Open University in introducing academic staff to mobile learning, we have previously argued that a major barrier to the uptake and integration of mobile technologies in teaching and learning is the lack of personal experience on the part of those involved in teaching; we reported our attempt to address this lack of hands-on experience by running a project to introduce a group of academics and other staff to the use of mobile devices to support their own learning (Kukulska-Hulme & Pettit, 2008). However, whilst this attempt created an opportunity that was appreciated by the participants, on reflection it did not create the conditions for personal conviction, since a particular use agenda had been imposed. The professional learning community approach adopted by that project has met with success elsewhere (e.g., Wright State University, 2007), but it requires relatively high levels of time investment and commitment to change. Whilst not rejecting evidence that a community of peers is important in helping academics take steps to investigate and adopt new technologies, it seems to be a necessary but not sufficient condition for generating personal conviction. A recent evaluation (Farrow, 2010) of an internally authored Mobile Learning Guide -- a booklet explaining the potential of mobile learning and giving pointers to how it could be developed at The Open University -- concluded that, although there is an encouraging level of interest in mobile learning, important issues included the amount of time and effort course teams felt able to invest in learning activities which they consider to be peripheral to the delivery of their courses. One recent response is the development of short ‘mobile learning experiences’ for academic staff.

QUESTIONS FOR DISCUSSION

- How can we engage academic staff in use of new technology when they perceive to have no available time?
- Does every new technology require a distinct approach to academic staff development?
- What are the possible roles of ‘community’ in academic staff development across the university?

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ARTICULATING THE PROBLEM

We start with the realization of the immense challenges and the costs of putting real transformations of educational paradigms into practice. Many educational reforms stress the importance of deep learning that foster conceptual understanding and transfer, lifelong learning skills, and abilities to learn or unlearn. Policy makers in many countries know they need to advance or reform their educational systems but they do not know how, or are not prepared to take uncalculated risks in tinkering with educational systems that have in many ways worked for them in the past. They have also recognized the need for enhancing the education of their citizenry and preparing learners for the 21st century. To address this, some have invested heavily in educational research and implementation in the hope of improving or transforming their school systems. Despite the devotion, this sobering decade-long observation is still pertinent:

“Decades of funded study that have resulted in many exciting programs and advances have not resulted in pervasive, accepted, sustainable, large-scale improvements in actual classroom practice, in a critical mass of effective models for educational improvement, or in supportive interplay among researchers, schools, families, employers, and communities. (Sabelli & Dede, 2001).

Research supported by individual grants to researchers has produced interesting ideas and small-scale proofs of concept. However, when one thinks about transforming school systems, one sees that the practical tools are fragmentary and scattered. Putting together a coherent classroom program requires work that has not been done much: surveying what is available, adapting what is available to local conditions, setting up infrastructure, carrying out the missing research, adopting long-term approaches to training and supporting teachers as well as affecting a cultural change of public expectations, understandings and attitudes. This requires massive funding to facilitate coordinated research, infrastructure building, administration, training, teacher time for mentoring, support, textbook materials (Stahl, 2009).

We can perhaps study the multi-faceted problem from the perspective of learning eco-system. A learning ecology is one that is self-sustaining, self-organising and emergent. From this perspective, we can view schools as ecosystems, technologies as living species, teachers as keystone species and exogenous innovations as invasion of exotic species. The outcomes of the invasion may result in the elimination of existing species, dysfunction of ecosystem, annihilation of invaders or co-evolvement of invaders and species to gain new properties (Zhao & Frank, 2003). We contend that many educational technology innovations are short-lived because the self-preserving or self-correcting balancing mechanism of the ecosystem will find a way to condemn, co-opt or marginalize the innovations (Collins & Halverson, 2009). Collins & Halverson (pp. 30) cited Jane David as applying the metaphor of a jigsaw puzzle to the interlocking and self-sustaining school system: not only do the existing pieces depend on one another, new pieces fit only into gaps and contours shaped by previous practices. Thus, a “highly-evolved, complex institutional systems can be locked in place and very difficult to change.” (pp. 30).
STABILITY OF EQUILIBRIUM IN ECO-SYSTEMS

The stability of the eco-system may be subjected to continuous changes triggered by pedagogical innovation or disruptive technologies (Christensen, Horn & Johnson, 2008). How do we introduce changes so that social diffusion can penetrate ecological barriers to elevate the steady state to a new and better equilibrium?

Larry Cuban (1984) talks about “situationally constrained choices” available to teachers and leaders in terms of school and classroom structures, and a culture of teaching that arises in response to the stability of structures. These work to restrict the range of innovations realistically open to schools. Cohen (1988) talks about teaching as a conservative practice and teachers find it difficult to implement innovations when they have already dedicated years adapting to what the traditional school system offers. Fishman (2005) talks about how innovation should be nimble enough to allow modifications to produce a more cogent fit with the school’s capability, policy and management as well as culture. Fullan (2009) talks about establishing “dynamic connectivity” (p73) among the core elements of personalization, precision and professional learning. In education systems which are top-down driven (like Singapore and other Asian cities), there could also be "self-organization" from bottom-up to fine-tune dispositions as well as attitudes and behaviours of various stakeholders to what is rewarded or valued.

HOW TO ROCK THE EQUILIBRIUM: POSING THE QUESTIONS

So then, what are the conditions that favour the nurturing of innovations in a sustainable way? We propose adopting ground-up initiatives that can fit into systemic considerations of the learning ecology. However, such self-organizing traits are rare. Moreover, the social diffusion of natural-occurring innovations will take place too slowly. This triggers us to contemplate on whether and how we should or could speed up the transformative process. Should we introduce more diversity and allow more peaks of performance or be more conservative and focused?

We pose the following questions:

1. What are examples of learning eco-systems that have reached equilibrium state? What are our judgments about these states? Optimal or sub-optimal? Optimal with respect to what criteria?
2. What are some of the systemic factors that will affect the well-being of learning eco-systems? What kind of alignment amongst these systemic factors is needed in a learning eco-system? How do we achieve such alignment?
3. In what ways will innovations perturb learning eco-system? How should we respond to these “invasions”?
4. What are the kinds of innovations that are scalable and sustainable? Can we learn anything from some promising examples?
5. What is the role of multivocality (voices of stakeholders such policy makers, education administrators, school leaders, teachers, students, parents and the community at large) in nurturing sustainable learning ecosystems?

To date, very little research has focused on innovations (social innovations) as catalysts or as disruptions to feed into the learning ecologies to bring about a new state of equilibrium. We made attempts to do so in one of our projects carried out in Singapore elementary school. Based on our preliminary research findings on students’ use of mobile phones, we suggest that for innovations to be sustainable, they should be weaved into the daily activities of all actors in the learning ecology. In our particular context, we looked specifically into the eco-system that embraces formal learning and informal learning where students should learn anytime, anywhere, using the mobile phone as their intellectual partner. What we have now are learning ecologies, stable now but not sustainable in the long term because of the disconnect between formal learning and informal learning (Hannon, 2009). We argue that if we can forge more linkages between formal and informal learning, we will be able to build strong fundamentals for the sustainability of learning ecologies.
REFERENCES
Shared and Personal Learning Spaces: Investigating the Relation of Individual and Group-Level Dimensions of Collaborative Learning

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Abstract. As technology is available in the ubiquitous way at the beginning of the 21st century, there is an evident trend that people access, use and create information and knowledge in a different and more flexible ways than earlier. The development of social media and Web2.0 applications such as blogs, wikis and different community services are nowadays in a crucial role in both leisure time and work activities. However, without sufficient guidance students might not reach the goals set for their interactions and knowledge sharing. This is particularly the case in minimally structured environments, which is often the case in utilization of social software. In this paper, we will call for empirical evidence on productive learning activities in variously scripted environments that integrate shared and personal learning spaces.

Keywords: Collaborative learning, pedagogical scripts, social software, shared and personal learning spaces

INTRODUCTION

Tools and environments for collaboration and joint knowledge creation have rapidly changed during the last years. The emphasis on participation, peer production of content, dialogue and collaboration in Web 2.0 practices make them valuable elements in programmes focusing on the learner’s active engagement – either individually or collaboratively – as a prerequisite for learning (Bonderup Dohn, 2009). However, there is a lot of hype and overly optimistic notions around the possibilities of social media, but we need more systematic empirical research on learning processes and effects in these environments. Furthermore, it can be argued that utilizing social media tools for learning purposes requires careful pedagogical design, structure and support.

This research leans on earlier long-term research on collaborative learning in several projects (funded by the Academy of Finland) such as in ECOL (Ecology of Collaboration; Järvelä & Häkkinen, 2005), SCORE (Pedagogical Structuring of Collaboration and Self-Regulated Learning; Häkkinen & Järvelä, 2006) and STRUCTURE projects (How to Support Productive Collaboration? - Developing Resources for Computer-Supported Collaborative Learning; Häkkinen, Arvaja, Hämäläinen & Pöysä, 2010). These projects have made us to focus more on the specific relation between individual (personal) and group-level (shared) dimensions of collaborative learning. The fundamental questions related to this challenge are: In what ways are individual and group-level learning processes intertwined in productive collaboration? What need to be understood in order to design flexible support for productive learning activities in learning environments that integrate shared and personal learning spaces?

INDIVIDUAL AND GROUP-LEVEL DIMENSIONS OF LEARNING

Socially shared learning approach describes the group life to depend on individual participation, while individual life depends on the impact of groups (Levine, Resnick & Higgins, 1993). Knowledge sharing is used to understand the relationship between the individual knowledge construction and how the participants share knowledge and create joint understanding (Jeong & Chi, 1997; Stahl, 2005). Stahl (2005) suggests that collaborative learning takes place through processes of shared meaning-making when there is a dynamic relationship between shared meaning meanings and individual interpretations. Through this process learners verify and negotiate their individual views so as to reach shared understanding or group cognition (Stahl, 2005). In other words, it is evident to see individual minds in interaction with group understandings. In the emerging technological landscapes based on e.g., social media, the line between individual (personal) and group-level (shared) activities is blurring in particular.
SCRIPTING LEARNING ACTIVITIES IN SHARED AND PERSONAL LEARNING SPACES

Researchers have shown that when learners are left on their own, they rarely engage in productive interactions and knowledge-generative activities such as asking each other questions, explaining and justifying their opinions, articulating their reasoning, or elaborating and reflecting upon their knowledge (Kobbe et al., 2007). Pedagogical scripts as instructional support have been presented as a promising method to trigger productive collaborative activities and to provide structure and support for otherwise open learning environments (Dillenbourg, 2002). The results of many studies have indicated that collaborative learning, even in scripted settings, is achieved under unique circumstances whose significance is interactively constructed by the learners and cannot be directly predicted (Arvaja, 2007). Therefore, we need flexible ways of designing collaborative activities in order to avoid overscripting learners’ interactions.

CONCLUSIONS

There is a need to work on how people establish or design spaces for individual and collaborative activities within new architectures for educational activities, and what kind of structure and support is needed for this. Future learning environments are hybrid entities that integrate physical and virtual (Web2.0 & 3D) as well as personal and collective spaces. According to Dillenbourg and Jermann (2006), integrated learning refers to this intertwining of computerized activities (Web 2.0 tools, mobile devices, simulations) with face-to-face activities (small-group work, lectures, field trips). These activities are integrated together with the aid of a pedagogical script that may include activities from multiple social levels (individual, group, classroom). Instead of focusing purely on either individual use of learning technology or computer-supported collaborative learning, we should shift to integrating all activities that are relevant to the intended learning objectives (Dillenbourg & Jermann, 2006). We also need more empirical evidence on productive learning activities in variously scripted learning environments that integrate shared and personal learning spaces including new tools for collaboration.

REFERENCES

Leveraging New Media Skills for Peer Feedback in Collaborative Inquiry Learning

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Abstract
Today’s youth develop new media skills encompassing cultural competencies and social skills mainly through participation in informal communities. In this paper we consider how to leverage aspects of these skills and the environments in which they are developed in the design of a “playful” peer feedback tool, SCYFeedback, for collaborative inquiry learning. Our position is that the tool needs to be lightweight, and “playful” in order to entice and motivate students to give and receive feedback.

Keywords: peer feedback, peer assessment, collaborative inquiry learning, new media skills

INTRODUCTION
Today’s youth develop new media skills including cultural competencies and social skills mainly through participation in informal communities and “schools as institutions have been slow to react to the emergence of this new participatory culture” (Jenkins et al., 2006). In their 2006 report on Confronting the Challenges of a Participatory Culture, Jenkins et al. (2006) identify 10 new skills—Play, Performance, Simulation, Appropriation, Multitasking, Distributed Cognition, Collective Intelligence, Judgment, Transmedia Navigation, Negotiation, Networking—developed through collaboration and networking. Furthermore, they point out that these new skills build on school taught skills literacy, research skills, technical skills, and critical analysis. In this paper we consider how to leverage aspects of these new skills and new participatory environments in order to engage students in peer assessment in a designed collaborative inquiry learning environment.

In a participatory culture of learning students would be “expected to be actively engaged contributors to the intellectual and artistic content of their schooling rather than just passive receivers of a curriculum” (Bosco, 2009). In participatory environments, participants create, play, interact, collaborate, solve problems, and give feedback to one another while developing skills. Harnessing these new skills and ways of interacting to learn for example, physics, biology, or mathematics is a challenge for technology enhanced learning environment designers, and for those interested in assessment in particular. Peer assessment is an important component of a participatory culture of learning (Kollar & Fischer, 2010) and an important component in the design of learning environments implementing this contemporary culture of learning. Fadel, Honey, and Pasnik (2007) argue that as we have moved towards more participatory culture, such as collaborative learning and knowledge building, new methods of assessment are required.

POSITION STATEMENT
In the EU 7th framework project SCY (Science Created by You; www.scynet.eu), we are inspired by the ease with which participants interact and give each other feedback in participatory environments and we attempt to design a peer assessment tool, SCYFeedback, that is easy to use and engaging. We believe that peer feedback, a form of formative peer assessment, needs to be lightweight, easy to use, and seamlessly integrated into the learning process. In SCY (de Jong, et al., forthcoming) we take an approach to learning where student developed artefacts are central. Students embark on a mission such as “Design a CO2 friendly house” and through inquiry learning activities supported by resources, tools and scaffolds embedded in SCY-LAB, the SCY learning environment, create a number of ELOs (Emerging Learning Objects (Chen 2004, Hoppe, et al., 2005)) to complete the mission. During a SCY mission learners gather and process information, design and conduct experiments, make interpretations and abstraction, and communicate their conclusions; that is they engage in processes of active learning, based on inquiry, knowledge building, and learning by design. SCY ELOs include models (e.g., system dynamics models), concept maps, designed artefacts, data sets, hypotheses, tables, summaries, reports, plans, and lists of learning goals. Furthermore, SCY missions require students to self-regulate their learning activities such as
planning a line of investigation, discussing and collaborating with others, or asking for peer feedback, all with the creation of ELOs in focus. Thus, in our approach to assessment (Vold, Wasson & de Jong, forthcoming) these ELOs are central. ELOs placed in the SCYPortfolio form the basis of summative evaluation to be carried out by teachers after the mission is completed, and formative assessment is given during the mission in the form of peer feedback through the SCYFeedback tool.

Peer assessment can be described generally as a process whereby students evaluate, or are evaluated by, their peers (van Zundert, Sluijsmans, & van Merriënboer, 2010). Ronen and Langley (2004) point to the benefits of peer assessment when students are provided the opportunity to learn from artefacts created by their peers, and Falchikov (2003) shows how peer assessment assists students to create higher quality artefacts. As such, this type of assessment needs to be embedded within the learning process. In SCY we provide such opportunity for peer assessment of student created learning objects through SCYFeedback, a tool developed to support playful peer feedback. Based on an extensive literature survey (Vold et al., 2010) on peer assessment, the design of SCYFeedback is inspired by:

- an increasing view of learning as a participative activity (Kollar & Fischer, 2009)
- SCY’s focus on emerging learning objects which matches with research on how peer assessment introduces the students to the perspective that the focus of instruction is not only on the end product(s) but also on the process, and it highlights the value of collaboration (e.g., social interactions, trust in others; Noonan & Duncan, 2005)
- the recognition that peer assessment can motivate students to engage in the learning process (Sluijsmans, 2002)
- the recognition that many people (students included) take part in participatory worlds that offer interaction among the participants around a common interest
- research that indicates that formal instructional intervention asking students to reflect on feedback from peers does not significantly increase learning gains
- students are more willing to accept feedback given in “student-speak” (Frost & Turner, 2005)
- an interest in trying “something new, lightweight and motivating” within the field of peer assessment utilising the benefits of using a lightweight Web 2.0 tool

QUESTIONS FOR DISCUSSION

- How can we motivate students to participate in spontaneous peer feedback (as opposed to planned)?
- Does a peer feedback tool such as SCYFeedback encourage the students to engage in peer feedback?
- Can students give peer feedback without following rubrics or other rating or sentence opener schemes?

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New Interaction Patterns and Group Dynamics in the Classroom

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ARTICULATING THE PROBLEM

The XXI century student has different dimensions. Are hipper connected; almost every teenager has a phone and/or access to Internet. Has developed new codes; new research has shown that the cryptic languages used is SMS and Chat may have a positive impact in writing since initial results show deeper understanding of writing. Are multiprocess; not only with processes within the computing system, but outside this too. Are visual; if you ask a child of generation Z a concept she will look for at Youtube (Youtube has 1000 million downloads daily); this has enormous implications in how knowledge is constructed. Are interactive; want immediate responses not only in the cognitive dimension, but lately also through the interaction of the body (Nintendo Wii, Microsoft Natal, etc).

School however is the same for at least the last century. The big difference you might see inside some classrooms are netbooks on the students bench with the same teacher student disposition: an active teacher that spreads knowledge to passive students. (Some Universities in the US are banning laptops inside their classroom due to negative student in classroom attention and involvement.

The question is then, how can technology change the classroom dynamics to fulfill students and teachers needs? We have to understand that for teaching a given content or skill there are different pedagogical models possible, but not all of these fit all needs. For the given intersection, not all media or technology fits the corresponding requirements. Therefore, if we first buy the technology we are starting from the wrong direction: the solution and not the problem. What we want with technology is to change the classroom practice. However, as it has happened with for example interactive white boards, teachers are not using the technology in ways that are pedagogically productive, privileging the use of technological features ahead of any clear pedagogical intentions (Becta, 2007). The benefits of technology can be realized only through an effective learning and teaching strategy.

TRANSFORMING THE CLASSROOM EXPERIENCE WITH THE SUPPORT OF TECHNOLOGY

Different approaches can be followed. First, a 1 to 1 solution that makes use of small group collaborative learning supported by technology. This approach follows the constructivist ideas, where students are participants of their learning, identifying two pillars:

1. Collaboration: Members of a group work together on the same objective. Each group member is responsible for his/her own work, role and learning effort, and each one constructs, prior to the collaborative discussion, his/her own vision of the problem. Thus, all group members are a source of information for building the common answer as they help each other reach the common goal. In this way, a shared understanding of the task is constructed, enabling the students to exchange opinions, negotiate and construct an answer together.

2. Significance: Learning hast to be with a meaning. The tasks chosen for peer collaboration must be structured so that the students are obliged to work together cooperatively toward a common goal. Through joint actions and verbal explanations, the denotation of the task is discovered. Thus, learning occurs in the social network, where group mates verbally interact to construct knowledge, which is supported by the technological network that transparently supports the social network activities, by coordinating and synchronizing activity states and mediating the activities and the social interaction of the participants (Zurita et al., 2004).

This approach has shown to be technology independent and has been implemented in PDAs, Phones, Netbooks, Tablets, and Digital Pens, having each its advantages and drawbacks (Echeverria et al., 2010).
A second approach is Interpersonal Computers. Today’s computers are designed on the assumption that a single person interacts with the display at any given moment, manipulating the input device exclusively. Single Display
Groupware (SDG) lets multiple co-located people, each with their own input device on the same machine, interact simultaneously over a single communal display.

Two approaches have been developed. One for small group sharing (1:3) and another for whole classroom participation (1: N), also known as One Mouse per Child. In small group sharing, three students sit at one PC each with his/her own input device acting on a shared display, working collaboratively on the same goal. The system promotes a balanced involvement of the three group members through a coordination mechanism that forces each participant to perform a task. To successfully complete the activity, a student must not only achieve his/her own individual goal, but also help ensure that all the other children in the group achieve theirs. Social interaction between participants is promoted. In order to give or receive an object, group members have to communicate their ideas, express their opinions and concepts and negotiate among themselves. This leads to the emergence of pedagogical and social support networks among the participants, and the activity within each group is thus collaborative and noncompetitive (Infante et al., 2009).

The second approach, known as One Mouse per Child, is oriented towards working simultaneously with an entire class using an interpersonal computer. In our case, this consists of a PC, a projector, and a mouse for each child participating in the activity. Experimentally we observed in a classroom that on a 1024 X 768 pixel projection, on a conventional 1.5 mt. x 1.5 mt. screen, up to 49 children can adequately work simultaneously in a classroom. Each student must solve a series of exercises, which are generated according to the child performance through a set of pedagogical rules incorporated into the system. In the learning process the teacher has an active mediating role. A teacher (personal) mouse enables to directly intervene with each of the students’ learning process, according to what the teacher considers to be pedagogically convenient. (Nussbaum et al 2010)

RESEARCH QUESTIONS

The previous analysis indicates us that the problem of improving learning in the classroom with the support of technology has then been shifted from a technological one, to a pedagogical one. Several open questions remain. Experience and active participation in the educational process are two elements that have revolutionized the traditional concept of teaching and learning over the course of the 20th century. The writings of Dewey, Vygotsky, Piaget and others have taken on renewed relevance for specialists attempting to explain and improve the quality of learning, with participatory interaction as the focal point for organizing the experiences of the participants in the learning process.

Considering that Interpersonal Computers allow the simultaneous participation of a whole classroom with personal interactivity, how can we maximize their educational value?

Regardless of the theoretical approach, educators and specialists consider that participation generates better conditions for learning (Lim, 2008), and the quality of that participation is one of the foci of study of current pedagogical propositions (Shulman, 2005). Studies have demonstrated the importance of active participation by students in the learning process for phenomena such as achieving better results, both with technological support (Zurita et al., 2004) and without it; improving students’ perceptions of self-efficacy (Hamman et al., 2007); and developing metacognitive reflexive practices and student commitment to the learning process (Dede, 2009).

Are there other forms of simultaneous participations that can be obtained beyond the use of interpersonal computers?

For what classes of problems can we successfully achieve the various forms of participatory learning?

From an ethnographic perspective, a session of classroom interaction is organized temporally around three phases or moments (Sinclair et al., 1975):

a) Initial phase: aspects referring to the definition of space, time and purpose of the class.

b) Development phase: interaction activities conducted among the students and between them and the instructor, and the use of computer support and other elements that mediate pedagogical interaction.

c) Closing phase: learning exploitation activities, conclusions of the development activities, and transferring of what has been learned.

Considering the curricular needs, when should students work individually, in small groups, and in whole classroom participation? In the two last ones, what types of collaboration or cooperation can be established?

How much scaffolding should be considered?
Teachers are key for the successful implementation of innovations in schools (Barber and Mourshed, 2007). We have to empower them to adequately perform their labor in dynamic and heterogeneous situations, and support their decisions with accurate, relevant and timely data.

**How can the instructor’s role as mediator of each student, the small group and the whole classroom be supported?**

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A Socio-Cultural Ecological Approach to Mobile Learning and its Implications for Pedagogy

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Abstract. This paper briefly outlines the socio-cultural ecological approach to mobile learning of the London Mobile Learning Group comprising structures, agency and cultural practices and exemplifies its pedagogical potential. The paper does so against the background of a discussion of the key features of the ‘mobile complex’, the fundamental transformation of social, cultural, educational and technological structures in the context of the normalisation of mobile technologies in everyday life. Prior to discussing possible educational responses the paper also explores appropriation and user-generated context for development as key variables.

Keywords: socio-cultural ecology, mobile complex, appropriation, user-generated contexts for development

INTRODUCTION

With the normalisation of mobile devices in everyday life, characterised by functional convergence including internet connectivity, comes an increase in their use for learning in informal contexts in the process of engaging with, and making sense of the world. Mobile device users are developing a wide range of new cultural practices, which are in danger of leading to a potential disconnection between the ways they operate in their daily lives and the cultural practices and pedagogical scripts of educational institutions, who have so far by-and-large remained resistant to mobile technologies, and how they interact with young people.

THE LONDON MOBILE LEARNING GROUP SOCIO-CULTURAL ECOLOGY

The paper discusses a socio-cultural approach to mobile learning which updates Vygotsky’s and Piaget’s perspective on child development and learning. The paper argues that the original categories of time and phases in the life-course require cultural re-interpretation in the context of prevailing structures of individualised and mobile mass communication as well as of the society of individualised risks.

Learning using mobile devices is viewed as being governed by a triangular relationship between socio-cultural structures, cultural practices and the agency of media users / learners. The interrelationship of these three components is seen as an ecology. Mobile devices, contexts and content are viewed as cultural products within a ‘mobile complex’, i.e. the cultural, technological and educational transformations currently taking place globally in response to the increasing normalization of mobile devices in everyday life.

Social negotiation of child development and the internalization of cultural products, the paper argues, have to be reconsidered with the aim of matching learning with meaning-making in disparate, fragmented situations. Such new situations for meaning-making and development are socio-cultural milieus. These milieus result from the process of individualisation and fragmentation, which lead to a fragmentation of meaning-making. The socio-cultural ecology promotes an understanding of the importance of socio-cultural milieus in the context of mobile learning.

Characteristic of the socio-cultural ecology are two main issues requiring urgent pedagogical responses, which the paper explores: appropriation and user-generated context. In an individualised society, personal appropriation can be seen as the dominant activity to deal with socio-cultural prerequisites and to form a personal life world. Personal appropriation of cultural products is viewed as the main mechanism for dealing with the world. The focus here is on the personal, which points to the importance of appropriation within a personal frame of relevance. This personal frame consists of the learner’s life world and her everyday life.

The prevalence of ‘user-generated contexts’ are evident, for example, in the shift away from traditional forms of mass communication and editorial push towards user-generated content and individualised communication contexts. These structural changes to mass communication also affect the agency of users and their relationship with traditional and new media. Indeed, it is argued that users are now actively engaged in shaping their own forms of individualised generation of contexts for learning through individualised communication contexts and
that new relationships between context and production are emerging. Mobile devices position the user in new relationships with space, i.e. the outer world, and place, i.e. social space; they enable and foster the broadening and breaking up of genres. These developments have significant implications on teaching and learning.

This raises important questions about how educational institutions can cope with the more informal communicative approaches to digital interactions that new generations of learners possess. Learning as a process of meaning-making can be seen to occur through acts of communication which take place within rapidly changing socio-cultural, mass communication and technological structures. Does the notion of ‘learner-generated cultural resources’ represent a sustainable paradigm shift for formal education in which learning is viewed in categories of context and not content? And, what are the issues for ‘text’ production in terms of modes of representation, (re)contextualisation and conceptions of ‘literacy’? Who decides/redefines what it means to have coherence in contemporary interaction?

The paper argues that, in order to be useful, pedagogical approaches to mobile learning have to engage critically with the characteristics of the ‘mobile complex’. They also have to enable the identification of cultural resources for the development of children, their participation in cultural practices and their meaning-making, i.e. their learning. The ‘mobile complex’ requires a paradigm shift in educational thinking away from the notion of education as protecting learners and the development of children from distracting influences of mobile device use in everyday life (e.g. by banning them) towards their critical and reflexive adoption and assimilation. The process of assimilation of mobile devices must respect the school’s established practices of learning and teaching but at the same time it advocates the opening up of the school to learning in informal contexts within the students’ cultural mobile practices.

How can we ground a pedagogy of mobile device use for learning theoretically and ensure schools, which are after all still society’s leading learning institutions, buy into it? In our view the theoretical key is to conceptualise mobile devices within the ‘mobile complex’ as cultural products, which can function as cultural resources for learning. Appropriation for us includes the learner’s relationship with mobile devices as well as the objects, which the school is offering its students for learning. A key educational challenge thus is to find a way of harnessing these mobile cultural products with their agency of ‘naïve expertise’ for curricular use within formal learning contexts. One of our proposals is to take ‘conversational threads’ from everyday life and extend them into formal education as well as to identify points of convergence of school-based learning and formal education and user-generated contexts. We further propose to view contexts within the mobile complex as ‘zones’ of development and learning.

CONCLUSIONS

The paper concludes by proposing two main pedagogical approaches to support the interrelation of everyday life and school in relation to mobile learning:
(a) conversational threads between the children’s everyday lives and the school and
(b) docking the school as a developmental context onto contexts generated by students in and through their mobile practices.

The paper puts forward four didactic parameters for analysing and planning mobile learning interventions which are discussed in the context of practical examples drawn from a recent study involving teachers and media advisers in a range of secondary schools in Germany.

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Designing Learning Tools for Learning by Design

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Abstract. With this position paper I want to bring to the discussion of the Nordic technology enhanced learning community the importance of design. Firstly, design practice is a powerful learning method that could be used more widely in teaching and learning than is done today. Secondly, to have a greater impact on the educational practices we should pay more attention to the design of learning tools — the technology used in teaching and learning. With this executive summary I start by briefly presenting the principles of design thinking in the context of learning. After this I present some methodological discoveries and insights related to design research focusing on learning tools. The findings rely on my personal involvement and experience gained by participating in design processes of several distinct and experimental software tools aimed to enhance learning in different contexts.

Keywords: design, learning by design, learning tools, methodology

INTRODUCTION

In a high-quality learning students explore, ask why and look for solutions. They do all this simultaneously. When the process continues all the way to include in it some action, to the level of delivering a solution to real-world challenge or problem, we may call it a design process. When you ask why and look for solution to the problems you are designing — you learn by designing.

According to Victor Papanek (1985) "all men are designers". For him design is basic to all human activity: "The planning and patterning of any act toward a desired, foreseeable end constitutes the design process" (Papanek 1985). For Simon (1996) design is a science of the artificial and, as such, should not be only a component in technical education or special professional skill, but a core discipline for every liberally educated person.

Nelson and Stolterman claim that when natural sciences attempt to gain a universal concept of the world, design carries an intention to change the world deliberately. Design attempts to change the world. Design may provide new ways of doing things. It may give us a different perspectives and interpretations of the world. As such, it is often close to artistic activity, but with one major difference: when art is primary self-expression, design is other-service. (Nelson & Stolterman, 2003). In design activity there is always an attempt to serve other people; your peers, customers, humanity.

Donald Schön has described design as a skill to recognize and appreciate both desirable and undesirable design qualities — to understand what is possible and feasible and what is not. Design is reflection and dialog with the qualities of situations and materials available in it. (Schön, 1987, 1988)

Design thinking is not only focusing on artifacts, physical objects or software. Design is also about practices, processes and services. It is about contributions to the current state of affairs with intentional actions.

LEARNING BY DESIGNING

Learning by designing roots in the observations and practices of everyday life. A learner with design thinking skills often points out that things that are usually considered to be obvious, normal, or natural are problematic. She does not consider facts being in any way neutral, but considers that values have effects on our understanding of them. Learning by designing is not only an issue of questioning. It is also an attempt to have an impact — to design solutions. Learning by designing school project may start with an exploration on the students’ everyday living environment to find out challenges in it. Is there something that should be changed in the school? Are there social, economical or ecological challenges? Uncomfortable school yard? Noise in the library?

For instance, when solving the problem of noise in the library the students must study physics of sound, acoustics and materials, build scale models and prototypes and find out the most feasible solutions. (example from the Newsweek article “The Creativity Crisis”, July 10th 2010). New technology — digital cameras, GPS, mobile phones and websites — can be used to document possible challenges in the everyday life. The visual stories of the situation will help people to empathize and participate in the search of challenges and process of looking for solutions.
DESIGNING LEARNING TOOLS

If design as a learning method has not get a lot of attention among educational research, design of learning tools has gain even less attention. Still we know that more and more learning becomes technology mediated. We daily use software, websites, web tools, social media with computers and mobile phones in learning, but pay very little attention to them as artifacts — as something someone designed for some purpose.

In the last fifteen years I have been involved in design processes of number of software learning tools which all belong to the category of social media. By analyzing and reflecting these design processes I have made some methodological discoveries and insights. I have recognized three critical factors one should be aware of and consider when aiming to design software learning tools that would be beneficial and good in complex social learning situations and systems.

(1) Design research relying on practice should follow a certain research-based design process with four phases: 1. contextual inquiry; 2. participatory design; 3. product design, and 4. the production of software as a hypothesis.

(2) Designers and researchers should aim and accept that design is often based on informed guessing. The informed guessing means that the designers and researchers should understand that all the design decisions cannot be inferred from the research, but can be based on hints and clues gathered within the research operations.

(3) Designers and researchers should be aware of the need to move between different knowledge intentions. Without the ability to understand and mediate different knowledge interests — of the designers, the participants, different stakeholders, and the people who will try to use the tool for learning — the designer is not able to make design decisions. The analyses and interpretations of different knowledge interests must also vary according to the phase of the research-based design process and the world, in the Popperian sense, where it takes place. The designer of learning tools must operate in a jungle of different interests but still keep herself focused and able to make decisions.

The era of the Web, social software and open content means that more and more learning will be technology-mediated. Design research focusing on design of learning tools can deliberate and bring alternative approaches to the discussion; it can be critical and comprehensive. It may help us to understand better the phenomena of learning becoming more technology-mediated and will help us to design better tools for this. In practice, it may help us to do the right thing.

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Multimodal Learning in Technology Enhanced Learning Environments

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FRAMING

The ‘changes’ – social, technological, economic, political – which are everywhere evident and are everywhere discussed, have their effects on conceptions of what learning is, on environments of learning, and on understandings of what environments of learning are; and, crucially, on the position of learners and of teachers. Words such as ‘change’ or ‘new’, or the prefix ‘re-’ (as in ‘re-thinking’, ‘re-making’, etc) are used so frequently that their constant repetition threatens to void them of any impact. In that context, and in the context of the agenda of this symposium, I look at the present situation as far as learning is concerned, at the environments of learning, and at the distinct and significant differences between the characteristics of traditional sites and practices of learning, and those seen as non-traditional, those of younger generations – say up to the age of 30, maybe, for whom what appears as ‘new’ to my generation is simply what is to them.

My perspective is the dual one of a social semiotic theory of communication and representation (Kress, 1997, 2010 a) a conceptualization of the field of meaning (-making) and learning as multimodal. Social semiotic theory attends to forms, conditions and assumptions about agency in meaning-making, in representation and in learning. It regards sign-making as identical with meaning-making and regards both as identical with learning – though seen through different disciplinary lenses. Social semiotic theory is attentive to the effects of power in sign- and meaning-making; as it is to the distributions of power in environments of learning, where teachers and learners are differently placed with regard to power. Social semiotic theory attends to the multiple resources available in (meaning-making as) learning.

In my research and writing, I examine the characteristics of different kinds of sites of learning – ‘formal’ and institutional / traditional; ‘informal’ / not institutional; traditional and contemporary (Jewitt & Kress, 2003; Kress, 2010). I do so from a social perspective, focusing on power, on agency, on sites and forms of (inter-) action. From a social semiotic perspective, I focus on modes and their potentials, on genres and their (in)stability, on discourses, on forms of cohesion and coherence, and in general, on contemporary principles of composition.

ARGUMENTING

In concerns with learning in contemporary situations – whether with or without the ‘enhancement’ of the digital technologies - I reflect on the intricate link of social and representational organization and practices. The dynamics of social environments, their present and increasing instability and provisionality at all levels, are leaving and have already left their distinct mark on semiotic forms - such as contemporary texts, genres, young people’s writing, conceptions of knowledge, and so on. For me it is clear that the frame of a social semiotic multimodal theory provides one essential means for understanding the contemporary sites of learning and learning itself – whether of non-formal sites as well as an understanding of much of what goes wrong in formal sites. Meaning, forms of knowledge, or the principles brought by learners (of any age) to their engagement with the world can not be imagined, understood, analyzed and researched other than with such tools. That frame makes visible both where agency lies in meaning-making / learning and with what effects; and it shows with what modes meaning-making and learning take place. The emphasis on agency and on modes (as well as on the semiotic forms through which they are realized) enables the full recognition of the conditions and characteristics of environments of learning; the agency of learners; the necessary role of teachers; and the many modes through which learning takes place.

The lenses of ‘traditional education’, and its imagined shape of education, can not provide any possibility of success in coming to understand the potentials of contemporary digital technologies in relation to learning – whether in terms of curricular / representational or pedagogical / social affordances.
POsing THE QUESTIONS:

In light of the ideas discussed in the previous two sections the following questions are formulated which are presented according to four different categories:

1 What larger-level theories of learning - and therefore of assessment - are imagined or assumed in the context of the NORDITEL symposium?
Are the theories cognitivist / psychological, or are they social or socio-cultural? Which theories are apt for or entailed in “the digital culture of children and young people” – eg social networking (sites); user-created content; etc? One central question in this category is: Which is given conceptual, theoretical, ideological priority: the social or the technological (or the cognitive/psychological)? What ‘metrics’ of learning – that is, metrics for assessment - are assumed and / or derived from the theories of learning used or implied?

2 What place does ‘multimodality’ have in technology enhanced learning environments?
What is ‘multimodality’? What does it offer? Where does multimodality have its impact – in curricular issues, that is, in forms of ontology and epistemology, in knowledge construction; or in issues of learner identities; or in matters of screen-based genres? In all these? Is ‘multimodality’ as such a theory, or is it the setting out of a domain in which meaning is made, learning takes place, etc?

3 Learning and the ‘recognition’ of learning
What is regarded as evidence of learning: is it linguistic performance – spoken or written; or numerical; etc; is learning recognized in all culturally available semiotic resources for making meaning, even where these are not canonical, either presently or in the past? Is the agency of the learner regarded as prior or is the authority of the teacher (as the representative of institutional power) treated as decisive? How do imagined theories and approaches to learning measure up against the meaning-making practices of “the young”?

4 Issues of agency and contemporary landscapes of learning
Where does the school presently see the location of authority and agency? With learners? How can the culture of (still) traditional schooling – with its power-structures, its canonical modes and genres etc – be measured against the “the digital culture of children and young people” and their taken for granted assumption of agency, as well as their taken for granted capacities for designs of their intent and interest?

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Teachers/Teacher Educator’s Digital Competence in Norway

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Abstract
This position paper focuses on how the new national curriculum for school and the new general plan for teacher education in Norway change the underlying premises for teaching and learning in today’s schools and teacher education. This has become particularly pressing as a result of the new educational reform ‘Knowledge Promotion’ whereby digital competence is now the fifth basic competence in all subjects at all levels as well as in the new teacher education curriculum in Norway. The aim of the position paper is to consider digital competence in the light of these policy documents, relevant research studies, teacher education and the general digitisation of schools in the Norwegian context. The question considered by the article is if, and eventually how a digital competence model for teachers/teacher educators’ (TE) can meet the demanding in these new curricula.

INTRODUCTION

In Norway the National Curriculum for Knowledge Promotion (MOK, 2006) emphasises the teacher as a competent and responsible professional, and s/he is given opportunities to practice his/her teaching the way he/she wants, within given boundaries. This is based on the considerable local methodical freedom teachers have in this new educational reform (MOK, 2006). Their professional knowledge has traditionally consisted of content competence, didactic competence, social competence, professional ethics competence and adaptive and developmental competence (UFD, 2003), but the new educational reform demand a marked focus on ICT and digital competence. In this new educational reform digital competence has become the fifth basic competence in all subjects at all levels (stages 1 to 13, 6–19-year-olds). Consequently, Norwegian schools are infiltrated with new technology, and obligatory ICT in all subjects is in many ways making us question both our general perception of ‘technology’ as an educational term and teachers’ use of technology in school. Even if many teachers admit that the introduction of ICT brings new opportunities for the subjects, they state at the same time that it presents many challenges for teachers, who will have to cope with greater complexity in their everyday practice (Krumsvik, 2006; ITU, 2007; Almås & Krumsvik, 2007, 2008; Krumsvik 2008a, b, c; Krumsvik & Almås 2009). Teachers’ practice builds on their own learning and teaching experiences, but when it comes to ICT and teaching they have to create conditions for learning that they themselves may never have encountered before. Teachers who were born before 1980 do not know what it is to grow up in a digital world where cell phones and a minimum of one computer in each home are the norm. Neither did they receive teacher training where they were introduced to the digital era. At the same time ICT has not been incorporated properly in teacher education (NIFU/STEP, 2008; Norwegian University Monitor, 2010; OECD 2010) or in previous national curriculum regulations for teacher education in Norway (UFD, 2003), and there is a danger of a gap being created between teachers’ education and the practices they encounter afterwards. The new General Plan for Teacher Education (MOK, 2010), however, indicates a time of upheaval since it has highlighted digital competence as one of the five core competencies (as in school). Therefore it appears that teacher educators’ (TE) digital competence is a vital part of teacher education and needs to be discussed and elaborated in greater depth than before (as for teachers in school). Against this background the aim of the position paper is to consider digital competence in the light of these policy documents, relevant research studies, teacher education and the general digitisation of schools in the Norwegian context. The question considered by the paper is if, and eventually how a digital competence model for teachers/TE’s meets the demanding in these new curricula.
TEACHERS AND TEACHERS EDUCATORS’ DIGITAL COMPETENCE

It is evident that the pedagogy and the digital didactics of today in Norway depend on one very important assumption: that the teacher/TE has the necessary digital competence. When we approach the narrower content of digital competence and what this means for pupil and student learning, the need for digitally competent teachers becomes even more apparent. Despite the importance of international contributions in providing a conceptual understanding of digital literacy, it is clear that not all of them can be easily transferred to the context of Norwegian schools and teacher education. For example, the concepts digital literacy and digital competence have both similarities and differences, but the last one is more anchored to Norwegian conditions and the Scandinavian perception of the English term competence. And as a consequence of this (and other policy conditions) Norwegian teachers/TE under the new national curriculum for schools and the new General Plan for Teacher Educators are exposed for stronger educational top-down implementation of ICT in subjects than other countries. It is therefore important that attempts are made to create a Norwegian understanding of the complexity of digital competence in the light of the pedagogical and didactical circumstances in Norway (and probably in the Nordic countries in general). It is quite clear when we deal with the concept digital competence (or digital literacy) it is very often discussed and debated on a macro level both nationally and internationally. With the clear demanding in the curricula concerning ICT, it is quite clear that macro-definitions of digital competence have limited contribution in educational contexts for teachers. Therefore, there is a need in the Norwegian context to develop more specific definitions and theoretical underpinnings for digital competence on a micro level in school and teacher education. Very broadly, one can make a distinction between ordinary citizens’ digital competence in their everyday life (e-mail, social media, Net bank, SMS, etc.), pupils' digital competence in school (subject use of ICT) and teachers/TE’s digital competence (didactic ICT-use) in school/teacher education. This paper deals with the last one: teachers/TE’s digital competence. In an attempt to focus on a micro level and incorporate its implications for the individual teachers/TE’s digital didactic, I suggest a definition to describe the digital competence of the teacher/TE which is attached to digital didactic: 'Digital competence is the teacher/TE’s proficiency in using ICT in a professional context with good didactic judgement and his or her awareness of its implications for learning strategies and the digital Bildung of pupils/students (Krumsvik, 2007b, p. 74). This definition is attached to a model (Figure 1) which visualises this definition of teachers/TE’s digital competence.

Particularly important in this model is the intersection between a ‘mental digital competence journey’ [self-awareness, vertical axis] and a ‘practical competence journey’ [proficiency, horizontal axis]. The theoretical underpinnings for this model are distributed cognition (Hutchins, 1995) and situated learning (Lave & Wenger, 1991). The essence of the model is that cognitive processes are continuously off-loaded to digital artefacts when we are using computers and this kind of learning is situated everywhere in today's digitised society. In this way the computer becomes an ‘intellectual prosthesis’ for each and every one of us because we have access everywhere at any time.

![Figure 1. Teachers/teacher educators’ digital competence (Krumsvik, 2007a).](image)

From this we see that teachers/TE’s digital competence is much more complex than digital literacy in other occupations and among average citizens. This requires an awareness of such complexity and how the digital
didactic will be carried out for teachers/TE’s will very often depend on their digital competence. Therefore, as a summary of this position paper it is necessary to establish a pedagogical framework and didactic content related to teachers/teacher educators’ practices in school if one wishes to incorporate this complex digital competence requirement in the digitised school. The problem with such frameworks, definitions and descriptions is that they lack functionality in practice unless they are operationalized in a teaching context, to secure ecological and construct validity. It is therefore necessary that teachers/teacher educators’ digital competence is clearly linked to digital didactic and thus the different elements of the digital didactic model (Krumsvik & Almås 2009, Krumsvik 2008 a,b,c) are created to prompt teachers/TE to reflect on their own digital competence which takes on board the various key elements contained in this concept. Therefore, the position paper discusses whether such an understanding of digital competence can meet some of the challenges and problems with macro definitions of the concept.

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Some Demands Concerning Digital Development in Teacher Education

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BACKGROUND
Lots of research has already been done in relation to the digital development in schools and in teacher education. Many facts – related to both obstacles and possibilities – are known. My concern here is to bring some questions to the fore, related to a theoretical perspective on communication, teaching and learning.

CHANGES IN COMMUNICATION
A key question for me is that contemporary communication is multimodal. This relates to how facts are presented and information acknowledged, how patterns of global communication have developed, to the enhanced possibilities to produce new information, but also to the role of computer gaming in educational environments. Reading and writing in educational contexts have changed: reading is about understanding for example, both verbal and pictorial information (including moving images, sounds etc.); writing is about designing new texts out of other texts (the role of composition).

TEACHING AND LEARNING
The old (Shannon & Weaver, 1998/1949) view of communication as transformation of a message from a sender to a receiver (basically in technological systems but also a widely used metaphor) can be replaced by a view of individuals as active interpreters of different representations, who select information and then transform this information and design new representations (see for example Selander & Kress, 2010).

Learning is then understood as an active process of engagement and meaning-making by use of modes and media in a sign-making process. To understand learning in this way also has consequences for how we understand cultures of recognition (what is seen as and accepted as learning in a specific knowledge domain) and assessment matrices.

DIGITAL TECHNOLOGY IN RELATION TO TEACHING AND LEARNING
Digital technology seems to be a central device and a driving force for the development of new communication patterns, with consequences for how information is dealt with in educational environments. But as we know, the use of ICT or social media in teacher education (as well as in further education) is still not (at large) well developed.

WHAT ARE THE CHALLENGES?
From the perspective outlined above, some questions seem especially important to address and discuss:

- The development of multimodal documentation techniques as part of qualitative developmental work (understanding that the spoken word is still very important part of teachers’ culture)
- The development of a digitally based mentoring system, allowing for personal contact and the development of reflected, academic ways of reasoning
- How teachers can learn how to help others to learn within the frame of ICT, where students are present in the physical and in the digital space at the same time (which means: how can teachers act, and what are the new strategies, when they lose the traditional control over time, space and information resources?)
- The development of sites for comparative subject-didactics
- The development of a (digitally based) time-space, where reflection is enhanced – thus avoiding being “elsewhere” all the time
- Development of understanding of the (possible) roles of games and gaming in educational environments
- The development of courses allowing discussions of perspectives and interpretations of empirical data,
  - which allows for the training of necessary skills in a playful way (e.g. through gaming)
as well as the work with identity constructions and ethical issues
The use of ICT to come closer to an understanding of students’ signs of learning
The development of new and more adequate assessment systems related to an understanding of the students’ ways of selecting and transforming information

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I Have No Understanding and I Have to Design

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Abstract
In spite of increased interest in game-based learning, the development of educational game design methods has been insignificant. Apparently, this lack has negatively influenced also the quality of published educational games and the diffusion of game based learning in general. Educational games have to be designed properly to incorporate engagement that integrates with educational effectiveness. As a solution, I propose a pattern-based approach that could support the design, analysis and comparison of educational games. Educational game design patterns are descriptions of commonly reoccurring parts of the game design that concern and optimize gameplay from an educational perspective. The overall aim of this contribution is to awaken the educational game community to approach educational game design more structurally and to motivate them to communally create a theoretical, but practical basis for educational game design.

Keywords: Game design, pattern, game, learning, method

INTRODUCTION
In nineteen’s Greg Costikyan (1994) wrote an article “I Have No Words & I Must Design”. Costikyan argued that game designers would need a critical and common language that provides a way to analyze games, to try to understand them, and to understand what works and what makes them interesting. Costikyans wishes have partly become true. Since then a lot of game design books, game design tools and also design methods have been published and created. However, the state of the learning game design field is worse.

As Quinn (2005) argued, educational games have to be designed properly to incorporate engagement that integrates with educational effectiveness – the challenge is to find a balance between gameplay and learning objectives. Thus, there is a need to develop educational game design methods that align these compelling perspectives. The development of such design methods is necessary because nowadays educational game development is usually teamwork involving different experts, such as game designers, content experts, instructional experts, and programmers, to name a few. However, it is common that the multidisciplinary nature of the design teams arouses problems – there are too many chief cooks with their own recipes without having a common language to collaboratively mix the masterpiece. Good educational games just do not get cooked by merely hiring game designers and instructional designers for the game design team. A shared vocabulary and an understanding of how the instructional designers’ and the game designers’ work aligns and synergizes would facilitate the development of high quality educational games.

In this paper, I argue that better educational game design methods need to be created. In fact, I propose a pattern-based design approach to overcome the problems and challenges mentioned above. The overall aim is to awaken the educational game community to approach educational game design more structurally and to motivate them to communally create a theoretical and practical basis for educational game design and game based learning research. I want to stress that much quality research has already been conducted, but it is splinterly in nature. The existing theoretical and practical knowledge has to be collected and organized into such a form that is more usable and understandable, as the entertainment game community have already done (e.g. Björk & Holopainen, 2005; Schell, 2008).

EDUCATIONAL GAME DESIGN PATTERNS
Traditionally, patterns are used as problem-solving tools, but such an approach is not fruitful in game design, as Björk and Holopainen (2005) have argued. Instead, Björk and Holopainen (2005) see game design patterns more like models that provide the means to structure knowledge about gameplay that is applicable to the design and analysis of games. Existing game design patterns provide a good starting point for designing educational games,
but they are not adequate to overcome the integration problem of gameplay and learning objectives and they do not provide ways of supporting learning. Thus, new patterns, truly focusing on educational game design, are needed. Based on Björk’s and Holopainen’s definition, the concept of educational game design pattern is defined as follows: Educational game design patterns are semiformal interdependent descriptions of commonly reoccurring parts of the design of an educational game that concern and optimize gameplay from an educational perspective focusing on the integration of engagement and learning objectives.

Because the educational game design patterns are supposed to be used together with game design patterns, their structure and usage are similar. In fact, the educational game design patterns can be seen as an extension of the game design pattern library. Just like the game design patterns, the educational game design patterns are divided into categories:

- Integration patterns describe solutions that harmoniously integrate game elements and learning objectives with educationally effective, engaging gameplay.
- Cognition patterns describe solutions that trigger reflective and metacognitive processes in players. The main focus is on cognitive feedback that aims to stimulate players to reflect on their experiences, problem-solving strategies, and created solutions in order to further develop their mental models and playing strategies.
- Social interaction patterns are interwoven into cognition patterns. They describe solutions that facilitate learning or teaching (trigger reflective and metacognitive processes) through social activities and socially constructed game elements. This pattern category is not restricted only to direct game activities, but can also include patterns that guide debriefing sessions, for example.
- Presentation patterns describe solutions that decrease the extraneous cognitive load that refers to the processing of information that is not relevant to the learning objectives. It is obvious that in rich game worlds especially, the amount of extraneous cognitive load has to be optimized.
- Engagement patterns describe solutions that motivate players to perform better in a game, facilitate reciprocal learning, and increase playing time.
- Teaching patterns describe solutions that facilitate teacher's work by providing observation, assessment and participation possibilities.

The proposed categories are hierarchical. The integration of learning objectives and gameplay creates the foundation of a game and usually arouses constraints that affect the whole design. Cognition and social interaction patterns stimulate players to process relevant content experienced through gameplay and presentation patterns ensure that the processing of the content is effective. Finally, engagement patterns provide a means of wrapping the whole gaming experience into a meaningful and motivating package.

Furthermore, in order to facilitate the development and use of educational design patterns a pattern template is needed. A pattern template refers to a format that describes how the content of a pattern is presented. It could be reasonable to derive the template from Björk’s and Holopainen’s (2005) work – their template distinguishes six main elements: name, core definition, description, use of the pattern, consequences, and relations.

CONCLUSION

Educational game design is hard to master – one has to understand a complex web comprised of education, psychology, technology, art, business, and creativity. In this paper a pattern-based approach for educational game design was proposed. The aim of the educational game design patterns is to clarify this complex web and its relations – increase understanding about game based learning. However, patterns do not provide any magic bullet for design, but rather they provide common ground for developers, whether they are game designers, instructional experts, graphic designers or programmers, to build their designs on. It is obvious that educational game designers would benefit from a shared and sound vocabulary to name the objects and structures of educational games. However, common vocabulary is not enough – the demand for rules to express how educational game design patterns fit together and can be integrated into existing game design patterns creates a real challenge for the educational game design community. The relations included in patterns may help designers to create an inner blueprint about educational game design, thereby facilitating the development of high quality games and vicariously the diffusion of game-based learning.

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No Map, No Compass: Design Challenges in Mobile Educational Games

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Abstract. This short position paper discusses the core aspects of a design toolkit to support the special needs of mobile educational games. Understanding and designing for learners to cope with the physical aspects and the cognitive learning challenges when navigating, negotiating, sharing, and producing in the different settings is the key focus of the toolkit. By using a design toolkit approach, researchers, designers, and teachers can better address the challenges for game-based mobile learning activities.

Keywords: Mobile Learning, Game-based Learning, Design-based Research, Design Methods

ARTICULATING THE PROBLEM

There is long history of modern educational games in the classroom from the from Froebel’s gifts to Papert’s LOGO and to early computer games such as the Oregon Trail. In today’s classroom, educational games can include powerful mobile devices that mix augmented reality with geocaching and other types of stimulations to engage students (Klopfer, 2008). But, unlike the previous sedentary games, these activities put the learners into the outside world involved in game play. In the current market there is a plethora of location based applications available for mobile phones that engage players by connecting them socially and/or providing layers of information such as Foursquare, Wikitude, and Layars. In the relevant educational market location based mobile activities like Create-A-Scape, OOKL, and Wild Knowledge there is a lack of agreement how to best design games to support learning that takes advantage of the special requirements of physical activity. Furthermore, unlike some of the previous applications mentioned above, these educationally focused games have to support specific learning objectives and this leaves interesting design challenges to be considered that cut across learning, technology, and interaction design.

This short position paper argues that mobile learning games that take in consideration physical activities outside together with learning objectives raise new design challenges. This paper propose that designers (researchers, teachers, etc...) should consider what it means to the learner when navigating the physical and cognitive landscapes in relation to moving and the collaborative actions of the acquisition knowledge when participating in mobile activities. The aim of this paper is to discuss the key components that could support a set of design tools for the special needs in the design of mobile learning activities.

THE PHYSICAL LANDSCAPE, SOCIAL INTERACTIONS, AND COGNITIVE LOADS

The benefits of mobile learning games are that they take place the users’ onsite offering in situ opportunities for learning (Jenkins, 2009). But, when we move away from classroom educational games to the outside we have to become aware of new factors that may affect design. Waller and Johnston (2009) rightfully argued that Heidegger's (1978) analysis of the situated nature of action can be a good starting point for describing the state of being thrown into the world, coping with the present, and projecting new actions towards future learning outcomes. What this means is that learners are absorbed in coping with new situations that they encounter together with the learning objectives of the game, and therefore, the mobile activities need to be designed to support both the physical, social, and cognitive requirements of moving through the playing field outside and the different activities involved in learning. For example, how can we support learning with different mobile devices when the learners are engaged in navigating from one location to another in the heat of competition? Learners must be aware of the landscape to be able to navigate to a specific location yet at the same time being able to participate in cognitive activities like negotiation and agreement about deciphering Roman Numerals or identifying different flora and fauna (Spikol & Milrad, 2008). The crux of this argument is that social and cognitive artifacts are needed...
to support tangible interactions with the world and how this space can be manipulated for future learning goals in tune with the physical landscape.

When considering the design of learning activities to support new media literacies and 21st century skills, such as play, multitasking, distributed cognition, and collective intelligence understanding how to leverage the different modes between physical and cognitive actions become a core requirement (Jenkins, 2009). Designing specific activities for when the learners are moving to specific locations and when they stop to carry out tasks needs to be carefully planned. This paper argues that learners need to cope with physical, social, and cognitive landscapes while moving and paused to learn can be extrapolated to a set of discursive tools to help in the design of these games.

The motivation behind creating these types of tools is grounded on need to extend Design-based research, interaction, and game design to encompass the complexities of realizing educational innovations that combine new mobile technologies with diverse learning skills. Unlike other methods such as: design patterns, narratives, method cards, and guidelines, the concept of creating a design toolkit with a core set of issues to be used by the team to aid in the development of new activities are inspired by innovation toolkits (von Hippel, 2001). The ideas behind innovation toolkits can be summarized as the following: i) to combine the iterative cycles of design within common space familiar to the users, ii) operate with common design language iii) contain libraries for common use, iv) produce usable products and services. The toolkit approach shifts the focus to the design process allowing the different outcomes required from research and product development to in balance. This balance can be used to explore how to best develop games that can take advantage of navigating both the physical, social and cognitive landscape afforded by mobile technologies. Additionally, issues of how learners can create content, reflect, and collaborate in games and in more formal situations can be discussed across the team.

NEW DESIGN APPROACHES FOR GAME INSPIRED MOBILE LEARNING

There is a need in both research and development teams to better understand the nature of game play and learning objectives for activities for mobile activities. The possibility of using a design toolkit that different stakeholders like designers, researchers, and teachers can discuss as team can help overcome some of challenges for mobile educational games. Additionally by supplying quick prototyping tools to realize mobile games along with this set of discursive tools the challenges of mobile educational activities can be addressed. But, the ideas behind the toolkit leave many challenges to be discussed in relation to design methods for supporting physical landscapes with social and cognitive actions. The following questions can be used to further the discussion:

1. What types of design research approaches can be developed to support mobile computing that take in consideration the different physical landscapes that include social and cognitive actions for learning?
2. How can different aspects of game play be better designed and utilized for mobile learning?

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Eye-Tracking in Game-Based Learning Research

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Abstract
In this paper, game-based learning processes are studied using eye-tracking methods. Based on perceptual data, we evaluated the effectiveness of cognitive feedback and identified game elements that hinder learning. The results indicated that the sooner the player grasps the meaning of cognitive feedback, the better they can play the game. The signaling method should be used strongly enough to highlight all the necessary game elements. On the other hand, extraneous elements should be eliminated from the game world to avoid incidental processing in crucial moments. Overall, eye-tracking can provide important information from game-based learning processes and game designs, but it should be completed with offline methods.

Keywords: Eye-tracking, learning, game, game design, reflection

INTRODUCTION
In educational games, learners are challenged to extract relevant information from a game world, select corresponding parts of information, and integrate all of these elements into a coherent representation. This requires a lot from the player, because the game world changes during playing, important information may be presented only a while, and thus it needs to be kept active in working memory in order to integrate it to earlier presented information and relate it to one’s actions. Furthermore, because the game worlds are usually very media rich, the learning process may easily impose too high cognitive load in learners' cognitive systems and hinder learning. Thus, it is important to consider carefully how educational game worlds are implemented.

The greatest challenge of educational game design is to implement the sorts of game elements that trigger reflection during gameplay (Ketamo & Kiili, 2010). Thus, this study focuses on cognitive feedback that can be used to trigger reflection during playing. The eye-tracking and retrospective interview methods are used to study how the cognitive feedback affects the game-based learning process. The AnimalClass series’ European Geography game is used as a test bed. In the game, a player teaches a virtual pet, a teachable agent, which can reason, based on how it is taught. Previous studies on games involving teachable agents have provided clear evidence of learning gains (e.g., Ketamo & Kiili, 2010). Basically, we know that teachable agent approach works, but we do not know exactly how it works. Thus, the current research is designed to take a closer look at the learning process focusing on players’ perceptual processes during playing.

METHOD

Participants and materials
Participants were 11 to 12 years old Finnish primary school pupils (N=16). Almost all participants (14/16) had played the geography game before and thus they knew how the game works. Figure 1 shows the user interface of a classroom where players teach their agents. To facilitate reflection and learning, AnimalClass games provide cognitive feedback for the player in several ways. This study focuses on agent’s brains and gestures. The size of the brain icon describes the quality of the agent’s conceptual structure compared to formal goals. Agent’s brains get bigger if agent’s knowledge increases and smaller if knowledge decreases. Agent’s gestures illustrate the certainty of its knowledge. Gestures are used, when the agent answers to questions made by the player. Three levels of certainty are included: Guessing, reasoning, and knowing. The certainty is based on the beliefs of the agent and it is not determined based on facts. Thus, the meaning of the brains is emphasized.
Procedure

The participants were tested one by one. First, the participant answered for four background questions. Second, the eye-tracker was calibrated and the participant started playing - participant was asked only to teach the octopus not to compete, although this was possible. Participant played the game approximately 5 minutes. After the playing phase retrospective interview phase was followed. In practice the researcher and the participant watched a replay of the recorded gaming session with gaze plots. The meaning of the gaze plots was told to the participant. The researcher stopped the recording in crucial places and laid questions to the participant. For example, do you know what the bird’s gestures mean? Did you notice the brains? Etc.

RESULTS AND DISCUSSION

The results indicated that players’ perception patterns varied a lot and some players even missed relevant information during playing. It seems that what sooner the player notices the cognitive feedback and grasps it meaning that better (effectively) they can play the game ($r = .46$, $p = .049$). Designers should ensure that players perceive all crucial elements, so that they can develop effective playing strategies. The signaling method should be used strongly enough to highlight all the necessary elements, for example cognitive feedback. In tested AnimalClass games the changes in brain size should be emphasized more and the brains could be also located nearer the pet’s head, because players tend to focus on pets’ gestures. Furthermore, the results showed that extraneous elements should be eliminated from the game world in order to avoid incidental processing in crucial moments. Every element in the game world has it cognitive price and its necessity should be considered. In fact, the earlier research has shown that multimedia presentations are more effective when irrelevant material is excluded (e.g. Mayer & Moreno, 2003). In rich game environments incidental processing may overload a player’s mind and disturb learning.

Overall, it seems that eye-tracking can provide important information from game based learning process. However, we have to remember that we cannot be ultimately sure whether we have interpreted the gaze plots validly or not. Thus, although the eye-tracking seems to provide new and important information about players’ perceptual and other cognitive processes, it needs to be complemented with other methods. In this study, we used retrospective interview as a complementary method that turned out to be very useful and increased the validity of the results. Without the complementary method, we would have not realized that although players paid attention for example on pets’ gestures they did not always understand the meaning of them. To conclude, eye-tracking seems to provide an interesting and effective tool for game designers and researchers to evaluate games from such a new perspective that is not possible with other methods. Eye-tracking could be used to reveal for example how learning happens in games, what kind of game elements can be used to enhance learning, how to focus players attention to important things, how to avoid evaluation gulfs etc. Such knowledge could help educational game designers to develop higher quality educational games and thus more research on this new topic should be conducted.

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Building Cultural Identity: 
Accessing Cultural Heritage Through Mobile Media

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Abstract
Libraries, museums and galleries are repositories of huge cultural heritage which when made accessible through digitisation and organised in databases become educational resources. The digitisation of the cultural heritage is a powerful resource that is becoming available for national and European identity projects. Digitalised cultural heritage materials become keystones for new learning activities and enhance intercultural understanding by adding a European dimension to education. Furthermore, making these resources accessible via mobile media bring them out of the classroom and integrate them in ongoing informal learning processes.

Keywords: Digital cultural heritage, learning repositories, learning activities, mobile-learning.

SHIFTING THE FOCUS FROM LEARNING CONTENT TO LEARNING ACTIVITIES

From a classical e-learning content point of view digitalised cultural heritage materials would not be considered as learning objects or educational resources before they have undergone a pedagogical adaptation. However, learning is not within the content. Learning takes place within the learner as a result of what he or she does with the content. Learning resources only become active in the learning process when the learner is doing something useful with them. Therefore the creation of relevant learning activities becomes essential. Successful learning activities mobilise the capacities (present knowledge, cultural heritage, etc.) of learners and establish a dialogue with the new learning resource as the basis for learning. Hereby teachers and tutors are reinstalled in a position as responsible for organising the learning process. S/he is choosing relevant learning resources and creating learning activities needed in order to reach defined educational objectives (Bang 2006).

My point is not to diminish achievements of the learning object concept, but to question the concept of learning incorporated through the use of instructional design theory: “Instructional design is based on the empiric assumption that behaviour is predictable, and that educational design, therefore, can occur in isolation from educational execution.” (Koper, 2000 p.14), but “(…) a lot of learning does not come from knowledge resources at all, but stems from the activities of learners solving problems, interacting with real devices, interacting in their social and work situation (…) it is the activities of the learners into the learning environment, which are accountable for the learning.” (Koper, 2001 p.3).

A dialectic relationship exists between learning activities and learning content, and the basic learning activity on which other activities build, is a dialogue between the learner and the learning material. Therefore any adaptation of learning material to enhance this dialogue become essential, in parallel with creation of new tools for interacting with the learning material and collaboration between peers. Lately OLCOS (Open eLearning Content Observatory Services) has predicted this development in their visionary ‘Roadmap 2012’:

"The current dominant paradigm of teacher- and subject-centred learning in formal education will have given way to a learner-centred, competency-based paradigm. In particular, learning communities and collaborative approaches will flourish, making use of a new generation of easy-to-use Web-based tools and information services (e.g. Wikis for collaborative work on study projects, Weblogs for sharing ideas and comments, RSS feeders and aggregators for receiving current “real world” information, etc.). (...) Open and easy access to e-content repositories of academic and educational institutions, public sector information agencies, libraries, museums and other cultural institutions will allow for making use of information sources as needed to carry out creative projects and study work.” (OLCOS, 2007 p.117)

By shifting the focus from learning content to learning activities in the symbiotic relation between the two, educational technologies for collaboration, sharing and knowledge construction become more important than technologies for distribution, dissemination and knowledge transfer. Focus is on content and the ways content is turned into knowledge via the activities of interaction, communication, collaboration, and construction. This process is very dependent on the social and cultural environments in which it is embedded.
BRIDGING FORMAL, INFORMAL AND NON-FORMAL LEARNING THROUGH MOBILE LEARNING

The OECD report ‘E-Learning. The Partnership Challenge’ expressed and documented a clear scepticism toward a ‘technology driven’ approach to education and learning: “Technology alone does not deliver educational success. It only becomes valuable in education if learners and teachers can do something useful with it.” (OECD, 2001 p. 24). Some years later another OECD report ‘E-learning in Tertiary Education. Where do we stand?’ elaborated on the same problem: “The current immaturity of online learning is demonstrated by low adoption of content management systems (…). ICT has penetrated tertiary education, but has had more impact on administrative services (e.g. admissions, registration, fee payment, purchasing) than on the pedagogic fundamentals of the classroom.” (OECD, 2005 p. 14-15). Therefore, the challenge is to create learning options that enhance learning by increasing flexibility, by offering tools for collaboration and by creating options for interaction with large-scale multi-medial learning resources – such as the digitalised cultural heritage.

Future learning environments should bridge the gap between formal, informal and non-formal learning with a focus on enhancing knowledge acquisition and sharing independently of whether the provider is an educational institution, a museum and library or a mass media. Web 2.0 offers clear opportunities for moving in this direction, but so do analytical tools for annotation and segmentation. Interestingly enough the evaluation of the open educational resources initiative initiated by the Hewlett Foundation ‘A Review of the Open Educational Resources (OER) Movement: Achievements, Challenges, and New Opportunities’ points towards the need for an open participatory learning infrastructure (OPLI) to fulfil the ambitions of the open educational resource movement:

“The next phase is to nurture a culture of learning in which both intellectual capital (content) and human capital (talent) spiral upward, together. The conditions now exist, we believe, to consolidate understanding, technology, and incentive from multiple threads of activity into an open participatory learning infrastructure (OPLI). (…) This perspective is consistent with collaboratories in science and humanities communities and the social software and the Web 2.0 movement more generally.” (Atkins a.o., 2007 p.6)

The mobile phone (the smart phone) with all its different communication devises offers the possibility of bridging formal, informal and non-formal learning. The uniqueness of the mobile phone is its availability - always at hand (appropriately called a “handy” in German) - in combination with its different communication facilities including almost unlimited access to stored resources and position marking. In the near future mobile technologies with built-in GPS devises will make information available everywhere as both ‘pull’ and ‘push’ services. As we move around in the countryside, in the city or in institutions we will have access to the information we want – just-in-time, just-in-place. Resources from libraries, museums and galleries - digitalised and organised in databases – in combination with user generated content may be available to enhance our experiences and our learning becomes educational resources. As we explore the pedagogical potential of mobile learning we may find our selves on the doorstep of a new enlightenment era. The danger is the digital divide following the law of Matthew: "For everyone who has will be given more, and he will have an abundance. Whoever does not have, even what he has will be taken from him.” (Matthew 25:29)

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Learning in Coupled Contexts

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Learning is one thing. A quite different matter is to use whatever learned when the situation of use has changed from the original learning context. Learning is to some extent always situated and this is a challenge for formal education in that education typically is trying to generate learning for external purposes: for use outside the educational institution. This challenge is known as the problem with transfer – how to transfer the learned from the teaching environment to the situation of use as in the work place for instance?

Basically, there have been two stances to take in the discussion of the challenge with transfer. One stance is to regard the challenge to be a matter of organisation. Transfer will take place if the educational institution as well as the receiving organisation knows the obstacles with transfer and take the right precautions. Transfer is thus seen as a technical problem that can be solved by organisational means. The other stance claims that all learning is situational and that transfer is impossible due to the differences between the two contexts – the education and the workplace. I will, however, claim that transfer is impossible unless transfer is seen as transformation. Learning is not something in its own right and is not to be understood as an abstract entity within the human mental repository. Learning occurs and expresses itself in the way in which activities are carried out in a certain context. Learning occurs when former experiences are transformed when one is trying to cope with a new situation. Learning has to be understood as a re-construction of former experiences when people are participating in common activities. Re-construction is here understood as a construction anew with the material of (former) experiences. Or as I suggest: a transformation of the learned.

The position taken in this presentation is twofold.

1. From a theoretical point of view the transfer problem is better understood from a pragmatic position, which means that although all learning might be situational the learner will always transform the learned into the new context. There will never be a 1:1 translation of the learned. But in a working situation (or any situation for that matter) the individual will use a strategy of meaning making. S/He will try to make sense of the situation at hand from the already known and, hence, interpret the known in this new context. Thereby the learner also has to see the learned from the perspective of its usefulness in the immediate context.

2. One way pragmatically to take issue with the transfer problem on the organisational level is to create coupling points between the different contexts. Coupling of two or more contexts creates a space between the contexts where the discourses of the separate contexts will mutually influence each other and thereby strengthen the capacity of the learner to translate between them. Possibly a shared space for collaboration will make the both contexts better understand each other, which is to say that it will increase their abilities to make useful inferences of what is going on in the other context. (See Figure 1)

Figure 1. A shared space for collaboration
The theoretical stance is supported by pragmatic learning theory as it is expressed among others by Jack Mezirow: “Learning is understood as the process of using a prior interpretation to construe a new or revised interpretation of the meaning of one’s experience as a guide to future action.” (Mezirow 2000 p.5) Mezirow and his associates has developed an understanding of learning that is grounded in the theory of communities of practice and situated learning as it is expressed by Jean Lave and Etienne Wenger.

The organisational stance and the model is partly grounded in field studies as part of a research and development project targeted to develop new concepts for digital enhanced competence development for SME’s in outer areas in Denmark. The model is generic but it is obvious to see digital media as an technology that will suite fit for facilitating the coupling of context. In the ELYK project (E-Learning, Outer Regions and Competence Development) we are working with this kind of coupling of contexts for vocational training.

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A Model for Planning the Archiving and Distribution of Educational Podcasts

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Abstract
Given the rising popularity of educational podcasts, the ease of producing them, and the proliferation of uses, a need is growing for establishing norms for what types of products universities will encourage and for deciding how to archive and distribute as formal or informal publications podcast productions developed for various purposes. This paper examines existing podcast taxonomies, and drawing on them outlines a simple communication model that may be used to inform decisions on how and where to register, store and distribute the growing number of podcasts produced by the institution, by its faculty, and by students.

Keywords: podcast, taxonomy, communication model, storing and distributing podcasts

INTRODUCTION
Posting digital media files (“podcasts”) on the Internet has become a powerful and popular means of disseminating scholarly information. Given the increasing availability of Wi-Fi and 3G wireless technologies and the proliferation of many kinds of handheld devices, audio-visual mobile learning is gaining momentum. Only imagination sets limits for the number of different uses, and practically everyone is a potential contributor. In a literature review, this author has dealt with typical educational uses of podcast technology as well as the documented efficacy of them (Heilesen, 2010). This position paper approaches the subject of podcasts from an organisational perspective, discussing ways of distinguishing podcast types.

Developing a useful taxonomy serves a double purpose. Firstly, in planning a production it is important to know what “genre” to work with – it may even encourage breaking conventions and developing new uses of podcasts. Secondly, it may help university administrators (libraries and e-learning units) decide how and where to archive and to register a podcast – does it belong in the library repository or iTunes as a product branding the institution and as a service to the public? Should it go into some local repository for easy reuse, but not for formal publication? Should it be left in the LMS for informal use, but not be registered? Would it be better to upload it to a public repository like YouTube? Etc.

TYPOLOGIES
Vogele and Gard (2006) distinguish three categories of administrative podcasts (e.g. general information, guides), special lecture series (guest lectures, commencement lectures, etc.), and classroom podcasts (anything involving curriculum teaching). Divisions between administrative and teaching podcasts are frequently found in podcast-repositories, notably in iTunes U, where “teaching” normally is subdivided according to discipline, simplifying the task of browsing for a podcast.

Rosell-Aguilar (2007) omits the administrative side. Focusing on language learning, his top-level distinction is between existing resources (authentic material and language courses) and self-developed resources (by teacher or student). This taxonomy was adapted by Hew (2009), who downplays the role of existing resources, but further distinguishes between lectures and supplementary materials produced by teachers (and in addition projects done by students). McGarr (2009) independently has arrived at a rather similar taxonomy of substitutional podcasts (documenting or substituting classroom teaching), supplementary podcasts (providing summaries of classroom teaching or additional materials), and creative podcasts (productions by learners).

Finally, Carvalho, Aguilar, & Maciel (2009) have proposed a taxonomy based on a combination of type, medium, length, author, style, and purpose. Although this model may be too fine-grained to be used for practical purposes, some of the categories are useful, in particular type (Informative, Feedback/Comments, Guidelines, Authentic materials) and purpose (inform, analyze, develop, motivate, mediate for reflective learning, and more).
THE COMMUNICATION ASPECT

All of the taxonomies mentioned deal with actors and uses in the learning environment. But only Carvalho, Aguiar & Maciel (2009) go into some detail of how podcasts serve as communication products. More practical considerations of that nature are provided by guides for producing and delivering podcasts, notably the IMPALA Podcast Development Model (Salmon & Edirisingha, 2008) which outlines how to plan the production in terms of purpose, target group, distribution, and more.

However, the communication aspect is quite important both in terms of planning productions and in deciding how to distribute and how to archive podcast products. Developing a simple communication model, drawing on existing taxonomies is still work in progress, but it is likely to require the following elements:

**Senders** of podcasts include teachers, students, and (various levels of) university administrators. The **audience** for podcasts consists of teachers, students, administrators, and the general public. **Products** can be (planned) productions or documentation (of activities). **Productions** include (notably) feedback, guides, presentations, teaching materials. **Documentation** include (notably) processes and performances. **Scope** can be institutional or public.

Given these few concepts, it is possible to characterise a wide range of podcast products, and these characterisations may be used to inform decisions on how and where to register, archive and distribute productions. Consider the following general examples:

<table>
<thead>
<tr>
<th>Sender</th>
<th>Audience</th>
<th>Product</th>
<th>Scope</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrator</td>
<td>General public</td>
<td>Pro. guide</td>
<td>Public</td>
<td>Promotion</td>
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<tr>
<td>Teacher</td>
<td>General public</td>
<td>Pro. presentation</td>
<td>Public</td>
<td>Lecture, CV</td>
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<tr>
<td>Student</td>
<td>General public</td>
<td>Pro. presentation</td>
<td>Public</td>
<td>Report, CV</td>
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<td>Administrator</td>
<td>Teacher, stud., admin.</td>
<td>Pro. guide</td>
<td>Institution</td>
<td>Instructions</td>
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<td>Teacher</td>
<td>Student</td>
<td>Pro. presentation</td>
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<td>Student</td>
<td>Pro. teaching mat.</td>
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<td>Case</td>
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<td>Teacher</td>
<td>Student</td>
<td>Pro. feedback</td>
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<td>Evaluation</td>
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<td>Pro. guide</td>
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<td>Pro. presentation</td>
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<td>Assignment</td>
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<td>Student</td>
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<td>Teacher</td>
<td>Student</td>
<td>Doc. process</td>
<td>Institution</td>
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<td>Teacher</td>
<td>Doc. performance</td>
<td>Institution</td>
<td>Supervision</td>
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<tr>
<td>Student</td>
<td>Student</td>
<td>Doc. process</td>
<td>Institution</td>
<td>Meeting</td>
</tr>
<tr>
<td>Student</td>
<td>Teacher</td>
<td>Doc. performance</td>
<td>Institution</td>
<td>Real time project</td>
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Young People Using Digital Media for Multimodal Expression and Reflection

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Abstract
The theoretical discussion in this position paper is based on an ongoing research project (UNGMODs · http://mt.sh.se/UNGMODs) focusing on how young people (13 to 17 years old) use ICT in formal and informal everyday learning situations, and how multimodal expression support the learners critical reflection on learning, knowledge development and self development. This position paper introduces a theoretical frame work that tries to relate (i) knowledge development and human agency, (ii) the relation between humans and non-humans, and (iii) respecting the great variations in use of ICT.

Keywords: multimodal expression, youth, agency, knowledge development

THE SETTING
This position paper is based on an ongoing research project named UNGMODs, or Young people and multimodal expression -how digital media can be used for expression and reflection (Ungas multimodala gestaltning -hur digitala media kan användas för uttryck och reflektion · http://mt.sh.se/UNGMODs). This three year projected is founded by the Knowledge Foundation (KK-stiftelsen), based at Södertörn university and will continue until spring 2012. The aim of the project is to study how young people (13 to 17 years old) use ICT in formal and informal everyday learning situations, focusing on how multimodal expression support the learners critical reflection on learning, knowledge development and self development. Partners in this project are students from two classes (junior high [högstadiet] and upper secondary [gymnasiet]) in two different southern Stockholm schools (Broängsskolan and Tumba gymnasium). With "multimodal" we propose the extended notion of "text", also encompassing image, sound, moving image, etc. and the different combinations between them made possible by digital technology. My thoughts in this position paper present the contours of a theoretical framework for (i) knowledge development and human agency, (ii) the relation between humans and non-humans, and (iii) respecting the great variations in use of ICT.

HUMAN AGENCY AND ARTEFACTS
The conditions for human experience, thought and knowledge development are intertwined with the medias (in the broad McLuhanian sense), and more specifically with the current development of digital medias. This cyborgian understanding of the conditions for humans as presented by Donna Haraway (1991) -that the human and the conditions for humans are intimately intertwined with (digital) artefacts/technology -are in a sense old news when it comes to the pedagogical practice. The essence of the pedagogical practice is, as I would like to argue, to extend the possibilities of the human (pupil/student) by appropriating the tools that are of central importance in the contemporary society. Theoretically Vygotsky (1978) has offered an important theoretical framework for how to understand different kinds of tools or artefacts, them being psychological (or mental) or physical. Both being, again using the vocabulary of McLuhan, "extensions of our consciousness" creating new or more developed ways of relating to phenomena in the world, for the conditions for human agency and personal competences/abilities. More developed shall here be understood in the neutral sense, as it is related to a more advanced technology -if this development is for better or worse, supportive or obstructive, is a matter (I think) of opinion/perspective. Still, the ambition with the pedagogical practice is to support the subject into better life conditions by way of appropriating different kinds of tools.

Understood in this way, the pedagogical practice is in essence concerned with the appropriation of tools such as on the one hand the alphabet, arithmetic, reading and principles of reasoning or critical review, and on the other hand (proper) use of tools for writing, the abacus, and different more or less specialised tools used in different practices (such as in the handicraft subjects). The overarching principle behind this is, again, the assumption so clearly found in the socio-cultural theoretical tradition that there is a close relation between cognitive development and the use of tools.
So, on the one hand, there is a close intertwining of the conditions of humans and the development of digital technology, and on the other hand humans act, reflect and create meaning of experiences as they appropriate this technology. Based in the traditions of pedagogical research (or educology), I find it hard to embrace the theoretical assumptions behind i.e. actor network theory. The reason is quite simple; I believe that the human being is an active intentional cognitive meaning-making symbolic interpretational subjects. Or, in other words, humans make meaning.

HETEROGONIEOUS MEANING MAKING

Inspired by the critical cyborg theory, coupled with a firm base in socio-cultural theoretical tradition, I see Alan Prout (2005) and Karen Barad (2008) as two inspiring theoretical developments in relation to children and their use and meaning making of digital media. Prout going from the childhood sociological understanding of children as human beings, as in contrast to human becomings (which was an important critical contribution by the childhood sociology 20 years earlier in forwarding the position of children), to discussing how children are both. This is in a society where there are no longer any clear demarcation lines between being and becoming, or between humans and technology. Or, in other words, Prout calls for a new understanding of the position of the child in a culture where digital media support new forms of interaction, cognitive development and agency. And it is here, at the intersection between humans and non-humans, where I think Barad offers an interesting way of conceptualising at the same time the intertwining and human agency. Both are important as they make up the context, but it is the human who is the interpreting subject.

A very important consequence of the reasoning of Barad (2008), is that humans are affected rather than effected by their encounter with non-humans. And hence, that meaning as it is created is both inspired by and immersed in a specific social, cultural and historical setting, and at the same time a personal or subjective (temporal) construct based on personal experiences.

This indicates that every interpretation of phenomena in world are inseparable from heteronormative power structures. In relation to children using digital media (ubiquitous, plastic, participatory, etc.), each and every individual can develop hers or his personal uses of artefacts already imprinted with i.e. gender, ethnicity, age, class, and so on. In a strive of acknowledging non-traditional forms of usage and knowledge (c.f. Miller, 2005) a socio-cultural perspective on development can be complemented with intersectional theory (Lykke, 2003; McCall, 2005; de los Reyes & Mulinari, 2005) making it possible to critically study the complex heteronormative power structures of the learning situation, and how it influences the conditions for learning and meaning making.

REFERENCES

Writing to Learn in a Digital Environment

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Abstract
This position paper introduces the concept of Writing to Learn. Taking a pilot study (from 2010) as a starting point, I would like to discuss if, and how, digital learning and writing tools shape students academic writing within a distance course at Stockholm University. The study is part of the project “WIDE – Writing to Learn in a Digital Environment” which focus is to on how to develop literacy and writing practices within an educational context. The pilot study consists of interviews with students and teachers and a minor text material (student texts and course information). I’d also like to discuss what it means to write academically and the teacher’s role as “scaffolder”, when the main part of the learning and writing takes place on distance, with no supporting oral seminars or discussions.

Keywords: writing to learn, academic writing, digital literacy, genre competence

INTRODUCTION

The project “Writing to learn through digital medias” aims to contribute to an understanding of literacy aspect on the use of digital learning platforms in higher education, and is focused on how to develop literacy and writing practices within the educational context. The project Writing to learn through digital medias will investigate in which ways digital tools are used by students and teachers. In particular, it concentrates on learning platforms / environments used for asynchronous digital discussions or argumentations and similar activities. The more specific goal is to explore and analyze how students use digital writing for learning purposes: What and how do students write in a academic, digital mediated, writing context, and does this affect their learning?

PILOT STUDY SPRING 2010

In spring 2010 a minor pilot study was conducted on a distance course in Criminology at Stockholm University. The main material consists of interviews, and a smaller amount of text samples was collected. Taking this pilot as a starting point, I’d like to discuss how and when teachers use digital writing as a pedagogic tool and how students cope with the assignments. The interviews showed that students were fairly pleased with the form of discussions through writing. They also had a more or less clear picture of the demands regarding writing academically, through different texts and course material on for example academic writing and what the teachers called academic / scientific approach to the subject of learning. Some of the students were familiar with writing academically but no one had written digital discussions before.

The writing assignments can be seen as a couple “steps” from a more personal, social oriented text towards the more traditional academic text (the essay or paper). The students write literature oriented “study blog” in a form of digital group discussion, the so-called “learning dialogue” also in a digital discussion, form and finally the essay, with the teacher as its only reader. Drawing on Coffin & Hewings (2006), learning and writing academically go hand in hand, and one way to learn is simply to discuss, orally or in writing, in order to shape one’s argumentation (Coffin & Hewings, 2006; Lea 2001).

I would like to discuss if and how the digital tool, in this case a digital learning platform, shape or influence the writing within the course. The students in my pilot study didn’t pay that much attention to questions on the digital tool, but some findings give in hand that the tool both offered “help” in dealing with the content and narrow or limit the students opportunities to write as they wanted. I’d also like to discuss the teacher’s role, in scaffolding the students learning and writing, in this distance, digital mediated course (Delfino & Persico 2007, Wertch 1998).
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Campus Student Perceptions of Using Social Media to Support Their Studies: Towards Uncovering Myths and Realities

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Abstract  
The social media hype has created a lot of speculation among educators on how these media can be used to support learning. In this paper, initial result is presented from a study of campus student perceptions of using social media to support their studies. Although a vast majority of the respondents frequently use social media, few of them feel that they use such media to support their studies. The students mainly use instant messaging to communicate with other students and e-mail for sharing documents and contacting teachers. They use social media for coordinating project work and asking brief questions. Few mentioned that they use Facebook, Wikipedia, YouTube and other popular social media for educational purposes.

Keywords: social media, online learning, higher education.

INTRODUCTION

It is well agreed upon that most learning take place outside school in our everyday lives (Bowden & Martin, 1998). Student motivation and learning often stems from communal or informal support mechanisms (Brown, 1985). Lamport (1993) argued, based on a literature review, that informal interaction in peer groups and with faculty is the primary source of student satisfaction in education. On campuses, there are common spaces such as hallways, lounges and cafés, which support informal learning better than classrooms or lecture-halls (Nicholson, 2002).

Veen and Vrakking (2007) use the concept “Homo Zappiens” when arguing that we need a new education system because technology has dramatically changed the way future students of higher education live and learn. Although most would agree that emerging technologies, such as social media, support learning in new ways, we still now little about how students currently use social media to support learning and how students and teachers can take benefit of social media to support educational learning. We believe it is time to move forward from saying that “students learn in new ways” towards trying to understand the complex relationship between social media and student learning. In this paper, we present initial results from a study of campus student perceptions of using social media to support their studies. The study has been conducted from the perspective of students, in order to gain a better understanding of how to take advantage of social media to support teaching and learning in the future.

PRELIMINARY RESULTS

We interviewed 20 students in different subject disciplines at Uppsala University. Ten of these were graduate students. Eleven of the interviewees were male and nine were female. The face-to-face interviews, conducted in English, were supported by an interview guide. Each interview took approximately 20 minutes.

All but one interviewee use social media frequently and all of them use the formal learning management system provided by the university frequently. However, the use of social media is not so related to their studies but more for personal communications. According to many students, the relevance of social media to academic purposes varies and specially increases during the examination periods or near project deadlines. Notably, more or less all students put forth being able to communicate and collaborate anytime, anywhere as the key benefit of social media, which is consistent with previous studies of online media (e.g. Kearsley, 1995).

By drawing on the interview results, we identified three groups of students, depending on how much they perceived using social media to support their studies: frequent users (n=5), medium users (n=7) and infrequent users (n=8). Although all but one of the students used social media frequently, merely a quarter of them used such
media frequently to support their studies. When comparing mean ages of the three groups, all of them had a mean age of 24–26 years. The only pattern we could discern was that computer science and human-computer interaction students seem to either be frequent or infrequent users of social media. They have the technical competence to use such media, but seem to make an active choice in whether to use such media for academic purposes or not.

In the frequent user group (n=5), most respondents believe that social media cannot be as interactive and effective as face-to-face contact, leading to problems such as misunderstanding, and less knowledge sharing and creative thinking. One interviewee also mentioned that separating personal life from academic studies is difficult. All of the students in the group used instant messaging tools for communication and all but one student used e-mail to share documents. Two of the students used Facebook to locate students they did not previously know and to create groups. Two of the students mentioned Google doc and Google groups for student collaboration. Making closed groups in social networks can help students to arrange group meetings, sharing ideas or the latest version of the documents, and giving feedback on each other’s work. Finally, one computer science student mentioned the use of YouTube for video tutorials. Interestingly, none of these students seemed to use social media to communicate with their teachers.

In the medium user group (n=7), the students also put forth that there might be less collaboration and creativity when students “stay at home”. Student mentioned that they do different parts of an assignment and send their works to others by social media. All of the students use instant messaging and all but one use e-mail in similar ways as the frequent users groups. Two of the students mentioned using Facebook to find students and another mentioned Wikipedia and YouTube to access contents. One interviewee mentioned that the fact that some students use different platforms make collaborations difficult. One of the students mentioned using e-mail to communicate with teachers.

In the infrequent user group (n=8), all but one used social media frequently for private purposes but rarely to support their studies. Five of them worried about relying too much on internet sources, which they argued could lead to less creative and innovative thinking, and less spontaneous contact. Another student felt it was easy to get distracted. Four of them mentioned e-mail to communicate and share documents with students and two used it to communicate with teachers. Four students used instant messaging tools to communicate with students. One student mentioned Facebook to find students and another one mentioned Wikipedia.

PRELIMINARY CONCLUSIONS

One might expect that students frequently use social media to support their studies because it is a central part of their lives. However, only a quarter of the interviewed students used social media frequently for educational purposes. A vast majority of the students used instant messaging for communication with peers and most used e-mail for sharing documents. Two of the frequent users of social media for educational purposes also used such media to create closed groups for collaborating and sharing documents. Notably, the teachers are not part of the coordination that is mediated by social media, although they seem successful in promoting the use of the formal learning management system. Wikipedia and YouTube were used to some extent, but the students used these for retrieving content rather than collaboratively creating content.

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Mindtools and Learning Strategies for Mobile and Ubiquitous Learning

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Abstract
Several scholars have indicated the importance of providing a learning environment that can assist individual students to learn in an authentic environment. To investigate the possible tutoring strategies and learning activity models by applying Mindtools in a context-aware ubiquitous learning environment, a four-year project has been funded by the National Science Council of Taiwan since 2008. The project includes the development of learning environments, Mindtools, situated learning models, assessment models, learning diagnosis and guidance models, digital content and reflection strategies for ubiquitous learning. In this paper, we introduce the aims and goals of this project, along with a presentation of the research design and the achievements of the project.

Keywords: mobile and ubiquitous learning, Mindtools, science education, situated learning

INTRODUCTION
This study aims to create innovative Mindtools, develop appropriate instructional models and learning strategies, and properly use e-learning resources in authentic learning contexts. A Mindtool is a computer-based tool or a learning environment that serves as an extension of the mind. Jonassen (1999, p 9) described Mindtools as “a way of using a computer application program to engage learners in constructive, higher-order, critical thinking about the subjects they are studying”. A four-year national e-learning project has been initiated in Taiwan to support this study. It consists of five sub-projects: “Development of context-aware ubiquitous learning environments and Mindtools”, “Development of a dynamic assessment model for employing Mindtools in a context-aware u-learning environment”, “Development of a learning diagnosis and guidance model for employing Mindtools in a context-aware u-learning environment”, “Technology acceptance model for employing Mindtools in a context-aware u-learning environment” and “Development of digital content and learning activities for science courses for employing Mindtools in a context-aware u-learning environment”.

MINDTOOLS FOR UBQUITOUS LEARNING
The u-learning activities are conducted by setting up wireless communication networks in a real-world learning environment (e.g., the butterfly ecology garden), in which an RFID (Radio Frequency Identification) tag is installed on each target-learning object (e.g., each butterfly host plant). This kind of learning strategy has been called “context-aware ubiquitous learning” (u-learning) (Hwang et al., 2008). It not only supports learners with an alternative way to deal with problems in the real world, but also enables the learning system to more actively interact with the learners (Chiou et al., 2010; Chu et al., 2010; Hwang et al., 2010). While learning in the butterfly garden, each student holds a PDA (Personal Digital Assistant) equipped with an RFID reader and wireless communication facility to interact with the learning system and invoke the Mindtool. With the help of the RFID technology, the learning system is able to detect the location of the students and guide them to find the target objects to be observed during the learning process. When the students have arrived at the location of the target objects, the PDA learning system will show the learning tasks or related learning materials to the students (as shown in Figure 1). The students then start to observe the learning objects with the provided Mindtools.
Among the existing Mindtools, concept maps have been recognized as being an effective tool for assisting students for representing conceptual knowledge structures. Furthermore, concept maps can also be a visualized cognitive tool supported by computer system. In this study, a Mindtool originating from concept maps, CMM cul (Concept Map-oriented Mindtool for Collaborative U-Learning), is developed to assist students to cooperatively develop their concept maps. The concept map editing functions of CMM cul are provided by invoking the CmapTools developed by the Institute for Human and Machine Cognition (IHMC) of the Florida University System (Novak & Cañas, 2006).

PROJECT PERFORMANCE AND FUTURE WORK

In the first year (August 1st, 2008 to July 31st, 2009), the research team conducted 31 u-learning activities to try out the learning system, Mindtools, learning models and strategies, evaluation scales, and the design of learning content and activities. The learning experiments were conducted in several ecology areas in Tainan County. The subject matter mainly focused on natural science, but also extended to the social sciences, technology, and language learning. The total number of participants involved to date has reached 1,549 students. All of these experiments included experimental groups and control groups; moreover, the pre-and post-test results were analyzed to evaluate the effectiveness of our approach. Experimental results show that those Mindtools and u-learning strategies not only significantly promote the learning motivations, but also improve the learning achievements of the students. So far, the research team has published about 50 research papers, including 16 in SSCI journals. Now, we are planning to apply the Mindtools to several science inquiry-based u-learning activities and cooperative u-learning activities. Moreover, new u-learning tools will be employed via the cooperation with other research teams, such as Prof. Milrad’s team in Linnaeus University, Sweden.

ACKNOWLEDGMENTS

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How to Learn Adaptive Expertise: Perspective to Playfulness

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Abstract
We educate experts in learning and educational technology (LET), and the students are supposed to be experts in work life. Our two previous studies suggest that environments in work life are complex, they provide a lot of problems to solve, and adaptive expertise is required. They further indicate that expertise is not anymore individual process, but rather collaborative. In addition, playfulness seems to be important in problem-solving processes. In order to gain adaptive expertise during two-year master program, we have designed and implemented a particular problem-solving method, and we collect multiple data of the process. Since gaining expertise is primarily due to learning in which students understand of a) what is expertise, they b) practice of what is to work as an expert and they c) monitor of what is to reflect and assess the process, instructional method includes these three areas. The repetitive use with variations of that method results experts in the field of LET and meet requirements of work life. In this symposium we will discuss about our research where the goal is to educate collaboratively working adaptive experts in the field of LET, and particularly the role of playfulness in the problem-solving method.

Keywords: adaptive expertise, learning and educational technology, playfulness, collaboration

INTRODUCTION
This position paper is about connecting higher education with work life by means of new pedagogical and educational research-based approaches. We educate experts in learning and educational technology (LET), and the students are supposed to be experts in work life. The students are to become designers of innovative circuits and constantly changing problematic situations. Regardless of the field, achievement of expertise requires people to develop new pedagogical approaches and learning environments to foster expert-like learning. In addition, people need to adopt the characteristics and the methods of expert performers (Bereiter & Scardamalia, 1993; Ericsson, 2006). Achieving, performance and maintaining expertise are important, both in education and in working life. Consequently, as expertise is a life-long and life-wide learning process (Bereiter & Scardamalia, 1993; Chi & Koeske, 1983; Lajoie, 2003), and as working life largely follows as a continuum of education, working life and education should not be dissected separable. Learning expertise is a path of competence building in academic domain (Alexander, 2003). Since gaining expertise is due to learning in which students understand of what is expertise, they practice of what is to work as an expert and they monitor of what is to reflect the process, we have created particular instructional method that result experts in the field of LET and meet requirements of work life (Hyvönen, Impiö, Järvelä, 2010). In this symposium we will highlight our research, particularly problem-solving method and playfulness, once the goal is to educate collaboratively working adaptive experts in the field of LET.

PREVIOUS RESEARCH
In order to educate collaboratively working adaptive experts in the field of LET the following two studies precede the instructional problem-solving method of education.

1) Exploration of different fields of working life that provides research-based evidence of what it means to be expert in work life today (Hyvönen, Impiö & Järvelä, 2010). The results indicate that expert’s work is future-oriented and they are expected to innovate new or renew existing practices or tools (see also Schwartz, Bransford & Sears, 2005). Constant learning is a crucial part of their work. Their working environments are very complex, the most challenges deal with understanding other people. It is obvious that routine expertise in not enough to
employ, but adaptive expertise is required. In addition, expertise is not individual phenomena anymore, but rather collaborative. The study showed that in some cases playfulness is a crucial part of expert work.

2) Niina Impiö’s proposal in the present symposium deals with another study, exploration of teachers of what is the role of collaboration in their work (Impiö, 2009; Impiö & Hyvönen, 2010). Results revealed that teachers do collaborate in their work, but collaboration practices are not established yet, and need to be further developed.

PROBLEM-SOLVING METHOD

The third stage of our studies is ongoing and it includes problem-solving learning as an instruction method and related data collection. The method relies on TEL, collaborative learning within expert teams and research-based and constant learning. The problems are authentic with many possible solutions. The process and solutions utilize ICT, with an aim to create social innovations to be applied.

Multiple data of the problem-solving processes were collected from fall 2009, and will continue until spring 2011. The problem-solving method includes three areas to focus: 1) knowledge construction in terms of understanding of the domain and expertise, 2) expert-like performance and 3) self-regulation (Bereiter & Scardamalia, 1993; Glaser, 1992; Glaser, Chi & Farr, 1988; Järvelä, Järvenoja & Veermans, 2008; Zimmerman, 2006). The method has been designed and realized various times in our education. The method is flexible and adaptable to different courses, students and aims.

As proved by our earlier study (Hyvönen et al., 2010), routine expertise does not meet requirements of expert work, but adaptive expertise is required to learn. Interesting notion is that adaptive experts may utilize also playfulness in problem-solving processes. We finally introduce these two concepts.

ADAPTIVE EXPERTISE

‘Routine’ and ‘adaptive’ expertise (Bransford, 2001; Hatano & Inagagi, 1986) are two types of expertise, which are needed in education and working life. Everyday skills, routines, are developed in familiar environments and in familiar tasks. Development of the ‘adaptive’ expertise requires practices in complex environments and complex situations. Comprehending the distinctions between ‘adaptive’ and ‘routine’ expertise has important implications for students in higher education and individuals in working life, because adaptiveness enhances learning through problem solving (Bereiter & Scardamalia, 1993; Crawford, 2007; Crawford, Schlager, Toyama, Riel & Vahey, 2005; Hatano & Inagagi, 1985). Distinction between these two types of expertise has implications in education: how to design learning processes, evaluations, learning outcomes and instructions. Finally which type of expertise is valued and aimed. (Brophy, Hodge, & Bransford, 2004)

PLAYFULNESS IN ADAPTIVE EXPERTISE

Playfulness seems to have a role in adaptive expertise (Hyvönen et al, 2010, see also Hyvönen, 2008). We understand playfulness as a basis for creative and divergent thinking and performance that are essential in adaptive expertise. Individuals, who are highly playful, also show highest scores on divergent and creative thinking (Liebermann, 1981). Playfulness research identifies intellectual curiosity, motivation, courage, flexibility, enthusiasm and alertness as a signs of playfulness. Playfulness is also affective experience, which is integrated with not only cognition, but also with motivation (can be seen as interest or goals), in fact cognition, affects and motivation are bi-directional and reciprocal relations (Ainley, 2006; Linnenbrink, 2006; Op’t Eynde & Turner, 2006). In near future the data revealing meaning of playfulness in problem-solving method will be analysed.

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User-Driven Design of a Mobile Application for Teenagers’ Language Homework

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Abstract
In this paper we focus on mobile language learning, and the design and development of a mobile application for teenager’s homework in Swedish as a second language. In the project we have used participatory design methods, with the aim to have a user-driven design process. We wish to discuss how these design methods, and design activities relate to how design is viewed in the field of educational science.

Keywords: participatory design, teenagers, second language learning, mobile learning, design-based research

INTRODUCTION
In this paper we focus on mobile language learning in general, and the design and development of a mobile application for teenager’s Swedish language homework in particular. In the project we have used participatory design methods, with the aim to have a user-driven design process. We wish to discuss how these design methods relate to how design is viewed in the field of educational science. Another important issue we want to discuss is if learning applications put other demands on the design process than for instance the design of an e-mail application or a computer game.

The current project was collaboration between university, a mobile learning software company and an organization promoting Swedish culture and use of Swedish language in Finland. The aim of the project was to increase the motivation for learning Swedish as a second language in Finland. Swedish used to be the official language in Finland, widely used by e.g. public authorities. Nowadays only a minority speaks Swedish even if it is still an official language, alongside Finnish. Swedish is still an important language for many professional positions in the society. However, the interest for learning Swedish has decreased in Finland. Swedish as a school subject has been under political discussion for quite a while now, and it is not longer required in the graduation from the upper secondary school. The development of a mobile application for Swedish language homework is one part of the promoting work in order to enhance interest for the language. In the project we also investigated if and how the students’ motivation in learning Swedish language changes when introducing a mobile learning tool for learning Swedish. We will report on this particular study in the long version of this paper.

A research and development team organized the main design process in the project. The design process involved 36 students, which were involved in the development of the application using an iterative design process via design workshops (Löwgren & Stolterman, 2004). The students participating in the workshops were in the age of sixteen to eighteen, engaged in the school subject Swedish as a second language in three secondary upper schools in different parts of Finland. The methods used for the workshops were inspired by the relatively long tradition of cooperative/participatory design (Greenbaum & Kyng, 1991). The general idea of using these methods was that they have been proved to be successful for extensive user involvement in software development. In the project three rounds of workshops were arranged with the students. The development team worked with analysis and various design activities in between the workshops.

The future application that the development team had in mind at the beginning of the project was loosely
defined as a mobile application to the students. This was the frame, and the starting point presented to the students in a first workshop. Following the outline for the so called Future workshop (Kensing and Halskov Madsen, 1991) we started with a critique phase, in which the learners should try to identify all problems they saw with the future application, and its use. After that the students went from problems to solutions using brainstorming. As a last step they took some ideas further by developing them in detail.

After the first workshop, which gave us more than one hundred ideas for design, the development team analyzed the workshop material and matched it against realistic possibilities of mobile technology. The criteria used in the analysis covered technical possibilities and pedagogical aspects. This analysis resulted in eight design proposals:

1. Chat with language tools (dictionaries, grammar aids)
2. Different kinds of games with language focus
3. Music with lyrics and language tools
4. Text reader with language tools and exercises.
5. Personal profile
6. Pronunciation practice
7. Language tests – have I done my homework?
8. Discussion forum – a community for homework

We presented the proposals for the students in a second workshop, where they sketched, wrote scenarios of use, and drew storyboards of each one of the design proposals. The workshop resulted in more knowledge about the students’ ideas how each design proposal could work in a mobile application for homework. After this the team started to create digital prototypes using PowerPoint, in order to get a better idea of the different concepts developed by the students. These prototypes were used in our communications with programmers and pedagogical experts, in a process where a real running mobile prototype was developed. This prototype was then used in a third workshop with the students. This time the focus was on the use of the application, and its content. The results of the workshop gave us new insights on what students think are important when doing homework in a mobile application. From this point on more effort was put into the developing of a more full-fledge application including for instance a grammar exercise engine, and more advanced content and interaction. We used this application in a meeting with a group of teachers, who had expressed interest in using the application in different schools. We let the teachers test the application, and we encouraged them to give us their reflections and comments of the new mobile application. After the meeting with the teachers, the development went into a final phase before the real field-testing of the application in ten secondary upper schools. In our presentation we will report on the final design and tell more about our and the teachers’ experiences of this testing inside and outside school environment, which is the common everyday context for homework.

DISCUSSION

Is there anything special about designing computer-mediated artifacts for learning, or can it be treated as any other design case? Is there anything special when designing for language learning? In the paper we will illustrate and discuss by using examples found in our project as well as in other areas of interaction design. We will argue that the answer to the first question is that the design of a learning environment has more in common with a computer game, than with some common e-service. The analogy with the computer game is that the learning must promote motivation to continue with the task. You can of course always claim the user is goal-driven, and will always leave the application if it not will help the user to reach her/his goal. What differs the design of a learning environment/application from a computer game is that the learning application at least in some sense needs to promote avail. In other words, the application should not only be fun to use, but it must also stimulate and advance the user’s language learning. In the current project we have used this analogy with computer games in our discussions with the teenagers.

The concept design is a raising concept in educational science, and it is denoting several things and processes. One important movement is the so-called design-based research (The Design-Based Research Collective, 2003) emphasizes the relationships among theory, artifacts, and pedagogical practice. The design of artifacts does not necessary mean only digital learning environments, but a rich flora of materials. The design-based research perspective views educational interventions as interactions between teachers, learners and materials.

This perspective is useful for interaction design of learning environments because it adds didactic design to the traditional processes of interaction design. We cannot close our eyes for the very important fact that learning is the main design objective. We also have to relate to the fact that learning already takes place, in many cases without any digital material. Learners are already carrying out their language homework within the already established educational setting. So, what does digital technology and mobile technology in particular add to these activities of learning Swedish as a second language in Finland? We will not give the full answer to these questions, but we will reveal discussion of the issues with the teachers and learners that were participating in the project.
The main research objective of the project was the user-driven design process, and research about this particular process. This means that the workshops carried out might have been changed a bit during the design journey to the demonstrator, and also between the more or less repeated design workshops carried out in different schools in Finland. In order words, the design process of the artifact was more important than a scientific evaluation of artifact use. This might be seen as a drawback of research close to pedagogical practice, in the design-based tradition.

Cooperative or Participatory design (Greenbaum & Kyng, 1991) meets the requirements of the design-based research methods, it is close to praxis, and it might involve both teachers and learners. Participatory design has been applied to the learning area in several projects (see Druin 1999; Taxén et al, 2001). According to Mazzone, Read and Beale (2008), teenagers are a seldom a targeted group of users – as children are, at least in the last decade children have been forming its own area of interaction design research.

How user-driven is user-driven design? We will use the analysis tools developed by Janet Read et al (2002) as a support for us to reflect on the participatory design processes during the design of the homework application. They use a model including different levels of participation, and contributions of domain experts in the design process: Informant, Balanced, and Facilitated design (IBF). Furthermore, we will use the IBF participatory continuum model and its variables Environment, Knowledge, Skills, and Security in order to analyze the details of our design activities. We think that this model will help us to analyze and reflect on our design activities, and put light on important issues when designing for learning.

REFERENCES


Designing Online Collaborative Pedagogy with CeLS: Incorporating Ubiquitous Components

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Abstract
CeLS is a web-based environment aimed to provide teachers of all subject domains and levels with a flexible tool for creating, enacting and sharing structured online collaborative learning activities. CeLS special feature is the controllable data flow: the ability to selectively reuse learners' artifacts from previous stages according to various Social Settings and to support the design and enactment of rich multi-stage scenarios. We present the possibility and challenges of incorporating Ubiquitous components in CeLS in order to expand the pedagogical potential offered to teachers for designing, enacting and sharing collaborative learning scenarios.

Keywords: Collaborative Learning, CSCL scripts, Ubiquitous Technology.

CeLS APPROACH TO MODELING ONLINE COLLABORATION SCRIPTS

CeLS (Collaborative e-Learning Structures) is a web-based approach and system designed to enable teachers to design, enact, share and reuse structured online collaborative activities (collaboration scripts) and to incorporate them in the existing instructional setting for any subject and level, from elementary school to higher education (Ronen et. al, 2006). Our major concerns were: usability, flexibility and sharing between teachers. A script designed in CeLS may include any number of stages. A stage comprises of a combination of basic building blocks, while each building block generates a certain type of interface in the student's environment. The unique feature in the CeLS approach is its ability to control the data flow in order to reuse learners' inputs and products from previous stages and to relate actions on these products to different social requirements. There are five types of building blocks that can be used to create a script:

1. **Presentation** objects generate passive display of information (text, links, media). This information can be provided by the teacher or consist of learners' products from previous stages. A product can be an organized collection of items contributed by individual participants (identified or anonymous) or a single item that results from a collaborative action of a group (for instance a shared document).
2. **Input** objects generate interfaces that allow participants to submit new data to the system as individual or as group artifacts. Inputs may include: text, hyperlinks, media, files, voting on various scales, replies to questionnaires or rubrics and shared documents.
3. **Interaction** objects generate interfaces that allow participants to interact with individual or group products submitted in previous stages, in various ways: by commenting, grading, ranking, and categorizing via text or graphic manipulations.
4. **Communication** objects generate interfaces that allow participants to freely communicate with each other and with the teacher.
5. **Operational** objects do not affect the student's interface. They provide the ability to group participants according to different criteria based on their inputs and actions. This facility enables the design and implementation of adaptation patterns (Ronen & Kohen, 2009).

Each object has particular properties that can be adjusted by the author (teacher) in order to adapt the resulting interface and its function to the specific needs of the activity. Some properties are generic, for instance, if the completion of an object is mandatory or not, and others are particular to the object or to its type, for instance, maximum and minimum text length and imposing the use of a certain vocabulary for a Text Input object.

In CeLS approach the social aspects are the key for controlling the data flow within a script. Each building block can be assigned with particular Social Settings that determine what information would be presented or which
artifacts would be offered for interaction to each participant. The Social Settings may use pre-defined Social Structures that represent the characteristics of students’ grouping. Since the functionality of a script is determined by attributing social properties to the script's building blocks, different participants may encounter different information, perform actions on different data items, or perform different actions, during the same activity stage.

This flexible architecture enables the design and enactment of a large variety of online collaborative activities, representing various pedagogical approaches such as: creating and responding to a common database, peer product assessment, pros and cons, competition, jigsaw, collaborative problem solving and any combinations of the above.

INCORPORATING UBQUITOUS COMPONENTS IN CeLS SCRIPTS

The CeLS approach and its student interfaces were originally designed for use with computer workstations (stationary and laptops) connected to the web. Even if some of the scenarios implemented with the system involved outdoor activities (such as taking pictures at outdoor locations and submitting them to a competition activity), these aspects are not supported in ways that take maximal advantage of the potential of the existing technology.

Taking advantage of outdoor learning environments may significantly contribute to the learning process (Dillon et al., 2006). Efficient and meaningful enactment of collaborative outdoor activities would benefit from (and sometimes require) the usage of Ubiquitous Technologies such as mobile phones. Milrad & Spikol (2007) present the usage and pedagogical potential of mobile phones in terms of their availability (time and place) and their technological capabilities (multimedia and means of communication). Examples of pedagogical approaches may include peer communication via mobile phones during a problem solving process game (Spikol, 2009), blending indoor and outdoor activities performed by different groups of students (Kurti et. al., 2007), or using mobile and sensor technologies for collaborative inquiry learning (Vogel et. al., 2010).

Therefore, we propose to explore the possibilities of combining the CeLS capabilities for the design and enactment of online collaborative activities with the potential of Ubiquitous Technologies. Such combination would offer the ability to design scripts that could be fully or partially enacted outdoors, via small mobile devices. Since the CeLS approach is modular and generic, based on pre-defined types of building blocks, the incorporation of Ubiquitous elements in the scripts poses various challenges:

- Addition of new Input building blocks that would be relevant and applicable only to inputs from Ubiquitous devices (such as positioning data).
- Adaptations of existing Input building blocks that would allow processing of data generated via mobile phone communication (cradle data sync, SMS, MMS or internet connection).
- Adaptation (as much as possible) of large and complex data involved in Presentation and Interaction objects to small-scale displays that are typically used in mobile devices.
- Adaptation of the Authoring interface to support Ubiquitous elements.

REFERENCES

Supporting Work and Reflection in Project Teams by Aid of Collaboration Tools

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Abstract
This position paper presents a summary of the work presented in a PhD thesis at the Department of Computer and Information Science, NTNU. The research addresses work and learning in software engineering student projects, investigating in particular how lightweight collaboration tools are used in daily project work and how reflection on the work process can be supported through retrospective reflection workshops. The main contributions of the thesis include new insights about cross-community collaboration in SE student projects and about the potential of historical data in collaboration tools to aid reflection on the project process. Also, the contributions include a more general model of reflection on work processes conceptualized as distributed cognition.

Keywords: project-based learning, lightweight collaboration tools, reflection

INTRODUCTION
In project based learning, students learn from hands-on experience with the challenges and complexities of real work. To achieve this learning, reflection is essential. In project work in industry, retrospective reflection on the project process is established practice, e.g. in project debriefings. Student projects often include retrospective reflection as a mandatory exercise seen as important to learning but not as a part of the ‘real work’.

The research presented in the PhD thesis is guided by the idea that making retrospective reflection integral to the work practice in project based learning can help students learn more from their project experience. The thesis explores how retrospective reflection in software engineering (SE) student projects can be supported, particularly taking into account the use of collaboration tools — typically lightweight tools — by teams in their daily project work.

Figure 1. Timeline and experience curves from a reflection workshop with a student team.

To this end, a set of interpretive case studies have been conducted. The studies examine the current use of state-of-the-art lightweight collaboration tools in SE student projects, focusing on the role of the tools in work and learning within the teams and in collaboration with other project stakeholders. The thesis research also includes studies in which interventions have been made in the projects by introducing facilitated retrospective reflection activities with and without the aid of collaboration tools. Figure 1 shows an example of representations of a project process created by project participants in a reflection workshop: A timeline of project events has been collaboratively constructed. Along the timeline, the team members have drawn curves showing the individual experience of being in the project. These representations are shown to help teams reach new insights about their projects. Theoretically, they can be seen to correspond to trajectories (Strauss, 1993) helping the team members make sense of their project activity. The reflection workshops can be considered a way of implementing a reflective process by supporting a return to experience, including its emotional aspects (Boud, Keogh, & Walker, 1985). In one case study a similar approach was extended by having the team members examine data stored in a
development-oriented project management tool ("Trac home page, http://trac.edgewall.org/, Last accessed 10 September 2009,")) throughout their project. Comparing the set of project events recalled without the aid of historical data to the events recalled after the aid of such data, the study showed that there is a potential for historical data to help a team recall and reflect on events in a way that impacts on the final lessons learned from the projects. Another study indicated a similar potential for the historical data in project wikis (Krogstie, 2009). The implementation of the reflection workshops in the thesis research can be considered as initial steps of a design research effort for which the aim is to improve the pedagogical design of the course as well as developing new theory on reflection in project-based learning.

The resulting contributions from the thesis include new knowledge about the use of various types of lightweight collaboration tools to support day-to-day work in the projects; within the teams and in collaboration between the teams and other project stakeholders. These contributions can be used to aid the organization of future SE student projects including the choice and use of collaboration tools in the projects. The thesis also provides insights on how retrospective reflection, seen as a part of a collaborative work practice, can be supported in SE student projects and project work more generally. This research contribution includes a design for retrospective reflection workshops in educational settings (the timeline and experience curve approach adapted from industry practice and empirically tested in a project course), a prototype tool extending wiki functionality to support navigation of relevant historical data, and empirical results demonstrating how a collaboration tool used in daily project work can be used as an aid to memory in retrospective reflection. Finally, a main contribution of this PhD work is a model of reflection (Figure 2), conceptualized in terms of distributed cognition. Drawing on learning theory as well as current practice for Software Engineering retrospectives, the model represents a novel and practical view of the work-reflection-learning cycle in collaborative work. The model incorporates individual and collaborative steps of reflection on a collaborative work process, making explicit the role of internal and external representations of the process as an aid to reflection. The model also outlines the potential role of collaboration tools in supporting day-to-day work and retrospective reflection on that work, thereby integrating these aspects of the work practice. In this way shedding light on complexities and opportunities related to reflection on collaborative work the model can aid design for retrospective reflection in project based learning in educational and professional settings.

**Figure 2:** A model of reflection on a project process, including the potential role of collaboration tools. From (Krogstie & Divitini, 2010)

Planned further work includes refining the reflection model to create a framework outlining the connection between type of work setting and adequate tool support for reflection.
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Home page: http://trac.edgewall.org/
What is Social Learning in a Game About Complexity in Construction Work?

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Abstract
This position paper describes some considerations in relation to social aspects of game based learning. More specifically I consider the balance between viewing games as a vehicle that supports immersion in to game fiction and identification with specific roles and the more strategic and competitive aspects of gaming. The empirical setting that initiated this present position paper is a project that addresses collaboration between, and process understanding among, the various actors in the construction sector, by developing a learning game.

Keywords: Game-based learning, Social Learning

THE CHALLENGE GAME
The project “The Challenge Game” was initiated to meet the transdisciplinary challenges in the construction sector, by creating pre-service educational material. The challenge game is designed to be played by 2–4 teams of players. The narrative of the game is that each team acts as construction site managers. The gameplay has two main parts, a planning part where the construction site manager plans his own activities, allocating resources to various parts of his construction site, and addresses issues that come up. The main choices for each work-package is whether the work should be conducted as hourly based work or as pay-per-piece work, and to what extend the resources “communication” (HR-activities) and “control” (quality control) should be allocated to the work-packages. The second part is the “challenge part” where the players place a problem, or challenge, on the competitor’s construction site. This position paper describes the underlying understanding of learning (in general and through gaming), and discusses to which extend the learning potential of the game stems from players’ immersion into the game universe, and the character of construction site manager, or from the strategic reflections that are necessary to play well and win the game.

A SOCIAL APPROACH TO LEARNING
The project adopts a social approach to learning (Lave & Wenger, 1991). There are two reasons for taking this starting point. (1) The problems with collaboration in the construction sector are of a social nature in the sense that the problems are situated between the actors, in the culture, in the contractual and economical working conditions, and in the concrete collaboration and mutual understanding between the actors. (2) Furthermore we believe that it takes engaged people, that interacts to create an effective learning environment, and games is a good machinery, both to create situation where engaged people interact, and to provide context and knowledge to qualify such situations (Misfeldt & Vilhelmsen, 2007).

Taking a social approach to learning in a game environment makes it relevant to consider Shaffer’s framework of epistemic frames and epistemic games. The idea is that in order to create education that prepare for relevant competencies like innovation, we should look at professionals and working situations where the these competencies are in play (Shaffer, 2006, p. 12). One main value of learning games or “epistemic games” is then that they can provide a domain for student to act through different epistemic frames. An epistemic game is then a game that support learning by allowing its users to act through an epistemic frame. Learning through these epistemic frames might allow the users to develop competences, not apriori obtainable without a shift of epistemic frame. This is the core argument for Shaffer to introduce epistemic frames.

GAME-BASED LEARNING: IMMERSION OR STRATEGIC REFLECTION
When applying the ideas of epistemic games and learning through a simulated praxis we should not make what Salen and Zimmerman (2003) describes as the “immersive fallacy” (p. 450). The immersive fallacy is the, faulty,
idea that a good player experience consist of totally forgetting oneself, immersing into a game situation, you simply start “living” the virtual situation, accepting rules and premises as if they where ontologically true.

In case of learning games, the immersive fallacy might lead one to think that the rules and reality in the game is directly transferable to reality, and hence prompt the designers to judge realism as the by far most important aspect of a learning game.

We acknowledge that there can be a significant potential for learning in realistic simulations, but we believe that we should consider the gameplay and rules as well. On a concrete level this means that we aim at making games where the (strategic and concrete) reflections that you need to make in order to play well and win, are reflections that are valuable from an educational point of view. Furthermore we want the game to make the educational value of such reflections transparent.

EXPERIENCES WITH A PROTOTYPE OF THE GAME

Various prototypes of the game have been tested with different groups of students and practitioners. Here is an example of how the participants in the tests described the game as engaging:

“It was fun, like building a sand-castle, and then once in a while the tide comes in and takes some of it, and then: “oh shit” now you are set back a lot. And every time you end a task it was like “Yes! Now we are home free with this part.” It was good to feel safe on this” (Translated from Danish).

The quote above shows that the game was fun and engaging but not necessarily because you acted through a specific role or epistemic frame. Other students expressed different reasons for the game being engaging, as for instance that it was fun to play the boss. To sum up the challenge game can be viewed as an epistemic game because the main narrative of the game is that the players act as construction site managers. But the part of the game where the players poses challenges to each other is different; here the player does not act through the epistemic frame of a construction site manage. The role is still significant for learning: (1) The role as problem creator for the other construction sites, creates a competitive gameplay. Moving between the role as “defending” your own site and attacking another site helps create and interesting gameplay. (2) The two roles, defending and attacking, gives two different perspectives on planning. Trying to foresee what can go wrong in order to avoid it, and trying to make things go wrong, requires a similar competence in thinking forward in plans. But the perspective you put on the issue is very different. We believe that the double perspective will give the players a better and fuller understanding of the relation between plans and reality.

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Can OLC in TPD be TEL?

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Abstract
It is sometimes assumed that teachers in an informed way shall embrace technology enhanced learning in their practices. In this position paper we argue for the need of teacher professional development (TPD) for this purpose, and ask the questions – how can professional development be understood in relation to technology enhanced learning (TEL) and can professional development in an Online Learning Community (OLC) have a potential to transform teaching? We suggest that OLC have the potential to make teachers implement ICT in their practice to enhance learning, since in an OLC the teachers at first hand answer to their own demands or from colleagues. In this paper we elaborate on the possibilities and limitations of the OLC in terms of content and form.

Keywords: online learning communities, teacher professional development, digital competence

INTRODUCTION
It is sometimes assumed that teachers in an informed way shall embrace technology enhanced learning, and therefore also display a digital competence. For this purpose, teachers need not only develop their own use of information- and communication technologies (ICT), they need to integrate them in practices relevant to schools. In this position paper we argue for the need of teacher professional development (TPD) for this purpose, and ask the questions – how can professional development be understood in relation to technology enhanced learning (TEL) and can professional development in an OLC have a potential to transform teaching?

In E-learning Nordic 2006, one of the major findings was that pupils, teachers as well as parents believed that ICT had a positive impact on improving pupils’ performance. In general, ICT was said to have a positive impact on teaching and learning, but, and most importantly, its impact on teaching and learning in schools was also expected to be greater. In Sweden, the Knowledge Foundation (2006) study showed that only half of the teachers themselves assess their knowledge on ICT to be good enough. Of the teachers, more than a half use computers during their lectures at least once a week or more, but eight of ten teachers used computer daily outside of the lectures. Communication supported by IT had increased greatly, communication via e-mail between teachers and pupils were reported by seven of ten teachers and communication with the parents via e-mail by six of ten teachers. This suggest that in relation to informed choices needed in complex pedagogical settings teachers have the technological knowledge, but lack the knowledge of how to use ICT for pedagogical purposes, to facilitate technology enhanced learning. What seems to be needed in order to develop the use of ICT is an understanding of how to use ICT for pedagogical purposes in relation to a specific content matter and to develop a critical and reflective attitude towards the available sources for learning (compare Mishra & Koehler, 2006). Instead of relying on large-scale initiatives from a governmental level for this to be brought about, we suggest that support for a digital competence for teachers can include supporting their engagement in OLCs for cultural, social and/or professional purposes, in planned and unplanned, formal as well as informal settings.

The OLC is characterised by flexibility in time and space, providing teachers an arena for dialogue and meaning-making concerning teaching practices. Structure, project form, or demands for participation from others than the teachers seem to be of less importance. In an OLC the teachers at first hand answer to their own demands or from colleagues. In this paper we elaborate on the OLC in terms of content and form (from a framework inspired by Fraser et al. (2007) and Villegas-Reimers, (2003)). In relation to the content of professional development, two dimensions are used; (1) personal, social and professional together with (2) a continuum from transmissive, through transitive to transformative; coupled with an understanding for the content as being (1) part of a process in a specific context; (2) closely related to school reforms, (3) professional development can be diverse in different contexts. In relation to the form of teachers’ professional development we use the two dimensions (1) formal-informal, and (2) planned – unplanned, together with teachers’ professional development
being (1) based on constructivism rather than transmission, (2) and professional development as an on-going collaborative process, in which (3) teachers are understood as being reflective practitioners. A meta-analysis on six OLCs with the feature of being arenas for teachers’ professional development is presented in table 1. The six OLCs comprise three cases described in Lindberg & Olofsson (2010); The Inquiry Learning Forum (IFL) (Scheckler, chapter 3), Transformation Teachers Programme (TTP) Haringey City Learning Centre (CLC) (Pachler, Daly & Turvey, chapter 5), Florida Online Reading Professional Development (FOR-PD) (Zygouris-Coe & Swan, chapter 7), and three cases from other sources; Lektion.se (Olofsson, 2010), MirandaNet Fellowship (Preston, 2008), Peda.net – skolnätverk (school network) (OECD, 2008).

Table 1. The OLCs with focus on content and form

<table>
<thead>
<tr>
<th>OLC</th>
<th>IFL</th>
<th>TTP</th>
<th>FOR-PD</th>
<th>Lektion.se</th>
<th>MirandaNet Fellowships</th>
<th>Peda.net – skolnätverk (school network)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content</td>
<td>Transformative, social, professional, mathematics, science</td>
<td>Transformative, social, professional, digital technology</td>
<td>Transformative, social, professional, reading practice</td>
<td>Transmission, personal, social, professional, participation-driven</td>
<td>Transformative, social, professional, ICT, democracy</td>
<td>Transformative, social, professional, ICT</td>
</tr>
<tr>
<td>Form</td>
<td>Informal-formal, collaborative, constructivist</td>
<td>Informal-formal, collaborative, constructivist</td>
<td>Informal-formal, collaborative, constructivist</td>
<td>Informal, collaborative</td>
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<td>Formal, collaborative, constructivist</td>
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**DISCUSSION**

What can be noted from our short meta-analysis is that one question for future research is whether the OLC, in terms of content, contain limitations and if there are forms of OLCs that might be limiting its potential, if it is open for content being personal, social as well as professional. It could also be interesting to recognize that the OLCs can function as a type of professional development through net-based education with potential beyond the formal educational system. In line with a constructivist perspective, embracing a potential where competence is possible to validate outside formal educational contexts. One might also ask whether the OLC can be a site for professional development that already assumes a basic competence related to the use of computers and the Internet? Teachers use computers and the internet to communicate with students and parent, and they use it more outside of teaching than within their teaching practice. If the OLC can be support teachers to integrate ICT in teaching, the OLC might be a place for teaching to be enhanced by technology. But if so, what are the digital competencies developed and what are the pre-requisites? What is a basic digital competence for the OLC? The OLC, and its perhaps transformative potential, might be an answer to the often failed initiatives to cultivate the teachers’ digital competence through teacher professional development, and thereby to create a foundation for technology enhanced learning in schools.

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Reflective Learning With Mobile Blogging Enabled Personal Digital Portfolios

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Abstract
In this position paper we present an approach to support prospective teacher students engaged in personal development and learning through the use of two combined strategies. First strategy is to apply a process-based portfolio aimed at documenting one’s experiences, with an emphasis on reflection. This kind of activity encourages the students to develop personal meanings of the experiences during the teacher education. Second strategy is to apply a mobile blogging tool for smart phones to allow students to produce rich, immediate, and experientially meaningful documentation from their activities. We draw upon our findings from a study on a group of 14 teacher trainees using these portfolio tools.

Keywords: mobile technology supported learning, social software, digital portfolio, reflective learning, higher education

INTRODUCTION
Reflection plays an important role in the process of creating new knowledge and understanding. Reflection works through the reinterpretation of experiences by providing a bridge between practical experiences and theoretical knowledge in learning situations (Kolb 1984; Schön 1987). Narrative student journals that are often used in the higher education context have been shown to promote student reflection (Boud 2001). Reflective journal writing deepening personal understanding and stimulating critical thinking is also a key process in the portfolio construction. This makes weblogs with inherent narrative support, as noted by Pachler and Daly (2009), a promising platform for digital portfolio activities. Writing reflective journal pieces may thus become a vital tool in the learning process. Through reflection students learn to scrutinize their experiences and achievements, for instance, in the school practice. It is important for a teacher student to learn about one’s own strengths and weaknesses, reflect on what went wrong or well, contemplate strategies to enhance their success in future work and take responsibility of their learning and development (Fernsten & Fernsten 2005). Given the importance of different aspects of reflection their emergence should be facilitated early on in the learning and portfolio activities.

To support these kinds of processes we wanted to study the benefits of the smart phones. We were particularly interested in the immediate textual and multimedia documentation capabilities of the mobile software. The specific application developed was a ProBlogger 1.0 mobile application prototype.

Smith & Tillema (2003) have analyzed portfolio types according to how much control of the process is given to the student and whether the portfolio is meant for personal development purposes or external evaluation. Our digital portfolio implementation is a combination of two portfolio types: a personal development process portfolio and a reflective product portfolio (Smith Tillema 2003). As part of teacher students’ formal assessment under the Finnish system, the teacher students are required to produce a product portfolio for end-evaluation. We argue that producing the process portfolio is crucial to supports this final goal.

METHODS
14 prospective history teachers at University of Tampere developed a personal digital portfolio during their teacher training year. The applied methods were questionnaire with open-ended items, log-data and interviews. Supervising teachers’ (n=2) and lecturer’s interviews are used as expert opinions. The research questions were:

1. What were the strengths and weaknesses of the digital portfolio tools?
2. What were the observed usage patterns of the digital portfolio tools?
3. What were the supervisor and student perceptions of the digital portfolio activity?

RESULTS

The strengths and weaknesses of the digital portfolio tools were studied phenomenographically. The reported conceptions contain mainly positive views towards using the devices to support reflective learning and process portfolio activities. However, major issues were identified. Concerning weblog use the problems were in controlling who can read a single post entry, and difficulties producing the final product portfolio with the weblog. Concerning ProBlogger use, the issues regarding privacy and support for broader learning activities were of the most concern. These same problems were also present in earlier trials done with blogging tools to support teacher trainees learning in the field (Divitini, Haugaløkken & Morken 2005). Privacy was a problem when using ProBlogger as it did not support sending entries as private. Instead, they were instantly published to the whole student group. Also, the students felt that they could have used mobile blogging more diversely in portfolio development, if they could have attached documents processed on the smart phone. The diversity of mobile usage is the norm and should be addressed (Soloway, Guzdial, & Hay 2004).

The number of ProBlogger entries sent to a weblog correlated with general activeness in writing weblog entries ($r= .561$, $p=.037$). The number of written entries again correlated with social usage patterns: i.e. those that were active with their own blogs were also active in commenting and received comments ($r=.728$ $p=.003$). A social network diagram with a faction analysis fitness of $-0.622$ drawn from the given comments in students’ weblogs supported this finding; students with the least network ties were also the least active students.

The interviews on supervising lecturer, teacher’s and student’s perceptions of the digital portfolio activity underlined both successes and short-comings. The key perceptions dealt with emergence of the documented learning process material but no process writing taking place, photographs as illustration—not as evidence, no on-the-go mobile blogging on spare time, missing support for social interaction via ProBlogger and problematic personal-public aspects in digital portfolio activities. In portfolio activity there is a flipside to having an audience, although there is a similar need for it as noted by Kerawalla, Minocha, Kirkup and Conole (2008).

CONCLUSIONS

We have seen that students have a perspective that focuses on producing content that is filtered by how suitable and interesting it would be for others to read. This is partly formed by the limitations of the prototype provided, but also informed by students’ innate attitudes. Publicly sharing information is seen as a social act, and is enhanced by the active giving and receiving of comments, at least by a significant subset of the group. Students identify issues of privacy, however, and would almost certainly produce more personal perspectives if things could be sent to the blog as private entries. The process of portfolio creation was well supported, but more in terms of gathering material for later product portfolio than encouraging proper reflective practice already within the process portfolio.

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How to Design for City-Wide Learning Experiences?

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Abstract
Mobile and ubiquitous technologies open up many possibilities to engage with the environment and fostering informal learning experiences taking advantage of the spaces they are bound to. Here we would like to focus on how these experiences can be characterized and how we can design technology to support them. This paper outlines the possibility of adopting a framework of experience to characterize a range of situated, informal, learning experiences enabled by technologies. Here we would like to focus on how we can design technological support for long-term visitors’ experience of learning a city by living it.

Keywords: Situated learning, learning experience, experience of use, experience in place

INTRODUCTION
The advances and diffusion of mobile, ubiquitous and pervasive technologies increase people opportunities to engage with the environment (Weiser, 1999; Williams & Dourish, 2006). This has opened up many possibilities for learning to continue outside the classroom (Vavoula & Sharples, 2008; Kukulska-Hulme & Traxler, 2005). Learning activities can now be carried out not just while on-the-move, but in different places. Learners can take advantage of the spaces they inhabit and the resources available there, e.g. by exploring and experiencing things at hand in authentic settings or through serendipitous encounters and interaction within local communities.

In this perspective, the most interesting scenarios for learning become the ones that are tied to a specific context, providing a high degree of situatedness – as introduced by Lave and Wenger (Lave & Wenger, 1991), stressing the fact that learning does not happen in a vacuum but it is situated in a cultural, social and physical context.

The work discussed here has been carried out within the FABULA project. Its aim is to inform the design of a platform of services to support different forms of collaboration in a city-wide context. In particular, we are focusing on the experience of learning the city by being in the city. We look at the city as a dynamic entity that, with the help of seamless networks, becomes a learning arena for its inhabitants, with services that allow them to access learning material anytime and anywhere, but also, and most importantly, to take an active role here and now in collaborative processes of knowledge construction and sharing. My aim is to understand and explore how new-comers and long-term visitors learn and make sense of a city over time by being there, by exploring it and actively participating in the life of its community.

The learning situations we look at are informal, thus no specific learning activity nor pre-defined educational curricula are considered. Instead of supporting a range of learning tasks, we want to foster exploration and interaction that can lead to serendipitous and informal learning experiences. This means that their dynamic and emerging nature makes challenging for us to predict how they will unfold.

Even if the most interesting scenarios for city-wide collaborative learning are the ones that situate learning with respect to the social context and the space; here we would like to focus our attention to the role of space where those learning experiences take place. This is an aspect that has often been overlooked within formal education (Kukulska-Hulme & Traxler, 2005). What we would like to investigate in this paper is how people create a context for a learning experience? How can we characterize such experience? What elements of place support different types of learning experiences? And how can we design for these learning experiences?

EXPERIENCING TECHNOLOGY IN PLACE
This paper explores how the framework of experience developed by McCarthy and Wright (McCarthy & Wright, 2004) can be adopted to characterize a range of situated, informal, learning experiences enabled by technologies.

In order to provide a way to talk about the relationships between experience and technologies, McCarthy et al. (2004) conceptualize experience as characterized by four threads. The sensual thread addressing the sensory engagement with a sequence of actions (e.g. entailing aspects related to its “look and feel”). The emotional thread
DESIGN CHALLENGES

In the context of this symposium, we would like to explore whether the framework introduced to talk about experience with- and through- technology (McCarthy & Wright, 2004) can also be used to characterize the range of informal, learning experiences we will focus on. Furthermore, once these experiences have been conceptualized, how can we design technologies and services supporting them? What should the main foci be? We believe such questions are problematic to answer, since in an informal, learning setting there are not specific learning activities, processes and outcomes to be observed or assessed.

In FABULA we have identified a set of scenarios describing roles that technology can play in city-wide collaborative learning (Canova Calori & Divitini, 2009). The first scenario concerns the possibility to support the performance of a shared experience, e.g. exploring the city through a collaborative game. Another role relates to social matching and networking (e.g. a feeling of being connected) and how this can enhance a learning experience. Technology can also support people active participation in a community (e.g. allowing members to contribute to their on-line discussion). And last, technology can give visibility to learning experiences or contents produced therein, by promoting awareness and further user participation. These scenarios have assisted us defining a set of questions to be used for semi-structured interviews. The interviews’ outcomes will help us understand how people carry out the processes presented above in real life situations.

We now aim at working with new-comers and long-term visitors to better understand: how people learn the city (make sense of it) by being there and becoming part of its community; how learning the city evolves over time; and what are the tools they use today to do this.

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Design-Oriented Research or Research-Oriented Design in Mobile Learning?

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Abstract
Design research in mobile learning is challenging. In this position paper, we suggest that the dichotomy between design-oriented research and research-oriented design can help explicate the role of different design activities in mobile learning research.

Keywords: mobile learning, design, design-oriented research, research-oriented design

INTRODUCTION
"It might simply be too much to both do a good design, with a happy client – answering to all the real-world challenges one will face – and do a good research, with happy peers, i.e., answering to being true over being real."

The quote above is the closing sentence from Fällman (2007), suggesting a dichotomy between design-oriented research and research-oriented design in the interaction design research field. We argue that fulfilling expectations of all stakeholders is as challenging in the mobile learning research field. We also argue that the dichotomy suggested for the interaction design research field can be extended to the mobile learning research field.

BACKGROUND
The Design-Based Research Collective (2003) discusses design research in education and states that “[t]he challenge for design-based research is in flexibly developing research trajectories that meet our dual goals of refining locally valuable innovations and developing more globally usable knowledge for the field.”. This is to say that design-based research should simultaneously contribute to a product that can be used in a single school setting and to more general knowledge for the research field. If the challenge from the Design-Based Research Collective (2003) holds true for design research in general, then design research in mobile learning presents a more pronounced challenge because it contains “[d]esign and development processes integrated with applied or empirical research cycles for the purposes of generating knowledge about teaching, learning or training while simultaneously working toward producing a useful innovation or intervention” (Bannan, 2009). To meet this challenge Bannan (2009) suggests us to collect written accounts from actual design processes. The collected accounts, together with an analysis, form a design research approach that “provides a frame through which we might examine the unique considerations of mobile learning environments […]” (Bannan, 2009). In line with this, Spikol & Eliasson (2010) reports from a mobile learning pilot where they encountered “challenges to design activities that combine indoor and outdoor work across different technologies.”

How can we meet all these challenges for design research in mobile learning? Based on Bannan (2009), Cook (2010) formalizes the broad question: “What does the use of mobile devices for informal and formal learning mean for the collection and analysis of data and what methods might we employ in a systematic, iterative and interventionist Design Research effort?” In this paper we suggest that the dichotomy between design-oriented research and research-oriented design can be used to answer this question.

Related to interaction design, Fällman (2003, 2007) makes a distinction between the two concepts design-oriented research and research-oriented design. In design-oriented research the main motivation is new knowledge and the product is secondary. While in research-oriented design, the production of new artifacts is the main motivation. Fällman (2003, 2007) suggests that this distinction is useful for clarifying what is meant by design research. By this suggestion Fällman (2003, 2007) does not intend that what we should do in a research project is only design-oriented research. Instead the suggestion is that we can use the distinction to explicate the role of different design activities in the research project, e.g. by describing specific design activities as belonging to either one or the other. The dichotomy also distinguishes between design based on analysis and design based on
judgment. In design-oriented research, design is a conscious reflective process, while in research-oriented design it is based on judgment. With this distinction, design-oriented research goes well together with the goal of collecting written accounts from the design process, while research-oriented design does not support an analysis of the design process. Because of the similarities between interaction design research and design research in mobile learning, the suggestion from Fällman (2003, 2007) can equally well be used for design research in mobile learning.

Another way of describing interaction design research is presented by Löwgren (2007) as five strategies used in the research field:
1. Designing prototypes for empirical evaluation with the intention to study the qualities of the new design ideas in use
2. Exploring the potentials of a certain design material, design ideal or technology
3. Exploring possible futures which are rather far from current situations
4. Designing artifacts for instantiating a more general theory in a specific design material and assessing the results
5. Performing a participatory design process where the future users act as experts in their field of practice

DISCUSSION
Questions we want to raise for further discussion are:
• Would it be possible to make the role of specific design activities explicit as design-oriented research or research-oriented design in actual research projects?
• One way of reporting on the analysis of the design process is written accounts from actual research projects. Which other ways of reporting are there?
• Can participatory design meet the challenges for design research in mobile learning or is it just making things worse?
• Can theoretical foundations such as the Task Model (Taylor, Sharples, O'Malley, Vavoula, & Waycott, 2006), the Conversational Framework (Laurillard, 2009), the socio-cultural ecological approach (Pachler, 2010) and Augmented Contexts for Development (Cook, 2010) give us some guidance to be able to meet the challenges for design research in mobile learning?

REFERENCES
Contextual Relevance for Supporting Learner-Centered Configuration in City-Wide Learning

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Abstract
This paper introduces the problem of maintaining context throughout the learning activity in city-wide settings. It presents the background of the attempt to bridging the subjective view and the objective view of context in order to develop computational representations. With context defined by contextual relevance, the relevance is taken as the determining factor to the enactment of context, where mechanisms to determine contextual relevance and maintain context are required.

Keywords: mobile learning, context-aware computing, contextual relevance

INTRODUCTION
A challenging aspect for a successful progress in a mobile learning setting is the appropriate management and employment of context. A mobile learner inhabits some environment to perform a learning task or a learning opportunity may arise while being there. This foreign environment affords certain facilities, as well as it constrains the possibilities. Both the affordances and constraints are constituents of a larger context and they are significant in shaping and guiding the learner through a process of place-specific learning. In mobile learning systems this has to manage with these factors to support the learner in dynamically constructing a learning environment. Additionally, it has to cope with the associated dynamicity of open environments, where appearance and departure of resources are expected. Moreover, context is defined by contextual relevance of the ongoing interaction in a continuous process of constraining the space of possibilities to the meaningful entities (e.g. pieces of information, learning objects, services, or peers and experts) at the current point of time and in a specific location. The research question then is finding the mechanisms that help the system maintain context throughout the enactment of the learning activity. The next section will introduce city-wide collaborative learning as the domain of interest. Then, another section will introduce context as a wicked problem, and last but not least contextual relevance will be discussed.

CITY-WIDE COLLABORATIVE LEARNING
In this project we introduce City-wide Collaborative Learning (CwCL) as a class of m-learning, where the city with its different spaces is perceived as a learning arena. It is a place-specific learning in analogy to the place-specific computing defined by Messeter and Johansson (2008) that concerns interactions enhanced by resources in that particular place. The objective is to employ mobile technology and technology-rich urban environments to leverage the individual learning capacity to actively and collaboratively construct knowledge in authentic settings, informally, and serendipitously.

CONTEXT
Defining context and the design of context-aware applications is significant to make use of the mobile devices in different situations, but it is a wicked problem (Uden, 2007). There are a variety of definitions of context, which is seen by Kurti (2008) as an indication of its complexity. As observed and stated by Dey (2001): “while most people tacitly understand what context is, they find it hard to elucidate”. This led to loose definitions of context that describe it by example (e.g. location, identity, etc.), by synonyms (e.g. environment, and situation), or by a particular subset of physical and conceptual states of an entity (Dey, 2001). What makes context and how it interrelate with the ongoing activity is not of less discrepancies among the researchers.

Eventually, they are different views that emphasize different aspects based on the background of the authors and to serve different purposes. As briefly introduced in the former section, CwCL is concerned with learning as a social, collaborative activity where learners construct knowledge and complex skills through interaction. This
makes adopting the inter-subjective (phenomenological) view of context as common in CSCW more of an expected choice rather than the objective (positivist) view that is common in context-aware computing (Dourish, 2004). Thus, emphasizing the role of social interaction, which in and through it context is constructed (Chalmers, 2004, Dourish, 2004), as well as knowledge. However, providing specific practical design guidelines requires taking a pragmatic stance that brings together the physical positivist notion of context with the social phenomenological notion of context.

**CONTEXTUAL RELEVANCE**

The phenomenological view by Dourish (2004) is based on four assumptions. The first one makes it clear that objects and information are contextual only if relevant to the activity or interaction. This is in agreement with Dey (2001) who defines context (in the domain of context-aware computing) as “any information that can be used to characterise the situation of an entity ... that is considered relevant to the interaction...” (Dey, 2001). Dey (2001) believes that relevance depends on the user’s task when he defines a system to be context-aware “if it uses context to provide relevant information and/or services to the user, where relevancy depends on the user’s task”.

Assessing relevance is not only a need to overcome a problem, but it can also contribute to taking advantage of potential resources from the “opportunity space” (Hornecker, et al., 2006) offered by ubiquitous computing. What is relevant and what is not is elaborated by Sperber and Wilson (1995) that introduce Relevance Theory and define relevance as a measure of the contextual effects of an assumption and is proportional to it. According to this theory, an assumption can be relevant, not relevant, or more or less relevant than another. Moreover, relevance is not a static factor, but is maintained through the activity (Dourish, 2004), and may change by the availability of new information (Koole, 2009). Identifying the relevant and accurate resources is not limited to educational knowledge, but includes the abundance of resources in an urban space, together with information, learning objects, services and tools, people, etc.

Thus, maintaining context is a constant cycle of refining the input that in turn can be a trigger for another process of refinement. Each cycle is a contextual episode that can evolve into another episode as the interaction progress to include or exclude resources. This cycle can also be triggered by the availability of more relevant resources in the opportunity space that may arise or that may become available as the learner moves to another location. A measure of relevance can be represented by the distance of some resource from the center of interaction, represented by the interaction focal point.

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Exploring New Ways to Support Mobile Collaboration Through Mobile Virtual Devices

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Abstract
The use of mobile technologies to support novel ways of teaching and learning has been an opening door for carrying out more free educational scenarios during the last years. The imposed restrictions of traditional learning settings have been partially overcome in the field of mobile learning. However, some restrictions still remain due to the constrains and limitations of mobile devices and wireless technologies. Many of these restrictions are related to issues connected to mobile performance, but the limited amount of resources one mobile device can offer is also a boundary the learning activities have met. In the scope of this paper, the concept of Mobile Virtual Device (MVD) is presented and discussed. A MVD is an organization wherein several mobile devices form a membership in order to share their individual resources and services for creating a more powerful instance. A MVD, with the aggregation of several resources from multiple devices, enables to provide support for new learning activities that were not possible before. In this article, we present the benefits of this conceptualization and two examples where this concept has been applied. We envision a high potential offered by these enhanced virtual devices, although some challenges arise in its use, both technical and social, which should be discussed and addressed.

Keywords: collaboration, resource share, mobile organization

INTRODUCTION

Education in schools is changing with the presence of the different technologies and the multiple possibilities these can offer. With the adoption of mobile technologies, the alternatives existing to give lessons can be expanded and offer them in outdoors settings, bringing another dimensions to teaching and learning and crossing the walls of the formal-learning settings. In mobile learning (M-learning) activities, students can put into practice concepts learnt in the classroom, enhancing the theoretical aspects from the lectures and apply them in real scenarios. These latest development can lead to a deeper understanding. Examples can be found in the field of mathematics, identifying geometrical shapes in field studies, in the field of history, exploring ruins and historical buildings, in culture applied in museums, just to mention some examples. A powerful factor in M-learning lays in the possibility to create new scenarios enriching the content of the learning aspects. Moreover, it is important to remark the freedom of movements the students have, which let them interact with learning objects in the environment and to collaborate with their colleges. The freedom of the user in M-learning activities is a relevant factor to motivate students to understand the content discussed in the classroom and to use the proper methods for each specific scenario in the field. Group work is also suitable to motive collaboration, discussion and reasoning of the learnt concepts, which can play an important role in M-learning activities.

However, technologies used in outdoor activities are not mature enough and have not covered in deep some freedom-related aspects that the students require. Technology still imposes constrains to the learners, and in many cases dictates the rules of the activity, such as how groups of students are created for each learning activity. Mobile applications have been designed predefining the mobile behavior during the activity, the resources to use, how should these resources be used and even how students should collaborate within the different activities. We consider these constrains to be a limitation for the user experience in the learning process, and they should be reconsidered in order to increase the set of options students can benefit from.

MOBILE VIRTUAL DEVICES

Membership in groups of students participating in collaborative M-learning activities is still lacking degrees of freedom. When M-learning activities are not completely individual, they use to consist of a learning package. In the last case, the package consists of a set of mobile phones, laptops and other mobile devices configured to collaborate together, but being difficult to dynamically involve new devices in such collaboration. This is not the only aspect that requires a deeper analysis to create more flexible applications from a usability point of view. We
consider also the existence of a second flexibility-limitation thread which is related to the resources teachers can select to support learning activities carried out outdoors. Commonly, several mobile devices are used in M-learning settings; however learning applications are designed to use the mobile resources locally, meaning those resources residing inside the mobile device. In the best of the cases, the mobile applications enhance the creation of objects by the combination of resources existing in the Internet, such as positioning in Google Maps GPS enhanced pictures taken with a mobile phone.

The number of services and resources emerging from these scenarios could be considerably increased instead. The features existing in the mobile devices could be combined not only between the resources existing in one mobile device, but also combining the resources existing in all mobile devices involved in one specific activity and location. To illustrate this idea, features used in the GeM project (Gil, 2010b) can be used as an example. In this particular project, multiple mobile devices were used and GPS sensors were combined to create location-based services and specifically distance calculations. In order to provide the benefits of a dynamic resources share, the concept of Mobile Virtual Device (MVD) was conceived and defined. A MVD consists of an organization of mobile computational units where mobile devices can become members and exchange their resources and services. The MVD creates a complex device that will benefit from the aggregation of services and will be able to compose new services creating Mashup of the existing ones.

Sharing resources and services requires a communication solution between the mobile devices. Web Mash-up technologies are demonstrating to fulfill the requirements for service composition in the Internet, due to its standardization and easy escalation. Therefore, a service composition between mobile devices could consider the use of web-service technologies as well. The creation of new services and combination of them in MVD are built upon REST methods (Wikman, 2006) that the devices provide by a Web-Service API, accessible by Wireless and GSM networks. This approach can also be seen in (Prehofer, 2010).

In the GeM project, GPS coordinates were the shared objects in MVD and they served as the initial experiment to explore the potential of this concept. Sharing a dimension of the context representation was the first step leading to a resource sharing. An evolution of these ideas was tested in the Mulle project (Gil, 2010a), where the displays in the MVD, a physical resource in the devices, were shared to create a larger interface for the students. Current efforts in MVD consist on the implementation of dynamism in the MVD creation. As mentioned previously, we envision a higher degree of freedom in the actions users can perform and the type of collaborations they want to establish, thus letting them to create their own working groups. Two major benefits can be distinguished in the use of MVD. The first one concerns the possibility to facilitate the creation of more free mobile applications from a usability perspective. Allowing a dynamic creation of MVD enables users to have more freedom when it comes to collaboration and interaction with their peers. In the future, it will allow them to construct their own mobile services compositions (mashups) to support the learning activities. Secondly, the use of MVD allows the creation of new applications that were not possible before. The composition of mobile services opens a door for the creation of new services to be used in the M-learning activities, which will potentially increase their impact in the education.

QUESTIONS TO DISCUSS

We have identified a number of potential uses of MVD to support learning that may be beneficial. However, there are challenges that still need to be addressed for the successful implementation of this concept.

1- Creation of MVD implies the use of organizations, hierarchies, federations, teams, to mention some. How to select the most suitable organization based on the activity goals?
2- A dynamic organization requires for a service discovery mechanism. Which methods can be employed in a highly dynamic environment with mobile devices?
3- Are Web Services the best way to share resources between mobile devices or would it be better to apply a domain specific solution for service/resource exchange in mobile devices? Trade-off between performance against extensibility and interoperability.

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Towards Teachers’ Adaptive Expertise Through Collaboration

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Abstract
Our two previous studies suggest that work environments are complex, adaptive expertise is required and collaborative way of work is essential. In addition, in the context of schools and teachers’ work, collaborative working culture needs to be developed. To meet these challenges we have implemented a master’s programme called Edutool in the field of learning and educational technology (LET). Achievement of expertise requires people to develop new pedagogical approaches and learning environments to foster expert-like learning. In addition, people need to adopt the characteristics and the methods of expert performers. Since gaining expertise is due to learning in which students understand of what is expertise, they practice of what is to work as an expert and they monitor of what is to reflect the process, we have created particular instructional method that result experts in the field of LET and meet requirements of work life. The method is research-based approach for solving authentic problems or challenges in work life. In this symposium we will highlight our design-based research where the goal is to educate collaboratively working adaptive experts in the field of LET.

Keywords: teachers’ collaboration, teachers’ expertise, teacher communities

INTRODUCTION
Teachers’ learning is a process of growing into experts (Alexander, 2003). New learning environments, both in work and school, are complex and there is a need for collaboration and expertise sharing between different kinds of actors, such as teachers, planners, technical support personnel, and students. Teachers need to learn how to operate in this new, collaborative working culture. Teachers’ ways of working have developed from being independent experts to active members of collaborative knowledge sharing (Tynjälä, 2004). Recent studies focusing on teachers’ development have emphasized the importance of collaboration when working to affect change in schools (Fullan, 1991; Yuen, Law & Wong, 2003). Development projects in themes of pedagogical use of information and communication technology (ICT) has increased a need for collaboration. Despite the increased different kinds of collaboration between teachers and between schools, it seems that teachers’ collaborative working culture still needs to be developed (Ilomäki, 2008).

WHY TEACHERS SHOULD COLLABORATE?
Teachers’ expertise is based on following fields: practical knowledge, empirical knowledge, knowledge of self-regulation and knowledge of collaborative work practices (e.g. Barab, Kling & Gray 2003; Tynjälä, 2004). The development of expertise is linked to teachers’ willingness and ability to interact and communicate with colleagues and experts (Putnam & Borko, 2000). Nowadays teachers’ expertise is more than acquiring or adopting knowledge, it is formed in interaction with other members of the school community (Hakkarainen, Palonen & Paavola, 2002; Tynjälä, 2007).

Collaboration and its impact on pedagogical practices is important for teachers’ professional development. (Barab, Barnett & Squire, 2002; Barab, Makinster & Scheckler, 2003; Goddard, Hoy & Woolfolk Hoy, 2004 Yuen, Law & Wong, 2003). The studies focusing on teachers’ collaborative work have shown that teachers who have an important role in a school’s community were more likely to use collaborative instructional strategies in their classrooms, while teachers who were less involved in collaborative activities with their colleagues were more likely to use direct instruction and individualized learning tasks (Schlager & Fusco, 2004).
In order to meet these collaborative working culture’s challenges, teachers are need to be as adaptive experts (Hatano & Inagaki, 1986) who are able to include and apply new learning theories on curricula and on every day practices, develop new pedagogical methods based on recent research in the field of Learning Sciences, assess and evaluate pupils’ progress and plan teaching practices fostering pupils’ learning strategies and learning skills (Crawford et al., 2005).

PREVIOUS RESEARCH

In order to educate collaboratively working adaptive teachers in the field of LET we have done the following two studies.

1) Exploration of teachers of what is the role of collaboration in their work (Impiö, 2009; Impiö & Hyvönen, 2010). The results indicate that teacher communities are forums for developing expertise, sharing knowledge and networking. Networks offer peer support, a safe environment to adopt new practices. They also promote knowledge sharing and collaboration in pedagogical issues. The results show that the teachers have networks both inside and outside the school, thus giving them opportunities for collaboration in both informal and formal learning situations.

2) Pirkko Hyvonen’s proposal in present symposium deals with another study exploration of different fields of working life that provides research-based evidence of what it means to be expert in work life today (Hyvönen, Impiö & Järvelä, 2010). The results indicate that expert’s work is future-oriented and experts are expected to innovate new or renew existing practices or tools. Constant learning is a crucial part of their work. Their working environments are very complex, the most challenges deal with understanding other people.

Results revealed that teachers do collaborate in their work, but collaborative practices are not established yet, and need to be further developed. Since collaboration between teachers is demanding, evidence-based ways for advancing it should be developed. Longitudinal data collection is needed to explore what is the role of teachers’ collaboration as a part of the expertise development. Therefore our next studies will focus on exploring how teachers’ collaborative expertise will expand during two-year (2009–2011) educational period in master’s programme. In order to support successful teachers’ collaboration and adaptive expertise it’s essential to understand teachers’ collaborative work practices within their development of expertise. Therefore, this study investigates: 1) How collaborative adaptive expertise develops? 2) How collaborative adaptive expertise can be supported? and 3) How collaborative adaptive expertise can be utilized teachers’ working practices?

REFERENCES

Scaffolding Students Awareness of Situational Motivation and Emotions in Self-Regulated Learning

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Abstract
This study explores students’ situational motivation during learning. A “motivation scaffold sheet” is designed to prompt students’ awareness of their emotions and motivation in situations which require self-regulation. The sheet focuses on students’ situation-specific goals and the reasons for their current emotional state. It is assumed that by increasing students’ awareness of their “hot” cognition, namely motivational and emotional reactions, it is possible to scaffold their strategic use of motivation and emotion regulation. So far, the “motivation scaffold sheet” has been used in studies that aim to promote self-regulated learning in g/nStudy computer environment.

Keywords: self-regulated learning, motivation, emotions, g/nStudy

INTRODUCTION

In school and during free time, students are surrounded by growing demands, such as performing well but also being popular among friends. Those demands compete with their attention in the classroom. Simultaneously with these demands the importance to sustain engagement in learning is increasing, because learning has become an important condition for coping in life in general. However, as empirical research has evidenced, it is not easy to make appropriate choices, prioritise, resist temptations, and plan work strategically (Järvenoja & Järvelä, 2009). Models of self-regulated learning (SRL) argue that in order to overcome these difficulties and to study effectively, students need to take a purposeful role in their own learning by regulating their motivation, emotions and cognition (Pintrich, 2000).

Different studies on SRL have provided strong evidence how cognitive strategies contribute on student learning and how different motivational perceptions reciprocally effect on the use of strategies (e.g. Schunk, 2001; Winne, 1995). Based on the results from these studies it could be argued that self-regulated learners are autonomous, reflective and efficient and have the cognitive and metacognitive abilities as well as the motivational beliefs and attitudes needed to understand, monitor and direct their own learning. In spite of increased understanding of cognitive aspects of self-regulation, motivational aspects of regulation have not yet been probed thoroughly. Research on regulation of motivation have, however, defined several motivation and emotion regulation strategies that individuals use purposefully and in a willful manner to influence their motivation (Pintrich, 2000; Wolters, 2003).

Contemporary educational research has shown that cognitive regulation processes can be promoted with computer-based regulation tools (Winne, Hadwin, Nesbit, Kumar, & Beaudoin, 2005). On the other hand, however, contemporary cognitive and educational research has shown that the potential of hypermedia as a learning tool may be undermined by students’ inability or unwillingness to regulate learning (Azvedo, 2005). Students may not deploy key metacognitive monitoring activities during learning; they do not engage in planning activities such as creating learning goals and apply ineffective strategies (Azvedo & Cromley, 2004). It can be argued that without successful regulation of motivation, cognitive regulation skills may become ineffective. In the same manner that learners can regulate cognition they can regulate also their motivation and affect. However, although many recent studies have shown the importance of motivation and emotion regulation in classroom learning, there is not much research on how these processes can be supported (Boekaerts & Corno, 2005; Järvenoja & Järvelä, 2005).

In this study, the assumption is that it is possible to provide scaffolds for students’ motivation and emotions by prompting students’ awareness of their situational emotions and the sources of these emotional experiences as well as the acknowledgement of situation-specific motivational goals. Furthermore, this awareness creates a possibility for students to develop their self-regulatory aptitude purposefully by bringing these aspects to the
consciousness of students thinking as they work (Randi & Corno, 2000). This is why a “Situation-specific Motivation Scaffold Sheet” was developed. In the studies that implemented the sheet, the students were instructed to fill in the sheet every time they logged into g/nStudy. The Motivation Scaffold Sheet consisted of three components which each reflected the students’ motivation in the specific situation. The components were: (1) the student’s evaluation of his or her emotional state, (2) the student’s ability or willingness to elaborate and explain the reason for the situational emotions and, (3) the student’s ability to recognize his or her priorities in terms of situation-specific motivational goals. Emotional state was reported on a scale of negative -positive, smiley faces in its endpoints (☹ and ☻) and middle (☺). Explanations for emotional state was reported by answering on an open question “Why?”. The situation-specific motivational goal was specified from available options related to academic achievement and socio-emotional aspects of the learning situation. The students were prompted to fill in the sheet every time they logged in to the g/nStudy, but it was not compulsory for working in g/nStudy.

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Compositional Development of Situated Collaborative Learning Services

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Abstract
E/m-learning application is evolving from monolithic to learning object oriented to service oriented. Situatedness and connectedness are becoming almost inevitable with the advancement of location technologies and social web. Everything is being represented as services. Allowing domain experts like teachers to easily and flexibly compose new services from the existing services is therefore a major challenge. In this paper, collaborative learning domain is considered where learners collaborate and learn. A city guide based case study has been analyzed and collaborative services and participating domain entities are identified. A model driven development approach has been proposed to model the composition of collaborative services, refining the model to specify the service behavior, and to generate the application code from such models. The proposed methodology adds automation and more flexibility to domain experts.

Keywords: Collaborative learning, model driven development

INTRODUCTION

Well known principle in system engineering is to start by analyzing the problem domain rather than starting from specific technological solutions. City-wide collaborative learning domain is therefore analyzed and requirements and guidelines are discussed in (Calori, 2009). A delivery platform has been developed that provides general mechanisms and services to supports the domain (Kathayat, 2009).

The development of mobile and collaborative services for end-users faces several major challenges. Crosscutting service behaviors needs to be specified and designed so that components of the system interact consistently, providing the desired functionality. Complexity arises from the necessary coordination of distributed behaviors using asynchronous, peer-to-peer interactions. At the same time it is desirable that nontechnical people such as teachers can compose new services rapidly. Moreover, end users expect sophisticated and responsive user-interfaces. Not only do these depends on the availability of certain libraries for user interfaces (like swing or android), but they should also fit perfectly with the device they are executed on, to match the screen size and input methods. This implies a level of details that, using conventional modeling and programming techniques, is hard to combine with the cross-cutting view on service interactions needed to get the overall system right. The reactive nature of these perspectives unites together i.e. both user-interfaces as well as distributed communication react on the events from the environment i.e. user inputs or reception of signals.

We, therefore, have been looking for ways to simplify and improve the process of service development, and have got very encouraging results. By using the ideas of collaboration building-blocks supported by the ARCTIS tool (Kraemer, 2007) it is possible to model comprehensive collaborative services as well as their user interfaces on a high level of abstraction. The building blocks lead to an incremental specification style, since they can be developed and analyzed in isolation, and serve as interfaces between experts of different domains. The complete system specification can then be implemented in an automated way. As a case study, a city guide service is analyzed, modeled and implemented.

A CITY GUIDE SCENARIO

New students (or tourists) have just arrived in a city. They wish to learn different places of interests (POI) around the city. They move around the city with hand held devices specifying their profiles and preferences. Based on the locations and profiles the learners may belong to (create, join or leave) different dynamic social groups and perform social activities and learn. For instance when a learner is trying to find a particular POI (e.g. historic building), the learner may interact with others such as having similar interests, who are currently trying to identify the same POI or who have already identified that POI and/or left a comment about it. The scenario is analyzed and different services and interacting domain entities have been identified in (Kathayat, 2009) such as social matching, interactive quiz, group chat, positioning and etc.
SERVICE DEVELOPMENT METHODOLOGY

The proposed service development methodology is based on model driven development approach. In this approach, services (or applications) are first specified in abstract and platform independent models. Such models are then transformed into detailed and platform specific models and even application code is then generated. The proposed method is based on the previous works such are SPACE (Kraemer, 2008) and TIMe (Bræk, 1999). Overview of the method is shown in Figure 1 and is briefly described as following.

- Service models: Services can either be taken from the library (if available) or can be designed using Arctis like tools. Services are represented as building blocks having different types of input and output pins. Service behavior is expressed by UML activity diagrams.
- Global choreography models: Such services are composed together by connecting their pins together. This composition is technically not much detailed and is supposed to be done by domain experts such as teachers (the size of user icon in Figure shows human effort). This model basically shows the global ordering of the services. This also helps to detect the non-realizable compositions in a very high level.
- Local choreography models: The service pins and control constructs (such as decisions, merge) are localized to a certain service roles in the local choreography level. This may optionally be a intermittent step and may be made hidden or visible to the domain experts. Service developers or service engineers may look into it in-order to find and correct the errors. This model is semantically equivalent to Arctis model however it is better to Arctis in terms of layout. Arctis tool can be used for model checking, state machine synthesis and code generation from this model.
- Component models: In order to support the composition with heterogeneous components/role types having equivalent functionality, a component models are used. These models are automatically generated from local choreography models. These models are used to generate the application code.

IMPLEMENTATIONS

Current status of our tool set is that, agent behaviors and an application code can be automatically generated from the local choreography service models described above. Application be automatically generated (from the same service models) to different platforms such as Android, j2se, OSGi, and sun spot (Kathayat, 2009 and Kraemer et al., 2009). We are currently working with the global choreography models and component models as shown in Figure 1.

CONCLUSIONS

We have briefly discussed the model-driven methodology for the development of collaborative learning services. In particular, we have shown that how the collaborative services can be modeled using UML 2.x collaborations and activity diagrams and incrementally refined and composed. From the composite models, application code is generated. Future work consists evaluating developed application for learning and getting some feed backs.

REFERENCES

Learning in City Through Multi-Agent Support

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Abstract
Availability of wireless network in city can allow to convert a city into leaning arena for its inhabitants. However, informal learning which takes place in the city requires very different kinds of support from the learning system. In order to take full advantage of networking support, the learning system needs to perform intelligent operations to help the learners and possibly increase the learning outcome. In this paper I provide a very brief overview of such system. The system discussed here mainly focuses to support collaborative learning in a city. User profile management, context awareness and recommendations are the main features, which are realized using multi-agent system.

Keywords: informal learning, citywide, multi-agent, services, context, user profile, preferences

INTRODUCTION
Ubiquitous availability of wireless networks in citywide context and handheld-networked devices can potentially offer great benefits for the inhabitants of the city. Among others, a possible benefit is to utilize the available networking infrastructure to let people learn as they move in the city. Such form of learning (i.e. informal learning) is different from the learning (i.e. formal learning) that takes place in the classroom environment; involving teacher, students and predefined patterns of activities (e.g. student attends lectures, teacher gives out notes and assignments, students submit assignments etc.). During informal learning the boundaries between teacher and student fades out and both becomes knowledge peers. Such learning occurs through collaboration and knowledge sharing among knowledge peers, by performance of shared tasks, through social networking and by participating actively in learning activities (Canova & Divitini, 2008). Further more such learning may spring out in an unplanned and ad-hoc manner through interaction, exploration and serendipity (Canova, 2009). Informal learning is increasingly becoming popular in the technologically enriched societies where network connectivity is ubiquitously available. "[....] more learning needs to be done at home, in offices and kitchens, in the contexts where knowledge is deployed to solve problems and add value to people's lives" (Leadbeater, 2000).

While the core purpose of “Learning Support Systems” (LSS) used for formal learning is to provide access to the learning resources. But, when considering learning, which takes place outside the classrooms; the requirements on the support required form the LSS changes dramatically. Since such learning takes place in more open and unpredictable environments. In such situation just the ubiquitous availability of communication infrastructure and mobile devices is not enough for learning. Also considering the fact that a teacher might not always be available to learners. This requires "[...] networked tools that support and encourage individuals to learn together while retaining individual control over their time, space, presence, activity, identity and relationship” (Anderson, 2005).

Thus, there is a need of well-designed LSS; these systems should take into account both technical and pedagogical aspects of learning. Such system will provide the supporting services (functional units) and mechanisms (intelligent decision making) to conduct learning and collaborative activities. There might occur numerous potential possibilities of learning and interaction with other learners, but not every learning possibility will be real. The system needs to employ techniques to filter out the unimportant possibilities. It is important that LSS participates actively and intelligently during the learning process and attempt to fulfill the expertise gap created by the unavailability of teacher.

In the later sections I discuss an LSS we are developing in context of project FABULA1 and describe the highlights of our approach for developing our LSS for informal learning. I finish by presenting the questions, which I want to discuss with audience during the symposium.

1 FremrAgende By for Undervisning og LAering – (Seamless networks for transforming the city into an arena for learning) NFR project number 176841/S10
OUR APPROACH

The proactive role of LSS to support informal learning naturally requires application of software agents as main components of LSS. Software agents are autonomous entities, which provide and consume services and are capable of taking intelligent/proactive actions based on reasoning about the state of their environment. A similar approach (Khan & Matskin, 2009, 2010a) has been applied in FABULA system. Communication, Coordination and Negotiation among agents is supported by using the AGORA framework (Khan & Matskin, 2010b). Through this it is possible for the learning system to participate actively and intelligently during the learning process; by following and assisting the learner throughout the learning process. Through recommendation and filtering of relevant learning material, by understanding and evaluating the “learning context” of learner and adjusting the system's behavior accordingly and thereby personalizing the learning experience for each individual learner.

Some Highlights of our approach

In our approach we consider a “city” consisting of many different “learning places” (e.g. museum, city center, old bridge etc...). Each “learning place” consists of several “learning opportunities” (e.g. monument in the city center etc…). All these concepts are represented by their geographical coordinate points in the system. When learners with their mobile devices navigate through the city their position is updated in the system by using the wireless connection available throughout the city. An implicit (developed incrementally over time) and explicit profile of each learner is maintained in the system, in order to understand her better. Each learner also has the possibility to decide about her preferences of system’s behavior towards her. Based on the position (in the city), profile, preferences and other learners surrounding the learner (i.e. Context) the system adopts its behavior towards the learner. A learner may decide to engage in solo learning activities or group based learning activities. System supports different learning activities and has the ability to be extended for more learning activities. Learners are represented in the system by their personal agents situated in the mobile devices; personal agent performs many functions autonomously for its user. The system also provides collaboration services to the learners such as chat, voting, discussions etc…

ISSUES AND POINTS OF DISCUSSION

• Among the different aspects of context, which aspects are more important for informal form of learning presented above? Position of learner? Learning activity? Other learners? Profile/preferences of learners? Time/place/date of learning? Others?
• In what different ways can the software agent behave to increase the learning outcome during learning activities? Autonomously replying and filtering different incoming information? Recommending learning contents? Others?
• “How many” / what responsibilities of a teacher can be replaced by software agents? Any? None?
• To what extent should the software agents be allowed to help the learner? How can this effect the learning out come?
• What different aspects of “informal learning in a city” should ontology cover?
• What are important aspects of learning activities in the settings described above?

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Scaffolding Collaborative Learning With Cognitive Tools Based on Mobile Computers

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Abstract
This thesis focuses on developing and analyzing innovative ways of applying the framework of distributed scaffolding for learning activities in authentic real world contexts. In this study, theoretical ideas of cognitive tools and scaffolding are applied for designing lightweight mobile software and pedagogical models for learning in authentic real world contexts. This is done in order to generate new knowledge and solutions that advance collaborative learning in mobile computer supported collaborative learning.

Keywords: Collaborative Learning, Scaffolding, Mobile Learning

INTRODUCTION
This doctoral thesis focuses on the ways mobile computers (handhelds, mobile phones) support social interaction, cooperation and collaboration, for learning and knowledge building. In general, several researchers on Computer Supported Collaborative Learning have put special emphasis on how to favour the emergence of productive interactions and to improve the quality of knowledge building by using technological learning tools as scaffolding agents (Lai, Yang, Chen, Ho & Chan, 2007; Sharma & Hannafin, 2007). Scaffolding makes learning more tractable for students by changing complex and difficult tasks in ways that make these tasks accessible, manageable and within students’ zone of proximal development (ZPD) (Vygotsky, 1978).

In this thesis, a further elaborated framework, distributed scaffolding, has been employed as the theoretical framework for supporting collaboration. Although mobile computers are a self-evident example of distributed scaffolding in this thesis, it can also take a variety of other forms—it can be extended to cover physical artifacts and representations, which can serve as cognitive tools that mediate action (Palincsar, 1998; Wertch, 1998). In other words, instead of a single knowledgeable person or software providing support, there are multiple ZPDs consisting of tools and resources, peers or the environment itself (Puntambekar & Hubscher, 2005).

PURPOSE OF THE STUDY
This thesis focuses on developing and analyzing innovative ways of applying the framework of distributed scaffolding for learning activities in authentic real world contexts. In this study, theoretical ideas of cognitive tools and scaffolding are applied for designing lightweight mobile software and pedagogical models for learning in authentic real world contexts. This is done in order to generate new knowledge and solutions that advance collaborative learning in mobile computer supported collaborative learning. This objective is broken down into smaller objectives:

The first objective is to design effective scaffolds for combinations of humans and artifacts to further illuminate the framework of distributed scaffolding. Research question: What are the effective scaffolds for collaborative learning mediated by mobile computers? (Articles II, IV)

The second objective is to evaluate a lightweight design of cognitive tools aimed at scaffolding mobile computer supported collaborative learning. Research question: How can mobile computers and appropriate software be used to scaffold collaborative learning? (Articles I, II)

The third objective is to explore the effects of using the tools for learning in authentic real world contexts. Research question: What are the social, educational and technological affordances, which either constrain or promote collaborative learning during the activity (effects with) and after the activity (effects of)? (Articles I, II, III, IV)
CURRENT STATE OF RESEARCH & RESEARCH DESIGN

The research carried out in this thesis project consists of literature reviews, empirical activities, conceptual design, technological development practises and evaluation. It has been conducted on three case study experiments over a four-year period (see Figure 1). Each one of the predefined experimental activities was inspired by ideas and guidelines from design-based research and scenario-based design.

Figure 1. Overview of the research activities.

In this research, qualitative and quantitative methods were used. The reason for this mixed-method approach is attributed to the social-technical nature of the field of TEL, relating to design and engineering challenges. Creswell (2003) and Denscombe (2007) referred to the combined use of qualitative and quantitative research methods as mixed methods. Creswell (2003) suggested that the use of such an approach was beneficial, especially in the domain of complex systems and human-computer interaction. Such techniques in this thesis include not only interviews and surveys, pre- and posttests and interaction databases and log-files, but also contemporary data analysis methods including social Bayesian network analysis methods. To conclude, these various techniques facilitate the examination of many different aspects of the design and development of a qualitative and quantitative profile that characterizes the design in practice.

Overview of the empirical studies:

Case study I: The study was conducted in realistic settings within the University Learning Center, which offers education through retraining programmes within master’s programmes on information processing sciences. The task of the distributed organization in the Learning Center was to design and coordinate activities in the virtual master’s programmes (Laru & Järvelä, 2004).


Case study II: Twenty-two students (all aged 12) participated in a one-day learning project during a field trip to a nature park in a wilderness forest setting in northern Finland. Each dyad/triad was provided with a mobile phone and a prototype of a ubiquitous peer-to-peer messaging platform called Flyers (Laru & Järvelä, Clariana, 2006).


Case study III: The participants were 22 adult students (17 females and 5 males, age median 38 years) in higher education learning sciences and educational technology course for a period of 12 weeks. The group work of 4–5 learners was structured to recurrent individual and collective phases (see Figure 1), which were facilitated with social software (media-sharing, personal weblogs, wiki and syndication service via RSS) as well as mobile phones (mediasharing, syndication) and laptop computers (Laru & Järvelä, 2008b).


REFERENCES


A Context-Aware Framework for City-Wide Mobile Collaborative Learning

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Abstract
Mobile and wireless technologies open new possibilities for city-wide mobile learning. People can create knowledge by exploring in the city and interacting with others. Context awareness can help learners find potential collaborators, initiating collaboration communication and maintaining effective cooperation activities. Based on analyzing the functions of context awareness in the process of collaborative knowledge creation, a context-aware framework is proposed to collect, transform, process and deliver context information. Relative questions in context-aware framework are summarized for discussion.

Keywords: mobile learning, context awareness, collaboration, framework

INTRODUCTION
The emergence and development of mobile and wireless technologies open new possibilities for both formal and informal education (FABULA Project Introduction). The previous Internet-based E-learning puts focus on distance learning among people that are geographically distributed. The employment of mobile devices makes it possible for people to learn by exploring in the city and interacting with other learners in local learning communities. City-wide mobile learning encourages people to create knowledge by communication and collaboration. Successful collaboration requires the awareness of each other’s context information among learners. A learner can coordinate collaboration smoothly and dynamically when he knows who is currently available both in location and time, what his learning interests are, and what activity he is engaged in. And once the collaboration activity starts, the efficiency and effectiveness can be guaranteed by keeping a learner aware of context information: what task the collaborator is taking, what achievements he has made and what changes he is making.

Currently, most researches on mobile learning focus on how to provide adaptive content information for learners with the help of context information (Chuang et al., 2010, Chuantaol, et al., 2009, Didac et al., 2010) With the development of city-wide mobile collaborative learning, the research question of how to use context awareness to facilitate the establishment and maintenance of collaboration becomes more and more important. In order to meet with the requirements of context-aware collaborative learning, a context-aware framework is proposed to collect, transform, process and use context information.

CONTEXT-AWARE FRAMEWORK
Collaborative knowledge creation can be divided into three stages: finding potential collaborators, initializing collaboration communication and maintaining effective cooperation activities. A suitable potential collaborator may have the same learning interests with the learner, or present coincidently at the same location at the same time with the learner. To find a possible cooperator, learners need to identify each other’s learning interest, knowledge, availability, location, aspiration to cooperate. At the next stage, learners can initial collaboration communication on possible collaborative learning objective and tasks. When these objective and tasks are agreed by each other, the following cooperation activities can be effectively conducted with informing each other’s work progress. Context awareness can play important roles in all three stages. In the first stage, context awareness can help learners screen out suitable potential collaborators from a huge number of candidates by considering time, location, interests, knowledge and the current learning task. In the second stage, context awareness can help learners determine the available means of communication with the chosen collaborators. The context information, for example, current state of the counterpart (online or offline, busy or free, far or
near) and available communication channels (face-to-face, voice, messages) are very useful for learners to launch the collaboration request. In the third stage, learners can plan the learning content and collaboration manners accordingly by awareness of the other partner’s task progress and available collaborative ways.

There are some challenges when applying context awareness to support mobile collaborative learning. For example, context information can be collected from many different sources, such as sensors deployed in the city, Calendar and Schedule applications in mobile devices and mobile learning applications, when learners explore the city and interact with others. The context information from different sources has different format and meaning. The requirements for context information in different learning scenarios and stages are different. The context information should be integrated and filtered according to specific situation. Context information has to be delivered to learners with the appropriate manner at the right time. In order to apply easily context awareness to specific mobile learning applications, context awareness should be independent and generic.

In order to deal with these challenges, a context-aware framework is proposed to collect, transform, process and use context information.

1. Collecting context information from different sources.
   Collection component supports various context-sensing technologies. The collected information is integrated and stored for the future use.
2. Transforming context information to appropriate formats.
3. Processing context information according to specific requirements.
4. Delivering context information in suitable manners at the right time.
   Learners can selectively subscribe some context information. And context information can be used to trigger events.

There are still some questions left to be discussed:

1. The granularity of context information. Different learning scenarios require different granularity of context information. How to determine the appropriate level in actual situation?
2. Privacy protection of context information. Learners have to expose some personal information during the process of collaborative learning. The extent of information exposing is related to stages and roles in collaboration. Privacy rules should be given to control the visibility for strangers and collaborators. How to design appropriate privacy rules to balance the attraction of collaboration and privacy protection?

CONCLUSION

Based on analyzing the functions of context awareness during the process of mobile collaborative learning, a context-aware framework is proposed to deal with the challenges of collecting, transforming, processing and delivering context information. The context-aware framework is flexible because of its independence with specific learning applications. The granularity of context information and privacy protection issues are left to discuss.

REFERENCES

Elementary School Students’ Regulation and Cognitive Strategy Use in Challenging Learning Situations

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Abstract
Empirical studies have successfully demonstrated how cognitive and motivational predictions of students’ academic outcomes. Yet, it’s not probed through how students maintain their learning intentions when studying with computer supported learning environments. The specific aim of this paper is to introduce the methods that are used to investigate what types of challenges students’ encounters when studying with computer supported learning environment in a classroom context and illustrate with log file traces what kind of learning activity is related into regulation of these challenges.

This participants of this study are elementary school students (N=20) aged 9 to 10 years who participated in a science project for two months that supported SRL to emerge. During the science project, the students used gStudy learning environment for their studying which recorded log file traces of the learning activity. The student’s subject knowledge was measured before- and after the science project. Each student was also interviewed after the last lesson. The challenges students encountered were recorded in gStudy and asked when the students were interviewed. So far, the study results suggest that the students’ willingness or skill to encounter these challenges vary and it seems to influence to the following learning activity.

Keywords: self-regulated learning, cognitive strategy, motivation, computer supported learning, log file traces, elementary school students

AIM
First aim of this paper is to describe what kinds of data that represents elementary school students’ self-regulated learning when studying with computer supported learning environment in a classroom has been collected. The second aim is to introduce methods that are used in order to examine log file traces about the students learning activity in order to illustrate how the students actually regulated their learning in challenging learning situations

RESEARCH DESIGN
The participants are (N=36) primary and secondary school students, who use gStudy learning environment when studying science. The length of the study periods vary from a long-period data collection (up to 6 weeks) which prompted SRL to short targeted data collection (2 hours). This paper focuses on the first long-term data-collection (Figure 1).

The data is collected in three phases during the years 2008–2010. The first long-term data collection was conducted in autumn 2008 (Malmberg, Järvenoja & Järvelä, 2010). The targeted three empirical data collections are conducted one in each year, during the years 2009-2010 to follow how same students develop their learning strategies while studying with gStudy. During each study period gStudy learning environment was utilized to support students’ cognitive self-regulation. GStudy is multimedia learning system that offers cognitive tools that support strategic and self-regulated learning and gathers log file traces about learning activity (Winne et al., 2006).
METHODS

First, (A) logfile traces (F=177) gathered from the students gStudy learning sessions shows detailed information about the studying time in gStudy, the order of performed learning activities and the quality of performed learning activities (Nesbit, Xhou, Xu & Winne, 2007).

Second, (B) pre- and post tests about the subject knowledge were conducted before and after the study period. This will give an opportunity to classify the students in two categories, namely high - and low achievers.

Third, (C) semi structured interviews (F=20) included questions about the challenges the students encountered and regulation activities they reported to use in order to regulate these challenges. This will show what types of challenges and regulatory activities were used when studying with gStudy (Järvenoja & Järvelä, 2005).

Fourth, each time the students logged in a gStudy, the students were asked to identify a reason for their (D) motivational state (Järvenoja, Järvelä & Malmberg, in press). Locating log file traces about where the students report their situational motivational state "challenging" will give an opportunity to show how the following learning activity exactly was according to logfile traces and how the students regulated their learning.

RESULTS

So far, based on our earlier findings, the study results have suggested that elementary school students have potential to self-regulate their learning and successful regulation is linked positively into the students’ achievement (Malmberg et al., 2010). Yet, the students’ willingness or skill to encounter these challenges vary and it seems to influence to the following learning activity (Järvelä, Järvenoja, Malmberg, & Winne, 2010).

In order to locate the learning situations that required SRL, log file traces from those situations will be traced based on the students’ reflections about their motivational state. This will provide information about how the regulation activities (or lack of them) influences about how students actually maintain their learning intentions when confronting challenges. Also, this will provide detailed information about what are the differences between high- and low achievers regulatory- and learning activity when studying with computer supported learning environments.

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“Agents” Research Programme: Defining Efficacious Agency

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Abstract
This research project aims to identify factors both promoting and hindering children’s efficacious agency in the formal and informal contexts of childhood. In this research project, we explore the potential of theoretical concepts of self-efficacy, resilience and agency in order to define ‘efficacious agency’ at theoretical and empirical levels. Initial progressive refinement of our hypotheses will guide the next phases in the research project whose major goal is to create and use stimulations as pedagogical methods and tools for supporting the development of children’s efficacious agency in diverse contexts. In following this line of thought, the main principal in the research project is to consider children as co-researchers who are active participants in data production and interpretation for the promotion of their efficacious agency. This approach requires the refinement of video research methods to meet the authentic worlds and voices of children. Thus the aim of the research programme is to develop new pedagogical approaches for ubiquitous learning environments.

Keywords: efficacious agency, video research, stimulations

AGENTS RESEARCH PROGRAMME
Our first objective is to study how the concepts of self-efficacy and resilience explain children’s wellbeing. Our hypothesis is that these two concepts broaden the perspective of childhood development and learning and make for a new 21st century learning perspective. Self-efficacy beliefs are the core notions that people hold about their capabilities of performing in certain tasks that occur in their lives and the beliefs about how powerfully their efforts influence for the actions which they perform. Self-efficacy beliefs also help determine how much effort people will expend on an activity, how long they will persevere when confronting obstacles, and how resilient they will be in the face of adverse situations (Pajares, 2006). Resilience, instead, is usually defined as a developmental perspective, which refers to active coping and maintaining positive expectations in face of adversity and setbacks. It is dynamically developing and influenced by ongoing changes in context (Masten, 2001).

Based on these theoretical frameworks our second objective is to study efficacious agency in formal and informal settings. Our hypothesis is that children’s efficacy can be developed by supporting the development of their socially constructed agency. The idea of agency is that people do not merely react and repeat given practices, but intentionally transform and refine their social and material worlds as they confront particular challenges. We hypothesize that whilst children are positioned in learning environments where they are framed as authors of their own learning, this strengthens students’ agency. It gives them a possibility to learn to act authoritatively and accountably, and to build a strong ownership of their actions. But to make them more resilient, to build their efficacy, they need agentic experiences; that the things that they do and ideas that they produce are respected and recognized, and have some impact to their own lives.

Thus, if we want to educate agentic children that have capabilities for learning, and in large frame, efficacy to transform one’s own life activity, we must understand more deeply the relation between efficacy and agency. Our third objective is to operationalize efficacious agency to “stimulations” which help children to act as active participants and to study whether stimulating experiences mediate the relationship between self-efficacy, resilience and well-being. Research on environmental processes is consistent with the theoretical and empirical findings that stimulating activities promote children’s agency and resilience (Webster-Stratton et al., 2001). Efforts to reduce problems in behavior with stimulations could include examples of different methods and procedures to refocus attention and regulate behavior (Kim-Cohen et al., 2004). Stimulations can also activate adults (teachers, parents) to promote children’s efficacious agency, and to shape their environments.
In practice, these stimulations could be in the form of playful learning, e.g. various play episodes and games while using particular playful learning environments (Hyvönen, 2008).

Our fourth objective is to develop video research as a method that recognizes children as active participants. Our hypothesis is that children’s active participation can promote their efficacious agency. The main principal in the research project is to consider children as co-researchers who are active participants in data production and interpretation in the promotion of their own efficacious agency. The shift will thus be from research on children to research with children and positioning children as participants and as authentic co-researchers. Goldman-Segall (1998) shows that children can take part in video research in a way that does not portray them only through the lens of the researcher or as mere participants, but as competent actors and stakeholders in research. Children can participate in multiple ways in video data production: they can direct the focus of the camera or film with it, they can play with the camera, act in front of it or interview each other or the researcher. The power of this ‘approach’ is not only to be found in its method to tap into the knowledge that children possess of visual media or of their competences in engaging with the camera. This video research approach allows children to express their agency hence they can tell their own stories and share their experiences and knowledge of the world with others. In other words, children have a strong ontological position. Digital video compositions, written annotations and “voices” of children as represented in the field notes, in addition to the researchers, form the emerging patterns that inform our theories.

Thus video will act as a method and design in this research project. Children will design video episodes of their authentic life in diverse contexts (e.g. episodes from school, playground or museum), observe and discuss about stimulations in peer groups and develop and design ideas further to be used with parents in home settings. In the preschool context episodes from home contexts will be used. Theoretically the research project aims to broaden the understanding of children’s efficacious agency and development as phenomena where interpersonal, individual and contextual factors interrelate. In data gathering innovative methods such as children’s own voices, parent’s views as well as researchers’ and informants’ co-researching are used. In data analysis, multi-method and diverse research methods are developed to capture the phenomena and to get different lenses to the interpretation of the material.

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The Design of Mobile Learning Activities Informed by Learning Theories

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Abstract
We need mobile learning innovations that are adaptable in educational settings. Considering this aim, the mobile learning field has had a history of technology-driven designs with less successful results. However, in order to overcome the shortcomings of the technology-driven attempts several studies have leaned towards co-design approaches that involve teachers and students in the design process. In this position paper, we argue that the co-design approach is insufficient on its own and we direct our focus towards learning theories to inform the design of mobile learning activities in educational settings.

Keywords: Learning design, learning theory, co-design, evaluation

INTRODUCTION

Today we are witnessing a rapid advancement of mobile technology and along with that an emergent mobile learning field that has revealed a potential to transform the very nature of learning (Traxler, 2007). One of the field’s promising interests has been mobile learning in formal educational settings, and a growing body of pilot projects has been designed in this direction. Design for mobile learning has however become a critical challenge (Walker, 2007). There has for instance been an undesirable tendency to employ excessive technology-driven approaches, where learning adopts to technology instead of vice versa, resulting in less successful outcomes (Naismith et al., 2004).

An important issue that requires consideration is how we design innovative mobile learning activities that are both effective and adoptable in educational settings (Milrad, 2006). In an attempt to avoid the technology-driven approaches, advised by Denk et al. (2007), and design adoptable innovations, several projects such as Skattjakt (Spikol et al., 2008), have leaned towards human-centered co-design approaches. The co-design approach is a collaborative team-based process in which teachers and researchers work together to design educational innovations that fit into classroom contexts (Penuel et al., 2007). In order to design an adoptable innovation the approach puts teacher’s goals for learning and their beliefs of what learning takes, in center of attention and an assessment of their practices is a crucial step. The teachers are also accountable to help frame a vision for the innovation under creation, state their needs, and provide input after prototype testing.

The co-design approach has however deficiencies that can’t be neglected. It has for example been shown from studies that tensions arise during the design process and moreover that the efficiency of the end product can’t be verified (Penuel et al., 2007). The tension is often a result of the teachers and the researchers’ different learning goals and different criteria for evaluating success (Penuel et al., 2007). Additionally, we argue, that the end-product of co-designs in these settings, to high extent, is situational-bounded and can’t be claimed to be universal fit-able and transferable per se into other educational settings. This holds true, based on the background that the design is a result of inputs taken from teachers with subjective practices, needs and conceptions of what it takes to learn. There is furthermore no guarantee that the teachers don’t have outmoded conceptions of learning and its practice. Consequently, one can question the output of the design-based research in these studies.

Even though the transition from technology-driven design approaches to co-design was a step forward in the development, this step risks to result in end-products that reflects an adaptation to individual teachers conceptions of learning and its practice. Is it possible to take a step further, to adapt to general abstracted knowledge, instead of individual conceptions? A way to ensure that the end-product can be transferable and generalizable, meet both teachers and learners needs, could be to take the starting-point in the
learning theories - the abstracted and general knowledge we already have about what learning needs.

Similar difficulties and problems are found in evaluation of learning outcomes due to the adaptation of methodological approaches for evaluation of technology support for collaboration and learning.

In this position paper we ask the following questions:

Q1: How do we design mobile learning activities informed by learning theories?

Q2: Which learning theories are suitable for mobile learning?

Q3: Can we in pedagogical learning activity design find and/or adapt appropriate methodological approaches to ascertain learning outcomes?

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Inspiring Collective Creativity With Social Media and Pictorial Knowledge Representations

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Abstract. In this position paper, we address the issues of designing innovative learning practices with social media and mobile applications in higher education context. In our design experiment we deployed pictorial knowledge representations as a way to activate students’ thinking and knowledge sharing processes. We describe the design principles as well as outcomes of the study, and we offer ideas for the future challenges in respect of designing learning that stimulates active thinking and regulation of knowledge co-construction processes among the higher-education student groups.

Keywords: collective creativity, knowledge co-construction, learning design, mobile learning, pictorial knowledge representation, self-regulated learning, social media

INTRODUCTION

This position paper addresses issues of designing innovative learning practices with social media and mobile applications in higher education context. Creative thinking is one of the basic goals of higher education, since HE students are when graduated expected to work in an expert position where thinking skills as well as group working skills are highly valued. Collective creativity can be defined as a process where different and often controversial points of views are bridged together to create shared understanding in order to lead to the new insights, new ideas and new artifacts. Creativity flourishes best in a social environment which is stable enough to allow the efforts, yet diverse and broad-minded enough to nourish creativity in all its forms. Current technological development offers new methods and tools to practice and stimulate creative thinking in groups. In our design study we deployed pictorial knowledge representations as a way to activate students’ thinking and knowledge sharing processes (Näykki & Järvelä, 2006; 2008).

The concept of knowledge representation holds a dual meaning. Internal or mental knowledge representation refers to how information or experience is represented in individuals’ mind, what kind of interpretation about the issue or concept in question individuals have constructed. In addition in a social learning situation individuals need to make their thinking explicit for others by externalising their internal knowledge representations. This externalisation has two functions; it makes the knowledge co-construction fundamentally possible and can enhance individuals’ learning (Brown, Collins & Duguid, 1989, Collins & Brown, 1988; Lesgold, 1998). External knowledge representations can be viewed as object for individual or group to think with - to support information accumulation, transformation and interpretation. It can become a shared artefact of a group representing shared knowledge. Knowledge can be represented externally in different forms; e.g. as a speech, text, picture, figure, diagram or matrix. Prior studies have shown external representations importance to individual understanding and problem solving (e.g., Cox, 1999; Kotovsky & Simon, 1990; Larkin & Simon, 1987; Novak, 1990; Novick & Hmelo, 1994; Schnotz & Bannert, 2003; Zhang, 1997). However, only few studies have explored the role of representational aids in supporting groups’ learning processes (e.g., Suthers & Hundhausen, 2003).

The recent development of mobile technology and social media applications, such as blogs, wikis, social bookmarking and rich media sharing, as well as interest toward those potential in learning contexts have made possible to find out new ways to support also collective creativity. Handheld devices, e.g. smart phones are capable of capturing images, sound and video, and this kind of data can provide the basis for reflection and creative thinking in educational contexts (see e.g., McGreen & Sánchez, 2005). When captured images are students’ meaningful representations of learning they are considered as a pictorial knowledge representations. Social media services, eg., flickr, offer easy and affordable to use service for distributing the representations and blogs and wikis offer a platform for the use of representations in a larger learning environment.

In order to design appropriate dynamic support that is needed for collective creativity with mobile devices and social media, the collaborative interaction processes, including aspects of creative thinking, need to be
understood well enough. Our own empirical design studies have explored collaborative interaction from knowledge co-construction point of view (Näykki & Järvelä, 2006; 2008), regulation of shared learning activities (Näykki, Järvenoja, & Järvelä, 2010) as well as structuring of collaborative learning (Järvelä, Näykki, Laru, & Luokkanen, 2008). The pedagogical ideas and design principles in our studies are grounded on collaborative learning, including the socially distributed nature of cognition; in other words, humans are acting not only by using mentally represented knowledge, but also using knowledge distributed to several participants as well as knowledge tools and artifacts (Hutchins, 1993, 1995; Norman, 1993). Furthermore, studies are constructed by using self-regulated learning theory (Boekaerts, Pintrich & Zeidner, 2000). SRL theory concerns how learners develop learning skills and use the skills effectively by taking charge of their own learning by setting goals, using strategies to monitor, regulate and control learning process and evaluate actions.

The idea and importance of creativity in collaborative learning has arisen from our empirical studies; the need for creative thinking was implicit part of the learning design, but the students in the study made the importance of creativity more explicit. In other words, the visual tool of pictorial knowledge representation demanded and afforded creative thinking; for example the created pictorial knowledge representations were meaningful, idea rich and metaphoric (Näykki & Järvelä, 2008). In an individual level pictorial knowledge representations worked as a knowledge tool for activating individual thinking and knowledge construction processes and in a group level they worked also as a shared reference point (Pea, 1994) in generating shared understanding among the group members. However, collective creativity was also proven to be cognitively challenging; our study indicates that pictures can carry individuals’ co-created meanings within, but since those meanings are often personal and have multiple meanings, the negotiation processes are highly valuable. In sum, externalization of thinking in a visual mode can support creativity by 1) producing a record of students’ mental efforts, 2) causing students to move from mental conceptualization of an idea to a more concrete representation of it, 3) making thoughts and intentions more accessible to reflection (individually as well as in groups), 4) providing a means for others to interact with, negotiate around, and build upon an presented idea.

The future challenges that interests this position paper are: how to define collective creativity within the framework of collaborative and self-regulated learning and specify why it is important in higher education context; how collective creativity and knowledge building are interwoven processes; how can we help people of all ages learn to think and act more creatively; how can we help people to act as active contributors in learning; how to design learning activities that support collective creativity; what kind of technologies can be used and/or developed to support collective creativity in higher education context?

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Software Development Processes for Mobile Learning

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Abstract
The software development field is changing in order to be able to handle the new requirements for developing online systems. The notion of Software Ecosystems holds some promise to take advantage of externalizing development processes and harnessing external developers. Expanding the developer base enables vendors to better deal with customization and variability in the system. This paper elaborates on some of the important notions to enable this such as software reuse and presents a reference model that enables reasoning around Software Ecosystems for small communities in Mobile Learning. It also outlines some of the directions future efforts in the domain could take.

Keywords: Software Ecosystems, Reuse, Mobile Learning, M-learning

INTRODUCTION
Education in this information society is more important than ever. There are plenty of systems in E-learning for supporting learning processes in different fashions from a plethora of Course Management Systems like Moodle, Sakai and Blackboard to Learning Activity systems like LAMS or TelosLD. The success of all these systems depends on standardization however (Pettersson, 2009). Things like TCP/IP, HTTP and HTML are all open standards and are the base for what we now refer to as the Internet. This level of standardization is not pervasive however and fragmentation is present. A field where this fragmentation is clearer than in most is mobile communication devices. The mobile device industry was until a few years ago so fragmented that models from the same manufacturer from different generations was not binary compatible. One of the main reasons for this is the wide array of hardware ranging from simple phones with black/white screens to fairly advance personal computer-like devices. The introduction of the iPhone and Android was at first thought to be a part of a solution to the fragmentation issues but given a few years this was largely hype. A notion that changed the playing field however is the introduction of their respective ways of provisioning extensions to their existing code base and enabling external actors to take part in this development. Equipping external developers with toolsets and support, a shift of power took place and external developers were given new opportunities to extend what the platform was capable of, software-wise. These developments help but doesn't solve the problem of fragmentation between vendors and it certainly doesn't solve the problem of domain-specific solutions across this landscape.

So how can software development and processes in domain-specific solutions be supported in high variability landscapes such as mobile learning? This short position paper will elaborate on some of the important notions involved in a possible foundation for partly remedying these issues. Elaborating on the importance of reusability, what implications that has for collaborative development and towards the founding of a Software Ecosystem for this particular domain.

A REUSABILITY PERSPECTIVE
The notion of Web 2.0 is a popular topic these days, and regardless of the term it is quite clear that the face of the web has changed. Participation is now a central theme in the web landscape and people are sharing details about their lives every day on online social networks. But this participatory culture is not limited to social updates or media. Forums for different kind of interest have been available for long where users can discuss problems and get advice. New ways of sharing knowledge have emerged recently, good examples of this is for example Stackoverflow and CloudWorks. Here a small community is created around a domain to provision sharing of ideas and solutions in a structured and reusable manner. This type of crowd-sourcing solutions is gaining in traction even within companies that sees the possibility of the approach (Howe, 2006).
At a first glance the case for software reusability as a solution for the problems elaborated in the previous section seems to be an obvious solution. But software reusability is an elusive goal and even thought the meaning of the word is clear, the implications and actions to achieve reuse remains elusive at best. According to Krueger (1992) the primary motivation for reuse is to reduce the time and effort to build software systems. According to Jones (1993) there are ten different reusable aspects of software. These are (1) architectures, (2) source code, (3) data, (4) designs, (5) documentation, (6) estimates, (7) human interfaces, (8) plans, (9) requirements and (10) test cases. All of these are applicable to some extent to the domain of mobile learning but the focus has so far seem to have been on number 3 (Learning Objects) and 4 (Learning Design) (Pettersson, 2009). This implies that there is plenty of opportunity for improvement in the area of reusability of software in the mobile learning domain. Software Reuse as a field has many established models, metrics and methods for practice in the field.

One approach to bring this type of reuse to harvest the participatory culture is the notion of Software Ecosystems (SECOs), which is a good fit for SPL (Bosch, 2009). A SECO can simplified be defined as a set of internal and external developers cooperating in a software platform to satisfy user demand. There are naturally SECOs of all shapes and forms with big ones like those around Windows or GNU/Linux to small ones. Founding a SECO for a domain with a small user community could be one way to expand the reusability of software components and further enhance the development of the domain (Bosch, 2009). The more variability in the domain, the more the domain would benefit from having a common ground for developers to customize (Pettersson & Gil, 2010).

**A REFERENCE MODEL AND FUTURE WORK**

Considering the different areas of reuse from the previous section, there are plenty of interesting challenges with software reusability. Focusing on (1), (2) and (5) there are several things to further explore in a domain such as mobile learning. Reconnecting to the question posed in the beginning, how can the notions of reusability, crowd-sourcing and SECOs aid the development and processes in high variability domains? Based on the initial findings in (Pettersson et al., 2010) a reference model was presented to better be able to discuss the properties of a SECO for small communities. This particular model is tailored for a SECO in mobile learning and can be seen in Figure 1. This model is based on amongst other things the notions presented in the previous section. Taking advantage of an externalized development process to enable more actors to develop software components for M-learning in a shorter time. It also leverages sharing of these solution elements. Another interesting aspect is the attention to processes, employing notions from SPEM to structure development processes in the ecosystem.

![Figure 1: A reference model for Small Community Software Ecosystems in Mobile Learning](image)

This reference model serves as a basis for future work in the area. There still exist plenty of challenges however and future work includes implementing software for realizing this model. It also includes identifying
applicable metrics for evaluating the ideas, connecting the model to a development model like OpenUP and investigating best practices for this model. Finding open standards to base the software on is also a significant and important challenge.

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Methodological Considerations for Mobile Technology Enhanced Learning Research

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Abstract
We examine the field of Mobile Technology Enhanced Learning (M-TEL), raising challenges of data gathering and methodology. We ask, rather than answer, questions about what methods and techniques should be used to study the field. We conclude with a short problem description of a study we have gathered data for, but not yet analysed.

Keywords: Mobile Learning, Mobile Technology Enhanced Learning, M-TEL, Methods, Data-gathering, HCI

INTRODUCTION
Currently, the best way to experience mobile learning is by reading a book. It is portable, has a well-known interface, and chances are that it is structured according to a well-respected pedagogical area. Contrast this with mobile learning on a mobile device. Small novel interfaces, where the user depends on a mobile Internet connection that may work, and sometimes with a pedagogical attempt that seems to stem from the shortcomings of the technology, rather than to focus on the activity of learning. M-TEL (Mobile Technology Enhanced Learning) has the potential to take learning out of the classroom and put it in the hand of the learner. But mobile learning does not only have the potential of being asynchronous but it also has the potential of situating the learner, provide immediate updates of the learning material, enhance collaboration, and provide synchronous communication.

PREVIOUS WORK
A recent review of Mobile Learning projects state that “[l]earning in context raises the challenge to scaffold and moderate the process of learning (control), compared to learning in a classroom.” (Frohberg, Göth & Schwabe, 2009, 5). Making the learning mobile does not only give the learner freedom, it also has the potential to be used in a contextual environment, where the thing learnt has a real meaning. A mobile learning scenario might very well be a course on recognizing mushrooms in the forest, or measuring heights and distances in a field to calculate area and volume to construct a building (Spikol & Eliasson, 2010).

If mobile learning shall be a part of our future learning system, we must face the problem of doing it right. Or more specifically: “What does the use of mobile devices for informal and formal learning mean for the collection and analysis of data and what methods might we employ in a systematic, iterative and interventionist Design Research effort?” (Cook, 2010, 3). Current methods for evaluating mobile HCI consist mainly of qualitative methods, such as field studies, laboratory methods, but also surveys, with a bias against research in natural settings. “… methods examining phenomena in context such as case studies are not widely used”. (Kjeldskov & Graham, 2003)

Muuksen and colleagues have gathered data about stress and competence contextually and longitudinally in a learning situation via mobile means. They collect data with questionnaires with a sampling strategy of five queries a day using mobile technology and conclude that “…data collected about activities and experiences over time extended the understanding of students’ practices beyond what can be acquired by traditional post-course questionnaires…” (Muuksen et al., 2009).

In a review of 102 mobile learning projects, Frohberg and colleagues state that less than half of projects in Mobile Learning try to set the scenarios in a natural environment. They also conclude that a vast majority of Mobile Learning systems only deliver content or are used for motivation and control, as opposed to guided reflection, reflective data collection or content construction [ibid]. It seems as if it is hard to construct studies, which are complex in environment and activities. We believe that the complexity of data gathering and methods for evaluation might be one reason for this.

Pachler and colleagues summarise three distinct phases that the field of mobile learning has gone through:
1) a focus on devices; 2) a focus on learning outside the classroom; and 3) a focus on the mobility of the learner (Pachler, Bachmair & Cook, 2010). We believe that we should use methods that focus on the whole situation and tools of the mobile learner, rather than just the mobile device, the mobility or the learning.

**RESEARCH QUESTIONS**

- What methods are suitable to evaluate mobile learning systems?
- What data gathering techniques are suitable for mobile learning systems used in the field, also when doing longitudinally studies?
- What is different in a mobile learning scenario, compared to other learning scenarios such as distance learning?
- Is mobile learning simply learning that is mobile, or is mobile learning a different type of learning? For instance Pachler, et al. (2010) claims that it is completely new, and requires special considerations when studied, such as taking the historical context into account.

**RECENT WORK**

In a recent study (MULLE), yet to be published, we compared an M-TEL activity of the area concept with a classroom setting. The six students, divided into two groups, who where outside were given tasks through a mobile phone and used two mobile phones as tools to measure distances via GPS. The study was focused on an outdoor field activity, where the students measured areas with the GPS-enabled devices. Apart from this, we also conducted semi-structured interviews about the area concept, prepared the students with introductory activities (both regarding the device and it’s functionality), used a control group of students who learned in the classroom while the other group learned in the wild, and did a class room activity where all learners would use their knowledge to construct areas.

During the whole outdoor activity of the study we filmed the students, with two cameras per group, and recorded their speech with microphones and a recorder each. We recorded the learners who were in the class room. This small amount of recorded material, together about eight hours of video and even less audio, is still being evaluated, mainly in the form of interaction analysis, but also with other methods. Can this data gathering be done more efficiently? Is there another way to collect data that does not take many hours of analysis per hour of recorded material? Have we collected the right data? Apart from the recorded material, there were also difficulties when recording. The camera operators had trouble keeping up and keeping all of the students in the picture at the same time, even when the students were grouped together. Valuable material might be lost because of the choice of data gathering method. It will become even harder to gather material in longitudinal studies, where learning artefacts are given to the students and they use it in their daily lives. We might say that ethnographic methods have solved this problem before. We might say that technology may help, by logging every keystroke the user makes. It is not currently clear, though, which methods to use and how.

**DISCUSSION**

While the research field of M-TEL is still young, mobile learning has been happening for quite some time through books and portable audio players (for instance language courses). The technology used in mobile learning does offer multimodality, interactivity, different kinds of sensors (GPS and cameras) and a real possibility to communicate and collaborate, also over great distances. Mobile devices may also be situational and contextual. But questions remain; how can we collect data; what data should we collect; and which methods are most suitable to evaluate both the mobile and the learning? We will try to answer these questions by learning from the study made, and incorporate these lessons into future studies.

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Beyond Innovation in Technology Enhanced Learning

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Abstract
Information Technology has become a part of our everyday life. Everywhere we turn, we see adults and children walking around with their mp3 players and mobile phones; making phone calls, listening to music, taking pictures and videos and constantly sending text messages and surfing the web (Pachler, Bachmair & Cook, 2010). These different technologies have opened new opportunities and creative ways for supporting teaching and learning. The downside is the fact that most of these technologies and applications developed have not had the teaching or the learning perspective in mind (Laurillard, 2009). In this paper, some initial thoughts and problematic issues concerning some of the changes we are observing in the educational sector and learning environments will be raised and discussed. These ideas are based on observations and interviews conducted as part of our ongoing projects with schools in the Växjö region in Sweden in which we are exploring different ways to support novel ways of teaching and learning with mobile technologies and social media.

Keywords: innovation, technology-enhanced learning, learning environments

INTRODUCTION
The widespread use of information technology has changed many aspects of our society and the lifestyles of human beings. We find ourselves today in a time era where Internet and mobile technologies are providing us with global access to information and mobile knowledge just within a few seconds. Each technological era has had its own influence on education where as we gone from writing in sand and stone to trees and paper. Today, learning has together with modern technology taken a new turn that no one thought was possible (Dilllenbourg, Järvelä & Fischer, 2009). Digital and mobile technologies are creating new opportunities in ways for teachers to teach and learners to learn. The border between formal and informal learning has become blurred and the everyday life has a greater impact on students learning where the students bring the world and experiences gained outside school in to the classroom and share the experiences and knowledge to one another and earn from each other (Pachler, Bachmair & Cook, 2010). New, innovative technology has made this change possible, although so far have educators and learners not been the main actors and the source for requirements when developing these new technologies (Laurillard, 2009).

In the light of these latest developments, our society demands a change in the educational settings in the sense of preparing students with the so-called 21st century skills. There is need for “a set of cultural competencies and social skills that young people need in the new media landscape” (Jenkins, Purushotma, Clinton, Weigel, & Robison, 2008, p. 4). These literacy skills should be built upon the traditional skills taught in the classroom in schools, after school programs and by parents. Christensen et al., (2008) argue that schools have adopted computers, and thereby technology in a predictable and logical way and there by the wrong way. Each organization needs to modify and shape new innovation to fit the organization which is something that needs to be done in the schools. The question to address is how these innovative technologies and their use can bring added value to the traditional educational settings and to make it sustainable. This paper will raise some initial thoughts and problematic issues on the challenges of current interactive learning environments and how innovation patterns of using information technology to support teaching and learning can become more widespread and sustainable.
LEARNING, INFORMATION TECHNOLOGY AND INNOVATE EDUCATIONAL PRACTICES

Shaples states that learning theories have had their roots in assuming that learning occurs by trained teachers mediating in a school classroom (Sharples, 2007). The teacher has always supposed to be the one who has all the knowledge and know how to teach, as soon as they complete their teacher education. With the wide use of information technologies outside the school settings, teachers are challenged to rethink their role in the classroom; they are forced to act more as facilitators rather than merely a source of information and knowledge providers. With the boarder of formal and informal learning blurring and the information being available at anytime and anywhere, teachers need to not only to act as guides on how to access that information and knowledge but also as filters for creating a foundation for students to understand and distinguish right information from wrong. By introducing, or injecting digital technologies as Jenkins (2008) calls it, into the classrooms the teachers and the learners relationship to one another and to other traditional communication tools are effected and thereby, do the way of using and seeing pencils, books, chalks and blackboards change (Jenkins et al., 2008). The lines below described briefly some examples of these new trends based on our work. Alvarez et al., (2010) describe the ‘Collboard’ project conducted together with a 7th grade school in Växjö. In Collboard, students used digital pens and interactive whiteboards within the field of mathematics. The students began by working individually; using normal paper and digital pens on a mathematic task presented on the interactive whiteboard, and continued the lesson by collaborating on the interactive whiteboard as a shared workplace to reach the ultimate solution based on some of the individual answers the teacher had chosen. The possibility to cut, paste, move, drag and etc. from the digital individual answers (saved into the digital pen and then posted to the whiteboard) to a shared digital answer enables students to collaborate on a different level where as the teacher can focus on the knowledge of the students rather than writing on the board and “transferring” knowledge.

The image of the traditional leaning classroom today is based on a fixed location with a set of resources, a single teacher, and a pre-agreed on curriculum for a common ground and stable context that needs to be followed from day to day (Sharples, 2007). The possibilities mobile devices and wireless technologies provide today is to expand these fixed locations and to move them from a pre-set classroom environments to new locations outside the classroom. An example of the latest is the LETS GO project (Vogel et al., 2010) where we are working together with several schools in the Växjö region in the field of studying environmental science beyond the classroom settings. With sensors and mobile phones, students are able to “explore ‘traditional education’ in relation to the ‘new world’ from a perspective that is capable of challenging both” (Laurillard, 2009, p. 7). Equipped with the latest mobile technologies, students move their learning environment from the classroom to the forests and lakes around the city in order to measure the health of trees and forests, and to determine the water and soil quality. This gives the students the possibility to collaborate while collecting data within a specific environment and to further develop and increase their gained knowledge in the classroom. Some of these specific activities would not be possible in the context of a traditional classroom, as we know it today.

Despite the existence of the technologies mentioned above, the way education is conducted still looks as it did a few decades ago with some minor changes. One of the main challenges schools and educational institutions are facing is how to take advantage of the knowledge and experiences learners gain outside the school and how to bring those skills back into the classroom (Pachler, Bachmair & Cook, 2010). Based on the feedback we got from interviews with teachers involved in the projects described earlier in this section, many educators feel insecure and uncertain regarding how to use technology in the classroom and they experience problems related to the change this brings, thus resulting on a low rate of actual use of technology to support teaching and learning. A wide adoption of information technology in support of teaching and learning demands time from already worn out teachers, it demands a proof of the added value that information technology and novel educational practices may bring to learning and teaching. Further challenges to address are the development of the technology and activities to support novel ways of teaching and learning. So far, as stated above teachers and learners have not been the main targets for the development of these kinds of new innovative technologies. There is a need of a better understanding on how teachers teach and how learner learn in these new learning environments, what is demanded from the society and modern technology can be applied to fulfill these demands.

SCOPE OF MY FUTURE RESEARCH

The figure below aims at giving an overview of the above mentioned issues by pointing out several indicators which may influence current learning environments. The changing roles of teachers, new innovative technologies, user generated content and new ways of working are examples of those indicators that together
with external factors may affect the learning environment and the value of innovations. All these are complex issues they need to be further investigated from a pedagogical, technological and organizational perspective.

Figure 3. An overview of indicators that may provide some added values to traditional learning environments

Emerging information technologies will continue to develop and they will most likely continue to have a big impact on society and thereby our lives and it is of interest to further explore and investigate the above mention problematic and changes. As I am right now in the initial stages of my doctoral studies, the direction of my future work will include further research and investigation of the changes in the learning environments, the added value innovative educational technologies may provide and the impact, implementation and integration aspects associated to them. Currently, I am considering to use the so called Systems Thinking perspective and Innovative theories (Christiensen, Horn & Johnsson, 2008) in order to improve the understanding of current traditional educational settings and the relation to those changes and impacts information technology brings to education.

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Learning with a Mobile Social Video Application – Problem Areas Encountered

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Abstract
Mobile learning is getting more ground in today’s classrooms. It is understood to mean learning and teaching practices done with or via different mobile devices. It is also considered to be one of the 21st century skills children should adapt already in early stages in schools. This paper presents both qualitative and quantitative study on mobile social video application, MoViE, as a part of teaching in biology and geography in 8th and 9th grades. The study itself gave positive results since MoViE did enhance learning and for example students were willing to use MoViE again. However, this paper sets out to introduce the possible problem areas of mobile learning. They are introduced in order to make them apparent and by this easier avoidable in the future.

Keywords: mobile learning, MoViE-application, problem areas

INTRODUCTION
Mobility enables sharing and receiving almost whenever and wherever, which provides lots of different opportunities for schools, and especially for students, to broaden fields of learning. Lankshear notes that many of the new, changing social practices involve new, ever developing ways of producing, distributing, exchanging and receiving texts by electronic means, such as sound, text, images, video, animations and any combination of these. (Lankshear & Knobel 2006) This is what mobile video has to offer. The MoViE is designed to offer different ways of learning by doing (creating and remixing community created videos) and by experiencing (sharing experiences with others). Texting and photographing with mobile phones are common practices (notably among young people) across diverse social and economic groups in countries worldwide. (Lankshear & Knobel 2006, 182) The portability of mobile devices and their ability to connect to the Internet almost anywhere makes them ideal for storing reference materials and learning experiences, as well as general-use tools for fieldwork. In the field they can be used to record observations via voice, text or multimedia and also can access reference sources in real time. (Johnson, Smith, & Stone 2010)

BACKGROUND
In our study, the focus was on the use of social mobile videos and MoViE in teaching and learning. The actual testing was conducted in 2009 at Kasavuori School in Finland. The research material consists of three different parts: 1) a teacher interview, 2) students’ survey data and 3) the content of the uploaded mobile videos. The survey participants were 8th and 9th graders and approximately half of the students (n = 50) answered the survey. 23 were female and 27 male and their average age was 14,4 years. MoViE is a social mobile service that enables users to create video stories using their mobile phones. It is developed in Tampere University of technology as a research platform for studying how people can create stories, share and learn with mobile social media service. MoViE supports private groups, user-generated tags, tag spaces, geotags, remixing of clips and moderation. The remixing of mobile videos is where it differs for example from YouTube. MoViE has been developed to address the creative and collaborative demands of learning and it enables several novel ways of utilizing videos for educational purposes. (Kiili, Multisilta, Suominen, & Ketamo, 2009)

OVERALL RESULTS
To summarize, MoViE did fit well for learning purposes since it offers features that are not available in public video sharing services (Juicer, YouTube, LiveCasting). The use of mobile videos and MoViE enhanced learning of one third of the students. It was also positive that the majority, over half the students, preferred mobile learning based on these pilot courses more than traditional ways of learning. According to the study, attitudes towards mobile learning were neutral. One third of the students felt that they enjoyed it and the other third felt differently. The majority was still uncertain of their feelings, which is understandable since mobile videos as a learning method was introduced to the students for the first time. The attitudes were also affected
by the concrete experiences of usage of MoViE. Over half of the students thought that it was really easy to learn and use. When it comes to sociability, half of the students would like to work in similar groups in the future and almost the third felt that fellow students had positive impact on their learning during the pilot courses. Finally, also the social relations between teacher and students deepened.

**THE PROBLEM AREAS WORTH NOTICING**

The new role(s) of the teacher

Considering the probable situation in the classrooms today, students in a course on digital literature may have to confront the fact that they often know more than the teacher. Digital literature blurs the boundary between the student and the teacher. This has an enormous effect on the classroom situation. Teaching digital literature is not just an extension of teaching conventional literature using other means. It aims at making a student fit for a 21st century multi-media society and it starts by making the teacher fit for encountering her students. (Simanowski, 2009) One issue is the evaluation of the videos – what is good, what is accurate information and what the visual side of students’ results are about. The teacher is often left on her own, to not only combine the different experiences of the work, but also to judge the various interpretations of these experiences. This situation certainly requires didactic sophistication, including an ability to accept a wide range of answers and possibilities to leave questions open. (Goicoechea, 2009) The teacher also needs to be aware of sensing what the actual skills of the students are: who really needs assistance and who has enough knowledge to carry out the assigned tasks. This emphasizes the importance of balance in teaching new skills to students.

**Formal vs. informal content**

Another thing that is crucial in today’s classrooms that are technologically well-equipped, is the need of teaching also the content. This is something that media education is tackling constantly since the field of media is rapidly changing. The informal use of technology is part of today’s learning and a school’s task is to teach the appropriate use and creation of media contents. Working with digital literature constitutes an excellent way of teaching students to reflect on the use of digital language, media and culture. (Simanowski 2009) It is the idea of the consumer turning into a producer, which automatically changes the role of the student from a user of mass media products to being one of its producers. This was the case in this study since it offered a possibility to produce video content and to learn from it. However, it was difficult to combine the factual and fictive use of mobile videos. The students seemed had a clear vision of how a mobile video or published video on the Internet should look. This vision has evolved from certain video formats that are most commonplace on YouTube, for example. It needs to have entertainment value and it has to have certain features that are approved of by youth. The concept of a “mobile video” that contains bad language, swearing and silly stunts was seen in the video making situations, as for example from Jack Ass or Extreme Dudesons. There were material that contained a lot of laughter and some bad language. There were also problems with appropriate behavior on the video as well.

"Not that difficult, although the teacher did criticize my video contents.. ;) I used F-words of course! " / M15

"It was pretty difficult and disturbing..” / F14

**Awkwardness & privacy issues**

One theme that came up was publicity and the aspects revolving around it. Some of the students were worried about misuse of their material on the Internet. One’s appearance was problematic to some, despite the fact that it occurred in school, as a part of courses (the access to MoViE was not open, only for students and teacher).

"Well, it was a bit unpleasant..” / M15

"(It was unpleasant) since everybody was able to see my video and me on it.. ;(" / F15

"From time to time, I looked stupid on the video. ” / F16

**CONCLUSION**

Based on this study, mobile social media is a useful tool for school projects but the making of meaningful videos using social media services, should also be taught when mobile video tools are integrated to teaching and learning. This is a part of 21st century skills needed in future society. There are still lots to do in the field of mobile learning in order to overcome technical difficulties and to make it more functional for different types of learners. Also the sociability offered by new technologies for example mobile learning should be considered carefully in order to really enable learning that IS social.
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Design and Development of Mobile and Web-Based Visualization Tools in TEL

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Abstract
The field of Technology Enhanced Learning has greatly benefited from recent advances in mobile, wireless and sensor technologies, along with Web 2.0 services. The extension of visualization approaches along with novel forms of geo-collaborative technologies is emerging as a new field. In this position paper, we present our technical efforts in relation to design and development of mobile and visualization tools that integrate different types of content and sensory data. To test the validity of our technology development, we have conducted a several experiments with high schools students over a three-months period in the field of environmental science. The initial results and development of our mobile and visualization tool brings the idea to further explore the notions of geovisualization, collaboration, and interaction.

Keywords: visualization, mobile, sensors technologies, interoperability, inquiry-based science learning.

INTRODUCTION
The field of Technology Enhanced Learning (TEL) has greatly benefited from the advances in the mobile, wireless and sensor technologies as along with Web 2.0 services (Vogel et. al., 2010; Winters & Price, 2005). There are several significant efforts implementations in the domain of TEL that make use of these advancements to support learning across different settings such as in museums, parks, and field trips (Kukulska-Hulme et. al., 2009). Embedding all these technologies into a physical environment using different sensors and actuators responds to user needs and actions, which will seamlessly be integrated into our everyday environment (Ferscha & Vogl, 2009). Lately, the extension of web based geovisualization approaches along with new forms of collaborative technologies is constantly growing (MacEachren, 2005). Technological advances in sensing, computation, storage, visualization and collaboration are turning the near-ubiquitous mobile phone into a global sensing device (Campbell et al., 2008).

Nevertheless, these technologies rely on various standards for data exchange what makes the development of interoperable mobile and sensor-based applications a challenging task. Therefore, data interoperability of these technologies remains a key feature to resolve while dealing with diverse data exchange issues across different software and hardware components. Interoperability in these settings would enable multiple applications to interact and to share data seamlessly, by which visualization would support sharing of both content and process information in groups (users) easily.

The efforts described in this paper are related to our ongoing research that explores the challenges related to the technological integration of different devices and sensors in the context of TEL. Moreover, also the focus is on the technical interoperability of data exchange in mobile and sensor-based systems including visualization tools with the particular focus on how to support inquiry-based science learning activities (IBSL).

THE LEARNING ACTIVITIES
The learning activities were conducted as part of the Learning Ecology through Science with Global Outcomes (LETS GO!) project (Vogel et. al., 2010). The aim of the project is to design challenging collaborative IBSL activities supported by mobile and sensor technologies. The combination of these technologies enable the creation of “mobile science collaboratories” that can be defined as a set of mobile devices, open software tools, and resources, with an open framework for learner collaboration and inquiry (Vogel et. al., 2010a).

The experiments were conducted during April-June 2010, with two local schools in Växjö. In these experiments, more then 70 students participated over a 5-weeks period; the scenario was about water quality.
These activities required the use of sensor and mobile devices for data collection and web tools for data visualization. The visualization tool we developed was used to support the students’ inquiry process. Detailed descriptions of learning activities can be found at (Vogel et. al., 2010b).

**SYSTEM ARCHITECTURE**

In our technical development, we utilized and visualized sensor data to support different learning processes in the different cycles of IBSL (Vogel et. al., 2010). We have designed and developed a software system that integrates data coming from various technological tools and that include a mobile client for data collection and annotation, mobile sensor probes, a digital pen for notes and audio recording, and geo-temporal visualizations. Initially, we proposed a system architecture which consists of five different blocks. The blocks used to construct this architecture aim to provide some logical divisions of the resources in the system. The architecture organizes available resources into the following blocks: sensors, mobile devices and the transmission of sensor data, repositories, external APIs, and visualization. It provides a complete lifecycle showing how data can be stored, exported, shared, and visualized. The detailed description of the technical implementation and system architecture developed is provided in our previous work (Vogel et. al., 2010).

**INTEROPERABILITY ISSUES**

One central aspect we have identified based on our previous developments is the lack of data interoperability between the different tools and technologies. A common approach utilized to facilitate data interoperability is the usage of open standard formats for data exchange. Open standards approaches deal with the interoperability of data using transparent descriptions, by which different software systems can easily exchange information (Dinevski, 2008).

As a latest software development tool we have integrated into our system the Open Data Kit (ODK), which is a set of tools for collecting rich data and, it is especially designed to let users own, visualize and share data easily (Anokwa et. al., 2009). The key concept in ODK is to easily support next-generation data collection and exchange tools, making it applicable for different domains such as health, sports, learning and so on.

As a data collection tool from the mobile client side, we have developed an XForm that was rendered by ODK Collect allowing data collection during the learning activity. XForm is a standard based on a W3C recommendation that is used to build web forms for easy exchange of data across platforms and devices using XML as a data format. The XForm used in this implementation was developed using a simple XML editor. The logic and the structure of our XForm were jointly developed with the subject teachers following the IBSL cycle (De Jong et. al., 2009; Vogel et. al., 2010). The mobile application (ODK Collect) has the capabilities to render a form, survey into a sequence of input prompts that provide navigation logic, entry constraints in the mobile application (Anokwa et. al., 2009). The XForm supports various types of data and content inputs such as text, audio, pictures, video, visual codes and GPS that makes it possible to annotate the collected sensor data and content with location metadata.

**VISUALIZATION**

Sensory data, geo-tagging and web-based visualization APIs play an important part in the digital storage, retrieval, and visualization of information (Elwood, 2009). Web 2.0 applications have enabled users to produce and share their own information online easily (Elwood, 2009).

The sensory data aggregated by the mobile and sensory devices and applications from learning activities mentioned in the section above were used for visualization purposes. We consider the visualization to be an important component for creating a reflection and collaboration space to be used in the post-activities by users. For these purposes we developed the initial visualization tool that enables different content and sensory data to be visualized. This web-based visualization (see figure 1) tool utilizes several web based APIs using multiple representations such as graphs, maps, data tables, etc interactively. Technology used during the development cycle is based on Google Visualization APIs and Javascript/AJAX. The idea with this visualization tool is to provide novel visualizations and interactive space to facilitate reflection and collaboration among users by providing a clear overview of the geo-temporal aspects of the collected data.
DISCUSSION

The development and implementation described in this paper demonstrates the growing potential towards the utilization of existing open standards to support data collection, data interoperability, analysis, visualization and collaboration in the context of IBSL. In the activity described in this paper, data interoperability simplifies the integration of data generated by various technological resources and applications. This approach enables rapid development and reuse of technological resources for supporting different learning activities, thus resulting in the seamless integration of data coming from multiple devices. From a practical side, the added value for the classroom is the seamless integration of different sensor data combined with devices that enable powerful visualizations to support the users work. One issue that we will consider in our future work is the full utilization of the visualization component, by incorporating different techniques that provide interactive spaces for discussion, sharing and collaboration.

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Learners as Collaborators – What Does it Require?

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Abstract

Recent learning research has indicated that collaboration can lead to deeper understanding of knowledge among learners (e.g. Rochelle & Teasley, 1995). Collaborative learning is commonly supported by different technologies, especially by web-environments, which are developed in order to promote collaborative knowledge building and shared problem solving. However, collaborative learning is not easy and it sets new roles and challenges to learners (Kirschner, Sweller, & Clark, 2006; Mercer & Fisher, 1998.) In order to understand these challenges it is essential to understand requirements for successful collaboration.

The aim of this study is to explore students’ experiences about factors promoting and hindering collaborative learning in web-course. Research data has been collected from an international CSCL-webcourse and it consists of on-line questionnaires (n=311) and discussion notes (n= 330). Questionnaires has been analysed with qualitative content-driven data-analysis and the discussion notes with qualitative theory-driven content analysis (e.g. Creswell, 1998; Neuendorf, 2002). Results of the data analysis indicate that tightly structured pedagogical model promotes collaborative learning more effectively than loosely structured model. Students experienced that the most important requirement for successful collaboration are related to group and its’ behaviour, course arrangements, individual studying skills, tutoring and web environment.

Keywords: collaborative learning, structuring, on-line learning

INTRODUCTION

Collaborative learning is one of the current approaches when discussing about qualitative learning. Recent learning research has indicated that collaboration can lead to deeper understanding of new knowledge among learners (e.g., Rochelle & Teasley, 1995). Collaborative learning is commonly supported by different technologies, especially by web-environments, which are developed in order to promote collaborative knowledge building and shared problem solving. CSCL-research (Computer Supported Collaborative Learning) has proven that utilization of web-environments can enhance learners to reflect their thoughts together with other learners and promote deep learning (Scardamalia & Bereiter, 1996.) However, collaborative learning is not easy and it sets new roles and challenges to learners: How to collaborate effectively and benefit from other learners? In order to support learners effectively it is important to identify the requirements of collaborative learning (Kirschner, Sweller, & Clark, 2006; Mercer & Fisher, 1998.)

In former studies concerning requirements of collaborative learning the focus of analysis has been in groups’ functionality and interaction between group members (e.g., Arvaja, 2005; Lipponen, Rahikainen, Lallimo & Hakkarainen, 2003; Mercer, 1996). Results have shown that successful collaborative learning requires among others deep level discussions, learners’ equal participation to collaborative activities and common ground (e.g., Stahl, 2007). However, less is known about learners’ experiences of collaborative learning and its’ requirements. In order to planning, implementation and support successful collaborative learning it’s essential to understand learners’ perspective.

AIM

The aim of this study is to explore students’ experiences about factors promoting and hindering collaborative learning in web-course. The precise research questions are:

1. What kind of experiences about collaboration students have during variously structured studying periods?
2. What kind of factors promoting and hindering collaborative learning students describe during web course?
3. How do collaborative situations appear in contents and structure of web-discussions?
RESEARCH DESIGN

Research data has been collected from an international CSCL-web course. Students (N=86) were from seven Finnish and foreign universities. The data consists of on-line questionnaires (n=311) and discussion notes (n=330). Questionnaires has been analysed with qualitative content-driven data-analysis and the discussion notes with qualitative theory-driven content analysis (e.g., Creswell, 1998; Neuendorf, 2002). Research design is presented in figure 1.

Figure 1: Research design:
Progression of the Questionnaire Research questions Web discussion data course data Theme discussion PBL-work

RESULTS AND CONCLUSIONS

Results of the analysis of questionnaire data indicates that tightly structured pedagogical model promotes collaborative learning more effectively than loosely structured model. Students experienced that the most important requirement for successful collaboration is related to group and its’ behaviour. Group members have to participate actively in collaborative actions and the atmosphere of the group must be positive and permissive. Group members have to argue their opinions, discussions have to be reciprocal and learners must have common ground for working. Learners have to be willing to support each others. Communication between group members has to be fluent. Learners experienced that also course arrangements promoted collaborative learning. Especially the formulation of learning tasks was experienced to be essential. Assignment must presume collaboration between students.

Factors related to group and its behaviour was experienced to be the most significant factor that hindered collaborative learning. Negative group processes, like problems in communication and lack of shared understanding, made collaborative learning more difficult. Also course arrangements hindered collaborative learning. Students experienced that for example loose schedule and too large study group made collaborative learning more difficult. Also factors related to student him-/herself or his/hers own behaviour (e.g. lack of time, lack of motivation of, lack of studying skills) was experienced to be factor that hindered collaboration.

Analysis of web-discussions supports findings from questionnaire data. In successful collaboration students’ messages were mostly commentary or clarifying messages. In unsuccessful collaboration students’ messages were mostly individual and informative. Results indicate that in order to collaborate successfully learners must have sufficient studying skills. They have to be able and willing to interact, to present own ideas and thoughts, to understand others’ viewpoints and to shape own understanding. Successful collaboration also requires that learners are motivated to study together and willing to spend enough time for collaboration. They also have to be capable to regulate both their own and collaborative learning processes during variously structured studying periods.

From teachers’ point of view results indicates that it is very challenging to design, implement and support collaborative learning. Teachers have to consider carefully the pedagogical model they apply. In order to
enhance successful collaboration teachers have to consider the group formulation (e.g. group size, group members background etc.). Teachers also have to support their students during the process of collaborative learning. They also have to make students familiar with the web-environment applied in collaborative activities.

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Impact of Web 2.0 on Teaching and Learning at Universities

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Abstract
Web 2.0 applications are integrated with existing online learning environments at the universities to enhance the teaching and learning processes. This position paper discusses the benefits and the possible pitfalls of integrating Web 2.0 applications with existing online learning environments at universities and explains how to overcome those possible pitfalls.

Keywords: Web 2.0, collaborative learning, online learning

INTRODUCTION
With the help of Web 2.0 applications and services such as Wiki, social-networking services (e.g. Facebook, LinkedIn and Tagged), Web-based office applications (Google Docs, Zoho Office and Office Web Apps) and media-sharing applications (YouTube, CiteULike and Twitter), universities can make their students staying at distance and working collaboratively in online learning environment (OLEs). According to O’Reilly (2007), Web 2.0 applications make most of the inherent advantages of that platform, they get better the more people use them and the users can use others’ data, add data from multiple sources and work together with other users. This nature of the Web 2.0 goes in line with the new educational theories such as constructivism and connectionism (Ullrich, 2008). Therefore teachers and administrators in universities become interested in using Web 2.0 applications in developing online learning environments for their students.

There are different views on benefits and pitfalls that might cause in using Web 2.0 applications in universities. Also, researchers report different results after using Web 2.0 applications in learning and teaching processes at universities. By referring to those literatures, this paper answers to the questions (1) what possible benefits can be obtained and pitfalls can be encountered by adapting Web 2.0 application to the teaching learning activities at universities and (2) what measures should the universities take to overcome the possible pitfalls. Finally the author of this paper expresses her ideas on whether universities should use Web 2.0 applications.

BENEFITS OF USING WEB 2.0 APPLICATIONS

The university teachers can upload their lecture notes to online learning environment (OLEs) developed with Web 2.0 technologies. The students can work individually or collaboratively in the OLEs, add more content the lecturers’ notes to prepare their own notes and share them with other students (Rollett, 2007). Teachers and students can use Web-based office suites or Wiki for that purpose.

Wiki is found as one of the most impressive collaborative-learning tools (Parker and Chao, 2007). It helps to prepare reports, summaries, or any other document on a webpage or set of web pages (Duffy & Bruns, 2006). Page histories in Wiki support the teacher to check who contributed to prepare each page and what each student did on each page. Web 2.0 applications can be linked with available OLEs. University of Osnabruck in Germany adopted Web 2.0 applications such as blogs, Wiki, Facebook and YouTube to web lecturing and reports that it could make the web lectures more attractive to their learners and it was supposedly more effective for the learners (Ketterl et al., 2009).

PITFALLS OF USING WEB 2.0 APPLICATIONS

Web 2.0 technologies offer an increasing power to the learners who use them for their learning (Bonk, 2008). Therefore, Web 2.0 applications; especially the social networking applications linked to OLEs can direct the students far away from the focal areas of the lesson to be studied. As a result of that the students in OLEs with poor or no teacher guidance may not be able to do their studies successfully (Notari 2006). Also, due to the
connectivity with other students through networking applications, the students are more viable to get disturbed by other students and that might badly affect on their other work. Armstrong and Franklin (2008) report that the students working with Web 2.0 applications get more opportunities to plagiarize the work of another and post it to OLEs.

Videos in YouTube and other media sharing services are used by the teachers to support their teaching. Those videos have a potential risk of getting changed without prior notice (Bonk, 2008). Therefore, they can be unavailable or with irrelevant information by the time of showing it to the students. Oradini and Saunders (2008) conducted a study with a social networking site called ‘Connect’ and emphasize the importance of teacher’s participation in students’ activities in OLEs. When teachers get connected often with the students’ activities in Web 2.0 applications they may get their workload doubled.

**HOW TO OVERCOME POSSIBLE PITFALLS**

The most appropriate Web 2.0 applications should be carefully selected for the students to support doing their learning activities and achieve the learning objectives of the course. In doing that and planning all learning activities the teachers should consider the students’ background (computer facilities and the Internet accessibility), other studies that the students do during the course time and the deadlines of the activities of the other courses. The students should also be informed to well organize and schedule the student-led collaborative learning activities considering the availability of the other students and the teachers. That would help the students and the teachers to manage their time. In appropriate use of Web 2.0 applications can be overcome by preparing a set of netiquettes in line with code of ethics of the university and informing about that to the students at the beginning of each course. In order to avoid teachers facing the problems of missing or irrelevant content in videos on media-sharing services the teachers need to have an alternative lesson plan or they should try all the materials before using them in the class.

**CONCLUSION**

There are possible benefits and pitfalls of using Web 2.0 applications in teaching and learning. However, the benefits that it can bring to the learners and the teachers cannot be easily replaced by any other method. Also, the pitfalls that Web 2.0 applications can cause to the teaching and learning can be minimised by careful selecting of appropriate Web 2.0 applications and proper planning of all learning activities. Therefore the author of this paper believes that Web 2.0 should be used by the universities to enhance their teaching activities and support learners to construct knowledge.

**REFERENCES**


