INTERNATIONAL JOURNAL OF MOBILE AND BLENDED LEARNING

Table of Contents

Towards Work-Based Mobile Learning:
What We Can Learn from the Fields of Work-Based Learning and Mobile Learning

Christoph Pimmer, University of Applied Sciences Northwestern Switzerland, Switzerland

Norbert Pachler, Institute of Education University of London

Graham Attwell, University of Warwick, UK

ABSTRACT

Mobile devices are increasingly being used to support learning in work contexts. In exploring the emerging field of work-based mobile learning (WBML), researchers need to give consideration to the theoretical and empirical findings from mobile and work-based learning. In this paper, the authors provide an overview of key issues and dominant debates in these fields with the aim of providing a systematic introduction for mobile learning researchers interested in exploring the use of mobile devices for learning in work-based contexts. This paper's focus is aimed at scoping possible commonalities across mobile and work-based learning in order to establish a baseline for future conceptual work in empirical research towards WBML.

Keywords: Literature Review, Mobile Learning, Theoretical Approaches, Work-Based Learning, Workplace Learning

MOBILE LEARNING

An Emerging Field

Today mobile technologies such as cell phones are widespread and multifunctional, mobile broadband coverage has improved considerably in recent years and smartphones are combining more and more capabilities – ranging from telecommunication and video capturing to personal information management (Livingston, 2004);

this important characteristic is referred to as convergence in the literature (Pachler, Bachmair, & Cook, 2010). At the same time costs for telecommunication have been decreasing (compare e.g., European Statistics Eurostat, 2008). Mobiles – such as the iPhone – were identified in recent Horizon Reports (2009, 2010) as the technologies with the highest likelihood of entry into the mainstream of learning-focused institutions within the next year. Whereas mobile devices have become more and more embedded in the life worlds of learners, schools have mostly not considered

them as cultural resources (Pachler, 2009; Pachler, Bachmair, & Cook, 2010). Similarly, companies seem to be hesitant to acknowledge the potential of mobile technologies for learning (Härtel et al., 2007) despite the high penetration of mobile devices also in the business environments (Dzartevska, 2009).

In line with the spreading of mobile technologies, mobile learning is a rapidly expanding field of research (see e.g., Vavoula, Pachler, & Kukulska-Hulme, 2009). Its growing importance is reflected, for example, in the rising number of conferences [1], journals and books [2]. A number of mobile learning projects have been piloted in schools and institutions of Higher Education (see e.g., http://www.moleap.net; for a state of the art analysis of mobile projects compare e.g., Frohberg, 2006; Frohberg et al., 2009; Pachler, Bachmair, & Cook, 2010; Seipold & Pachler, 2010). Some projects have also been conducted and researched in business contexts (see e.g., Pimmer & Gröhbiel, 2008; Pachler, Pimmer, & Seipold, forthcoming).

Definitions and Theoretical Concepts

At present there is no dominant definition of what constitutes mobile learning. Particularly in the early days of work in the field, mobile learning was often conceived of as a technological concept (based on portable technology) (Kukulska-Hulme et al., 2009) and to the delivery of content to mobile devices (transmission based-learning) (Frohberg et al., 2009). Today, contextual factors are considered to be of great significance. This is also mirrored in some commonly used definitions where, for example, mobile learning is considered as "the processes of coming to know through conversations across multiple contexts among people and personal interactive technologies" (Sharples et al., 2007, p. 158). Our perception of mobile learning is based on a similar understanding: we characterise it as the processes of coming to know, and of being able to operate successfully in, and across, new and ever changing contexts with and through

the use of mobile devices. Instead of a technical orientation today's focus is on an educational perspective, given the affordances that mobile devices provide for meaning-making (Pachler, 2010; Pachler, Bachmair, & Cook, 2010).

Activity Theory (AT) is well acknowledged in mobile learning and many researchers have used the model as an explanatory frame for exploring learning with mobile devices. Of particular interest seems to be the triangular activity system of Engeström (1987). Despite its prevalence in the literature, AT has been criticised for not being an adequate theory for researching mobile learning: on the one hand it lacks the necessary simplicity to be of value for practitioners and policy makers; on the other hand (from a theoretical perspective), the notion of learning as the acquisition of objects, as well as the distinction between learning subjects and objects, is considered as problematic (Pachler, Bachmair, & Cook, 2010). In their article on Folksonomological Reification, Parslow et al. (2008), suggest that it is important to modify the AT 'triangle' for use with social tools relating to learning practice.

The reason being that the revised version seems (...) to emphasise the importance of the links between community and tools. Additionally, it can be argued that with social media (Web 2.0) style tools, the tool being used is really the information which has been contributed by the community rather than the underlying 'code' which quickly reaches the status of infrastructure. With this view, the tool itself is in a continual flux, changing and adapting to the environment through use. (ibid)

Pachler et al. (2010) favour a focus on the subject rather than the object. While they do not consider the object as irrelevant, they underline the relevance of content and context. Learning objects are viewed as cultural products and in this function they are equivalent to generated contexts.

Coming from a socio-cognitive engineering design perspective some authors (Sharples

et al., 2005; Sharples et al., 2007) argue that Engeström's model insufficiently emphasises that learning is an internal and external conversation, that activities are contextual and that human activity systems have reflexive potential. On the basis of this they developed a theoretical approach as a synthesis of AT and the conversational framework of Laurillard (2002, 2007).

The discursive 'conversational framework' model explains the learning process as being akin to a 'conversation' between the teacher and the student that operates at a discursive and interactive level linked by reflection and adaptation. The conversations take place with the external world and its artefacts, with oneself, and also with other learners and teachers.

Sharples et al.'s (2007) framework (Figure 1) has been criticised of late for not sufficiently acknowledging learning as practice as well as the notion of context (Wali et al., 2008). The authors also question the need to introduce two layers for the semiotic and technological dimensions of activity. While they, too, draw on AT, they put a stronger focus on the continuity of learning activities between and across contexts

(physical and social) which they describe as 'context crossing'. They point out the importance of considering context both in terms of environment as well as the social setting of the learning activities. Compared with Sharples et al, the tool dimension becomes subsumed under the concept of 'location'. Pachler, Bachmair and Cook (2010) agree with their emphasis on learning and practice across contexts. However, they criticise that the tool dimension is subsumed under the concept of 'location'. This, they argue, denies the importance of conceptual tools such as language or other semiotic means. Moreover, they criticise Wali et al.'s framework as remaining too abstract and insufficiently connected with the socio-cultural changes and the changes in the mass communication structures that are currently taking place within the context of an individual risk society. (For a detailed discussion of theoretical approaches to mobile learning see Pachler, Bachmair, & Cook, 2010).

In response to the perceived need for a comprehensive theory of mobile learning and in view of the limitations of AT, a socio-cultural approach to mobile learning was developed by the London Mobile Learning Group (Pachler,

Figure 1. Modified activity system (Sharples et al., 2007)
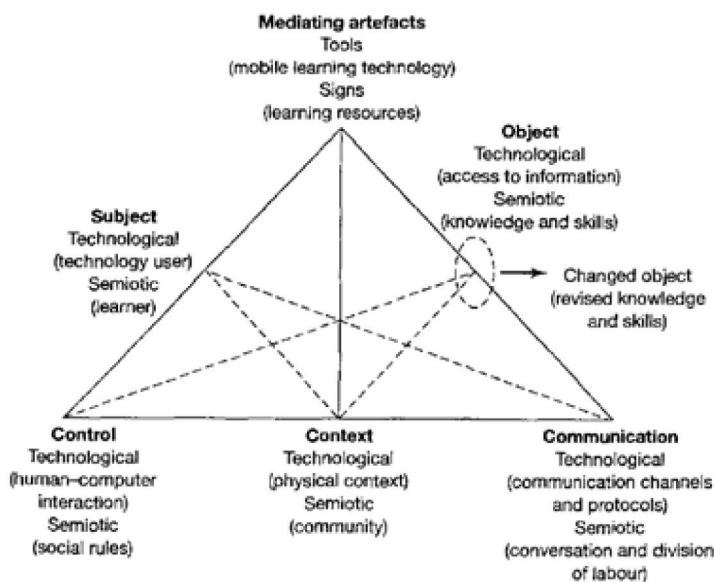
Bachmair, & Cook, 2010; Pachler, 2010). The conceptual frame of the LMLG of a 'socio-cultural ecology' has links to AT, for example, in that it is premised on notions of learner agency, i.e., intent and motivation, which can manifest itself in object-orientated activity systems. The LMLG agrees with Wali, Winters, and Oliver (2008) who foreground the importance of location and context. However, the group views learning in an ecological environment of *agency*, *practices* and *structures* (see Figure 2). Stressing the importance of learning as participating in cultural practices, the authors widened Giddens' binary model (1984) of structures and agency, which has also been used as conceptual framework in the field of WBL, into a triangular one, which includes cultural practices.

They understand *agency*, as the user's capacity to act on the world. Agency manifests itself as the learner's social and semiotic capacity, i.e., their ability to form relationships with others (mediated by technology) as well as to use media for meaning making and developing representations of the world. Agency is related to the formation of identity and subjectivity, i.e. with the processes attendant to the development of a distinct way of being in the world with and through the use of mobile devices. Accordingly, agency is linked to the use of mobile devices in relation to one's own, rather than necessarily predetermined ends.

The authors place centrality on *practices*, which can be viewed as a learner's engagement with particular settings. Cultural practices are seen as the routines users engage in their every-day lives: routines both in terms of media use in everyday life such as socialising, networking, play, entertainment etc as well as the pedagogical practices around teaching and learning in the context of educational institutions. They see acceptable behaviour in the use of mobile devices linked to social norms in the context of wider cultural practices surrounding the use of mobile devices. Traditional regulations of public and private spaces are being renegotiated.

The third important node of the triangle consists of the *social and technological structures* that govern the user's being in the world. Pachler (2010) and Pachler, Bachmair, and Cook (2010), for example, highlight the way in which risk is being increasingly individualized in the context of the provisionality and flexibility as a structural feature. Or they consider the importance of media related structural features of the convergence of mobiles and their applications with the internet.

For a more detailed description of the approach see (Pachler, 2010; Pachler, Bachmair, & Cook, 2010).

WORK-BASED LEARNING

Let us now turn to work-based learning. As we have noted at the outset, in order to start to delineate how WBML might be characterised, it is important to understand theoretical and conceptual approaches not only in the field of mobile learning but also in the field of work-based learning.

Figure 2. The socio-cultural ecological approach of the London Mobile Learning Group
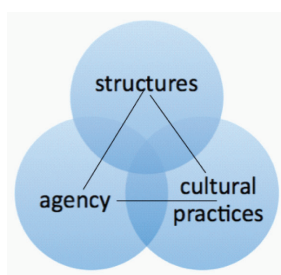
A socio-cultural, ecological approach

Relevance and Scope

The nature of organisations and work has changed considerably in the last decades. There is a stronger need to cope with greater job insecurity, greater job mobility and technological changes (Mulholland et al., 2005). For example, mobile technologies alter the nature of (knowledge) work as well as the balance between training and performance support (Traxler, 2007). Transformations caused by mobile phones can result in greater efficiency and supervision but also in the weakening of home and work boundaries (see also Traxler in this edition). Other examples for alterations are downsized companies that virtually cooperate in the value chain with partners in short and long term alliances (Carayon & Smith, 2000). These trends also impact on competence development and on workplace learning (Mulholland et al., 2005): smaller companies, for example, may not have sufficient resources to adequately support their employees' competence development and, the virtual cooperation leads to learning and knowledge sharing across company borders (Bal & Teo, 2001). Mazzoni and Gaffuri (2009a, p. 1) point out:

In this context, which is characterized by short terms of reaction to environmental changes, by inter-organisational mobility, and by weak connections between individuals and organisations in which they operate, a greater flexibility in the use, in the transfer, and in the integration of personal knowledge and social competences is required. […] the rapidity of the knowledge evolution, of the transfer and of the obsolescence tends to break the sequential nature of traditional training courses (models based on the transmission of repetitive competences isolated by contexts, the acquisition of behavioural schemes or movements automation) that nowadays seem to be obsolete and involved in marginal professional contexts.

They go on to say: "In contexts characterised by this speed of change, the classic refresher courses risk being characterised by simple por-tions of contents encapsulated in knowledge sets exposed to ageing processes difficult to predict" (Mazzoni & Gaffuri, 2009b, p. 1405).

These examples show the growing importance of learning that takes place outside conventional personnel development structures of organisations.

Job skills have risen significantly in the last decades: on the one hand, the number of jobs with little induction time has declined. On the other hand, more and more employees indicate that their job requires them to constantly learn; and employees see themselves increasingly helping workplace colleagues to learn new things. This evidence suggests that workplaces themselves are becoming a more and more important driver for learning (Felstead et al., 2007). Learning in work-contexts is considered as crucial in today's learning society (Evans et al., 2002).

However, it is recognised that these potentials are not simply met by acknowledging that "learning occurs at work: both the practices and discourses of workplace learning require both understanding and development" (Lee et al., 2004). In this context it has to be taken into account that the main objective of many organisations is not learning but the profit-orientated delivery of services and products. Learning makes a crucial contribution to it, but its importance might be underestimated because it is (in some contexts) difficult to separate from daily work-practices (see Unwin & Fuller, 2003, p. 3).

There exist a variety of different and even contradictory approaches to workplace learning (Lee et al., 2004, Kersch & Evans, 2006; Jacobs & Park, 2009) and work-based learning (Kersch & Evans, 2006; Evans et al., 2010; Burke et al., 2009). This paper is based on an inclusive notion of work-based learning "bridging embedded workplace learning perspectives and those that frame work-based learning as a class of programmes" (Evans, forthcoming). In this sense, work-based learning refers to expanding individual and collective human capacities in the context of employment (including also forms of self-employment, unpaid employment as well

as voluntary forms community organisation) *learning in, for and through the workplace* (drawing on Evans et al., 2010; Evans & Kersh, 2006; Kersch & Evans, 2006; Evans, 2009). Work-based learning can, accordingly, relate to placements as part of education courses, to (semi-)formal on-the-job training provided within organisations or to the manifold forms of learning in informal and incidental contexts at the workplace (Cheetham & Chivers, 2001). In the literature the discussion of learning in the workplace has been developed across different and conflicting paradigms and research communities as follows:

Individualised and/or Cognitive Perspectives

In many of the earlier theoretical approaches to learning in work contexts, behaviourist and cognitive views with a particular focus on reflection and experience prevailed. These were centred on the learning of individuals, marginalising the importance of social, organisational and cultural factors in the workplace.

Schön, for example, contrasted positivist notions of practice (what he called "technical rationality"): he introduced the concepts of reflection-in-action and reflection-on-action (Schön, 1983, 1987), pointing out the meaning of reflection for the activities and learning of (individual) practitioners. Similarly, Kolb (1984) described reflection as a core element in his well-known learning cycle, which further consists of generalisation and conceptualisation, experimentation and concrete experience. Kolb's cycle is part of experiential learning theories, which have been used to explain how practitioners learn from experience outside formal programmes. Also Collins, Brown, and Newman (1987) outline the importance of processes that experts engage in to acquire knowledge in complex and authentic situations. Combining these forms of learning with cognitive elements of schooling they introduced the concept of cognitive apprenticeship. Also in this model reflection plays a central role and is part of the proposed teaching methods which

aim at supporting the learner in the acquisition of cognitive and meta-cognitive competences: modeling, coaching, scaffolding, articulation, reflection and exploration (Collins et al., 1987). Beyond the model's intended use for the redesign of schooling, cognitive apprenticeship has also been used to explain competence development in workplace contexts, for example in clinical environments (see Pimmer, 2009; Pimmer et al., 2009). To a limited extent the authors in this field consider the social context and the culture in which learning takes place, linking those concepts, for example, to the learner's access to several models of expertise-in-use against which to refine their understanding of complex skills. A comprehensive review on how (individual) professionals learn in practice is offered by Cheetham and Chivers (2001).

Participatory and Socio-Cultural Perspectives of Learning in the Workplace

Social learning theorists have criticised cognitive theories for not being able to explain learning that occurs in schools and workplaces because of their disregard for social and situational factors. According to them, learning is situated, intrinsic and evolves throughout a process of legitimate, active participation in communities of practice (see, e.g., Lave & Wenger, 1991). According to Wenger (1988, 1999) a community of practice defines itself along three dimensions:

- What it is about – its joint enterprise as understood and continually renegotiated by its members.
- How it functions – mutual engagement that bind members together into a social entity.
- What capability it has produced – the shared repertoire of communal resources (routines, sensibilities, artefacts, vocabulary, styles, etc.) that members have developed over time.

A community of practice involves much more than the technical knowledge or skill

associated with undertaking some tasks. Members are involved in a set of relationships over time (Lave & Wenger, 1991) and communities develop around things that matter to people (Wenger, 1988). For a community of practice to function it needs to generate and appropriate a shared repertoire of ideas, commitments and memories. It also needs to develop various resources such as tools, documents, routines, vocabulary and symbols that in some way carry the accumulated knowledge of the community. In other words, it involves practice – ways of doing and approaching things that are shared to some significant extent among members.

Knowing is inherent in the growth and transformation of identities and it is located in relations among practitioners, their practice, the artefacts of that practice, and the social organization ... of communities of practice. (Lave & Wenger, 1991, p. 122)

Newcomers enter a community of practitioners, and, over time, with increasing responsibility, task complexity and effort they become 'old-timers', fully participating members of the community. During this transformation not only knowledge and skills change but also the learner's identity develops further. Lave and Wenger propose that the initial participation in a culture of practice can be observation from the periphery or "legitimate peripheral participation". The participant moves from the role of observer, as learning and observation in the culture increase, to a fully functioning member.

The concepts of legitimate peripheral participation and communities of practices have gained wide acceptance within workplace learning theory and research. They can be seen as a valuable complement (or counter-point) to the cognitivist and/or individualised approaches described in the previous section (see Sawchuck, 2010). However, several shortcomings have been identified – beyond the fact that Lave and Wenger's case studies mostly do not represent current workplace practices. Inter alia they do not take into account how 'old-timers', hav-

ing reached full participation, further engage in learning. Research has demonstrated, for example, that experienced workers can learn through their engagement with apprentices (Fuller et al., 2005, p. 64). Moreover, no or only marginal account is taken of the role of teaching and formal education, of the issues of power and conflict, and of prior learning and experiences. It is not considered that learning may take place in several communities of practice; a fact that can be central to workplace learning (ibid).

Learning across various communities is a crucial aspect of Activity Theory (AT). There, the notion of a community of practice is replaced by the term activity system (see Figure 3), whose collective, artefact-mediated and object-orientated nature, seen in its network relations to other activity systems is regarded as the prime unit of analysis (Engeström, 2001). An activity system is a community of multiple points of view, traditions and interests and consequently, a source of trouble and innovation that gets transformed over lengthy periods of time. Historically accumulating structural tensions, for example the adoption of a new element from the outside (such as a new technology) are the reason for transformations. As the contradictions of an activity system are aggravated, individual participants begin to question and deviate from its established norms, sometimes resulting in an expansive transformation of the activity system (p. 137). Engeström (1987) considers the main differences of the activity-theoretical concept of expansive learning from traditional types of learning as follows:

The contents and outcomes of learning are not merely knowledge in texts and the heads of students but new forms of practical activity and artefacts constructed by students and teachers in the process of tackling real-life projects or problems - it is 'learning what is not yet known'.

Learning is driven by genuine developmental needs in human practices and institutions, manifested in disturbances, breakdowns, prob-

Figure 3. Engeström's activity system
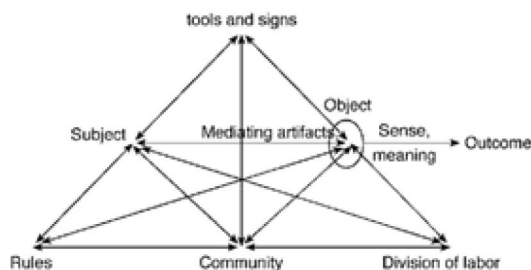
lems, and episodes of questioning the existing practice.

Learning proceeds through complex cycles of learning actions in which new objects and motives are created and implemented, opening up wider possibilities for participants involved in that activity.

The activity system described by Engeström (1987) and the concept of expansive learning (2001) are popular in workplace learning research and theory (Lee et al., 2004). However, Engeström has been criticized for not dealing with the issues of power and for "not taking into account organisational environments and work contexts, and especially the processes and impact of top-down decisions, many of which are often made in response to external influences" (Fuller & Unwin, 2004a). As other researchers have shown, aspects of hierarchy and power are crucial when it comes to learning in the workplace (Ashton, 2004; Billett, 2002).

Tacit and Explicit Knowledge, Formal and Informal Learning

Much of the most interesting research in this area has taken place in the field of organisational learning, in attempts to explain how personal knowledge and skills become shared in communities of practice or within organisations and how new knowledge is developed. Research has, for example, focused on different forms of knowledge and how such knowledge is ac-

quired and applied. Polyani has pointed to the importance of tacit knowledge stating: "we can know more than we can tell" (Polyani, 1967, p. 4). Enkenburg (1994) states that the curriculum has been based on a knowledge hierarchy of basic science, followed by applied science and then the technical skills of day to day practice (ibid.). Enkenburg stresses the importance of learning being 'situated' — knowledge cannot be separated from its source and context or environment. Knowledge is relative and learning occurs through a process of enculturation as concepts are understood through use. Knowledge is most powerfully adapted in authentic an activity, that is if it is 'coherent, meaningful and purposeful within the social framework' (Polanyi, 1958). Nonaka and Konno (1998) described with their knowledge development cycle the dynamic interaction of explicit and tacit workplace learning across multiple places. These ideas have been further developed by Dugoid and Brown (2001), Ellstrom (2001) and others.

In the field of workplace learning the concepts of formal, informal, or non-formal learning (see for example Eraut, 2000) have been widely and controversially discussed. More traditional approaches focus mostly on learning in formal, educational settings. This notion has been rejected by others such as Lave and Wenger, who pointed to the importance of learning in more informal contexts such as a community of practice (Lave & Wenger, 1991). It has been suggested that learning in informal work settings is more useful, memorable and

sustainable due to its meaning and relevancy for business needs than learning in formal classroom settings (Kersch & Evans, 2006). However, also learning in more formal contexts, such as teaching and learning in off-the-job settings, forms an integral part of learning within a community of practice (Fuller et al., 2005). Consequently, no form should be played off against the other. Other researchers have pointed to how work process knowledge is developed in communities of practice through application in the workplace (Fischer, 1996; Boreham, Samurcay, & Fischer, 2002). This work is useful in that it moves away from formally acquired and sequenced learning and towards understanding that there are different types of knowledge and that knowledge can be developed in different contexts. Similarly, it has been suggested that the distinction between formal and informal learning is problematic as all learning – regardless of where it happens – has both formal and informal characteristics (Colley et al., 2002; Billett, 2002). Pachler, Bachmair and Cook (2010) wonder whether the conceptual division between 'formal' and 'informal' learning is very helpful as it suggests differences in the processes attendant to learning where, in their view, the differences pertain mostly to the sites of learning. According to Billet (2002) and others, the discussion should be moved away from these notions, focussing instead on the structures, goals, norms, practices, agency and context.

Learning in Context: Between Practices, Structures and Agency

The current discussion in the field of workplace and work-based learning is very much centred on the notions of pedagogical and participatory practices, the (wider) organisational context and structures as well as agency: it has been widely discussed how pedagogical, participatory and daily workplace *practices* can contribute to learning. However, it has been stressed that learning and teaching at work are not solely a matter of these practices, a phenomenon flowing free of context and organisational structures: learning practices such as the mutual support

from colleagues, are seen as strongly facilitated or impeded by a range of internal organisational structures such as hierarchy and power relations; even the wider economic context such as products and markets impacts on learning practices. Practices and structures can shape individuals' learning only to a certain extent: many authors have pointed out how individual characteristics and biographies relate to individual forms of learning at work. Attwell (2007), for example, noted that, although some informal learning in the workplace is motivated by organisational needs or work-based problems, much learning is driven by personal interest.

In the next sections we will show recent and current theoretical approaches and empirical findings that are strongly based on the notions of practices, structures and contextual issues and agency.

Practices

Particularly the notion of participatory practices seems to be central in the literature: participatory practices describe how individuals participate in work. The participation in practices is seen as analogous to learning in the workplace (Lave & Wenger, 1991). Lave notes (1996) that, whenever one examines practice, one identifies learning. Workplaces as "historically, culturally, and situationally-shaped environments" (Billett, 2004, p. 1) and practices that shape the individual's participation are central to understanding learning at work. In this way, "the workplace's norms and values provide opportunities for participation and, therefore, opportunities to learn" (Billet, 2002, p. 63). Unwin et al. (2007, p. 334) consider pedagogical practices such as "instruction, coaching, mentoring, assessment and feedback in the learning process" as subjects of research across a range of disciplinary fields. A survey of 1943 employees, for example, revealed the importance of workplace activities (practices), including interaction with, and mutual support from colleagues, being shown different approaches and doing the job, engaging in self-reflection and keeping one's eyes and ears open for the enhancement of work

performance (Felstead et al., 2007). Fuller and Unwin (2003, 2008) describe a framework of an 'expansive/restrictive continuum' that is based upon 'practices' rather than modelled on 'structures' (Lee et al., 2004). An expansive learning environment includes the institutional recognition and support for the status as learner, the participation in multiple communities of practices, a gradual transition to full participation, career progression after apprenticeship and access to a range of 'on-and off-the-job' learning including knowledge-based and competence-based qualifications. They see learning shaped through a complex interplay between different forms of participation, organisational structures and workplace contexts.

Structures and Context

Beside isolated contributions the wider institutional contexts which shape the learning experiences of these communities have been neglected until recently (Ashton, 2004).

Authors such as Billett (2002) or Ashton (2004) pointed to organisational structure and context as significant factors influencing learning in the workplace (Lee et al., 2004).

It has been stressed that the structuring of workplace learning experiences is not benign: learning opportunities are unequally distributed and contested (Billett, 2004). Thus, learning at work has to be particularly explored within the context of power relations (Rainbird et al., 2004). The impact of organisational structure and power on learning was also shown in a case study in a major multinational corporation on the basis of four criteria (Ashton, 2004): the *distribution of knowledge and information* of the staff was clearly differentiated according to their position in the hierarchy. Senior managers, for example, had much better access than their subordinates. Beyond these formal restrictions sometimes additional informal barriers were imposed by line managers in order to protect their hierarchical position. This tendency might have been particularly visible due to a change project that coincided with the research: superiors were reluctant to transmit information

because they were afraid of losing their jobs. Another less formal learning opportunity was the access to networks which was also easier at the higher levels of the hierarchy. There was also a clear impact of organisational structure on *opportunities to practise* skills according to hierarchy. This included, for example, well-defined career lines for higher management and ad-hoc movement from one job to another for junior staff without the opportunity for the progressive building of skills over time. The availability of the *support for learning* was also strongly determined by the hierarchy of the organisation: senior staff had extensive support for learning from their peers and the HR department while junior staff were dependent on the skills and abilities of their managers and on the quality of their relationships with them. Also the form of *rewards* depended strongly on organisational hierarchy. Senior staff received increases in salary and moved up the internal career path through their learning. The internal progression of junior staff was weaker and was more dependent on their immediate supervisor's awareness of their performance.

Attwell (2007) argued that the likelihood of using technology for informal learning depended not just on access to computers and the internet (which was more often available to senior staff) but also on the opportunities to use that learning in work processes. Senior staffs (and those that had been longer in their post) were more likely to be afforded such opportunities.

Today there is much awareness of the contextual factors: in line with previous publications Unwin et al. (2007) argue that learning (and teaching) at work is not only a matter of (pedagogical) practices (and agency) that float free of context: it is, on the contrary, a phenomenon that is strongly impacted on by – what they describe as "contextual factors" that can facilitate or impede learning: based on case studies in hairdressing and automotive component manufacturing industries they illustrate how those factors can structure learning. In one example, they point out that employees in certain jobs felt much less likely to enhance

their work performance through interactions with colleagues, clients and the job itself because their work-processes were "tightly bounded and heavily prescribed" (Unwin et al., 2007, p. 337). Connecting the literatures on workplace learning, the organisation of work and performance they extended their concepts of *expansive/restrictive continuum* (ibid). They see a "Russian doll-like composition of workplaces". Beyond company internal structures (such as the organisation of work, level of employee involvement, organisational performance) there are a number of external contextual factors (such as the broader economic, regulatory, and social context) that impact on the company and the learning practices: concrete examples include the nature of their product market and ownership, regulatory requirements set by government, the price and availability of raw materials. They stress the importance of the understanding of the role and of the function of the various layers in a holistic way, but not in the sense that the tiny baby at the core is the answer to the questions (ibid).

A Fresh Approach to Learning in Context was also Developed by Evans et al (forthcoming). While the authors consider the workplace as an important starting point for analytical perspectives on work-based learning, they also recognise the need to take the social and organizational context of work and learning more fully into account. Instead of the transfer of knowledge from one setting to another they see the concept of recontextualisation at the heart of work-based learning: putting different kinds of knowledge to work in different ways according to context. The authors stress the importance of the understanding of how different forms of knowledge are 're-contextualised' as people move between sites of learning and practice in work, education and community settings. They distinguish four modes of recontextualisation (content, pedagogic, workplace and learner) that "focus on processes involved in successfully moving knowledge between disciplines and workplaces via pedagogic strategies and through learner/employee engagement".

Moving beyond different types of knowledge towards strategies of putting knowledge to work, the concept of recontextualisation allows, inter alia, the identification of how "new knowledge" changes people, social practices and contexts (Evans et al., 2010). Their claim for an inclusive understanding of work-based learning (also see the definition above) includes the need to explore how creative, digital technologies can enhance learning. They also point to the new meanings of mobility as "the locations in which work is carried out diversify" (ibid). These topics are closely linked to issues of mobile learning that we discussed above.

It becomes evident that the terms context and structures are sometimes used interchangeably in the literature. Both concepts are applied inter alia to describe elements of the closer and wider environment that impact on learning. Structures can be considered as dynamic rather than static entities, according to the sociological approach of Giddens (1984) and not as objectively existing entities outside of patterns of interaction (Watson, 2003). They can be seen as a social process: as organisational 'structuration'. In this sense, individual engagement takes a crucial role in the construction and operationalisation of organisational structures. These structures, in turn, shape the conditions for individual engagement. Thus, organisational structures are not separate entities which solely determine individuals' learning but rather a subject of creation and re-creation through them (Lee et al., 2004). The analysis of structures requires looking at official and unofficial aspects (Watson, 2003). Watson refers to informal structures which are constructed through the interrelationships between workers within and across various occupational/professional levels within a workplace and other more formal structures (i.e., systems, policies, rules and 'top-down' decision making).

Agency

It is argued that even the most structured learning experiences can shape individuals' learning only

to a certain extent. Some authors pointed out that a working environment structured to facilitate learning will not necessarily lead to the intended learning. In turn, working environments with little learning opportunities will not be able to "prevent" learning of individuals (Lee et al., 2004). It is, consequently, not helpful to analyse learning solely on the basis of the structuring of learning experiences (Billett, 2002). Billett (2004) argues that despite the regulation of participation, decisions about engagement in work and the learning that arises through work are not determined solely by the situation but also by the "individuals' agency and intentionalities" (ibid, p. 5) that shape their engagement in work practice. Thus, he pays attention to how individuals engage with the opportunities and obstacles to learning according to workplace cliques, affiliations, gender, race, language or employment standing and status. His approach of considering both structure and agency was generally well received in the community. Billet was, however, criticised for overemphasising voluntarism and "free will": according to some commentators (ibid), he neglected the way how the individuals' agencies are themselves influenced through factors such as occupational positioning, one's position within a workplace hierarchy and also within these, one's gender and social class.

To avoid the concepts of voluntarism and determinism, Fuller and Unwin (2004b) contribute to the agency and structure debate with the terminology of a "learning territory": the range of learning opportunities that each individual will have accessed and will be able to access over time. A territory consists of different – past and current – learning "regions". The character of the learning territory influences how the learner "perceives and engages with opportunities and barriers to learning at work" (ibid, p. 133). They reported, for example, apprentices with poor *previous* learning regions (e.g., poor socio-economic backgrounds) as not being able to 'overcome the disadvantages' of the (current) restricted workplace learning environment. In this way, the current learning region was only poorly contributing to the

extension of their existing learning territory (Fuller & Unwin, 2004b). Another apprentice with a broader learning territory (including good academic qualifications and social skills) was "fully aware that these could be utilized elsewhere should the opportunities provided by his employer prove too restricted" (ibid, p. 142).

In this way the authors underline the significance of individual biography in workplace learning (see also Hodkinson et al., 2004). They suggest that learning territories influence the individual engagement with the learning opportunities at work. However, they also point out how workplace environments themselves make a significant contribution to the individual's learning territory in the present and for the future.

Also Ashton (2004) paid attention to the importance of employee agency and the interpersonal relations between staff: the opportunities to practise were, for example, strongly determined by the delegation of responsibility. These varied between the managers according to their relationships with their subordinates, particularly depending on the level of trust. Having a trusting relationship with the person providing the knowledge and the guidance was a crucial part of the learning process (Ashton, 2004).

There are many publications about learner biographies such as how work experience or educational background impact on learning in workplace contexts (Evans et al., 2004) which show that employees with previous experience felt more confident within their current workplace and which describe how they use their previously acquired skills in their present workplace environments. Of importance is also the educational background: workers with "the lowest levels of educational attainment are the least likely to participate in work-related education or training" (Bates et al., 2005, p. 19). A number of further characteristics that impact on the learning such as age, gender, ethnicity, family circumstances, learners' attitudes and dispositions have been identified in the literature (compare for example Kersch & Evans, 2006, Bates et al., 2005). Bates et

al. reports, for example, that older workers are the least likely to participate in work-related training (ibid, p. 19).

Despite the creative potential and the valuable contributions of many of the stated schools of thought in their respective areas, none of the described single approaches can holistically explain the multi-dimensional phenomena of learning in work-contexts (see also Sawchuck, 2010). However, reflecting the discussion of learning in work-contexts it can be noted over time that more and more contextual factors have been taken into account. Departing from a rather narrow focus on the learning of individuals, the researchers' attention moved to socio-cultural contexts such as participatory practices. Today, there is recognition not only of agency, learning practices and the internal organisational contexts, but even the "wider canvas of political economy" (Unwin et al., 2007, p. 335) and society are taken into account. Latest publications have stressed the need to consider work-based learning in terms of ecology in order to understand the complexity of factors that impact directly and indirectly on learning without ignoring the bigger picture. In ecology individuals and groups have spaces in which to exercise agency in ways that can impact on the whole dynamic, through the interdependencies involved (Evans, forthcoming).

INTERIM CONCLUSIONS AND OUTLOOK

In mobile learning theory the focus has arguably been on moving away from a technological to a social point of view with reference to cultural-historical psychology. In particular, there has been an emphasis on structures, practices and agency within a socio-cultural ecology.

In our brief — and admittedly selective — outline of approaches to WBL with a focus on work-located concepts, we show how, over time, the attention of researchers has shifted from a narrow focus on the learning of individuals to the exploration of socio-cultural contexts with reference to organisational perspective and wider political and societal environment.

It is intriguing to note how much overlap there seems to exist across the work of researchers in these fields and how similar the key concepts as well as the theoretical and conceptual models drawn on by both fields appear to be.

Yet, key differences also emerge: terminology central to both fields is not necessarily understood in the same way as it tends to be embedded in different disciplinary discourses at different levels of maturity, for example an organisational perspective in the case of work-based learning and cultural and media studies in the case of mobile learning.

For WBML to be able to emerge as a theoretically and conceptually coherent field of inquiry in its own right, further work is needed on aligning the trajectories of research in mobile and work-based learning.

We have attempted to show in this paper that there is scope for fruitful synergies but that, at the same time, the 'cultural borrowing' across the different areas needs to be handled with caution and undertaken with great care.

Due to lack of space it has not been possible in this paper to embark on a discussion of how the two field of mobile and work-based learning might best be brought together into WBML. This is a logical next step.

In embarking on it, we argue, additional conceptual, theoretical and practical ground needs to be covered, which it was also not possible to do here. We are, for example, acutely aware that there exists a long tradition of research into technology use in learning in general as well as in WBL in particular with a body of literature that needs to be taken into account and built upon when considering the introduction of mobile devices into WBL (see e.g., Kersh et al., 2009; for work-based e-learning see e.g., Tynjala & Hakkinen, 2005; for collaborative learning see e.g., Suthers, 2006, or computer mediated communication see e.g., Warschauer, 1997).

This will be the task of a future paper.

REFERENCES

Ashton, D. (2004). The impact of organisational structure and practices on learning in the workplace. *International Journal of Training and Development*, *8*, 43–53. doi:10.1111/j.1360-3736.2004.00195.x

Attwell, G. (Ed.). (2007). Searching, lurking and the zone of proximal development. e-learning in small and medium enterprises in Europe. In *Proceedings of the ICT SME Project,* Vienna, Austria (Vol. 5). Retrieved from http://www.navreme.cz/dwn/1247/1299cs_CZ_Searching_Lurking.pdf

Bal, J., & Teo, P. (2001). Implementing virtual teamworking: Part 2-A literature review. *Logistics Information Management*, *14*, 208–222. doi:10.1108/09576050110390248

Bates, P., Hunt, W., & Hillage, J. (2005). *Learning at work: strategies for widening adult participation in learning below Level 2 via the workplace*. Learning and Skills Development Agency.

Billett, S. (2002). Critiquing workplace learning discourses: participation and continuity at work. *Studies in the Education of Adults*, *34*, 56–67.

Billett, S. (2004). Conceptualising workplaces as learning environments. *Journal of Workplace Learning: Employee Counselling Today*, *16*(6), 312–324.

Boreham, N., Samurcay, R., & Fischer, M. (2002). *Work process knowledge*. London: Routledge.

Burke, L., Marks-Maran, D., Ooms, A., Webb, M., & Cooper, D. (2009). Towards a pedagogy of work-based learning: perceptions of work-based learning in foundation degrees. *Journal of Vocational Education and Training*, *61*, 15–33. doi:10.1080/13636820902819917

Carayon, P., & Smith, M. (2000). Work organization and ergonomics. *Applied Ergonomics*, *31*, 649–662. doi:10.1016/S0003-6870(00)00040-5

Cheetham, G., & Chivers, G. (2001). How professionals learn in practice: an investigation of informal learning amongst people working in professions. *Journal of European Industrial Training*, *25*, 248–292. doi:10.1108/03090590110395870

Colley, H., Hodkinson, P., & Malcolm, J. (2002). *Non-formal learning: mapping the conceptual terrain. University of Leeds Lifelong Learning Institute*. Retrieved from http://www.infed.org/archives/etexts/colley_informal_learning.htm

Collins, A., Brown, J., & Newman, S. (1987). *Cognitive apprenticeship: teaching the craft of reading, writing, and mathematics* (Tech. Rep. No. 403). Cambirdge, MA: Beranek and Newman, Inc.

Dugoid, P., & Seely, B. J. (2001). Knowledge and organization: a social-practice perspective. *Organization Science*, *12*(2), 198–213.

Dzartevska, A. (2009). Developing a mobile learning platform for a professional environment . In Ryu, H., & Parsons, D. (Eds.), *Innovative mobile learning: techniques and technologies* (pp. 273–301). Hershey, PA: IGI Global.

Ellström, P. (2001). Integrating learning and work. *Human Resource Development Quarterly*, *12*(4), 421–435. doi:10.1002/hrdq.1006

Engeström, Y. (1987). *Learning by expanding: an activity-theoretical approach to developmental research*. Helsinki, Finland: Orienta-Kosultit Oy.

Engeström, Y. (2001). Expansive learning at work: toward an activity-theoretical reconceptualization. *Journal of Education and Work*, *14*, 133–156.

Enkenburg, J. (1994). Situated cognition and cognitive apprenticeship. New framework for education of professional skills . In Heikkinen, A. (Ed.), *Vocational Education and Culture - European Prospects from History and Life-History* (pp. 204–216). Tampere, Finland: Tampereen Yliopisto.

Eraut, M. (2000). Non-formal learning, implicit learning and tacit knowledge in professional work. In Coffield, F. (Ed.), *The necessity of informal learning* (pp. 12–31). Bristol, UK: The Policy Press.

Eurostat. (2008). Science and technology. In *id Europe in figures-Eurostat yearbook 2008* (pp. 493-498).

Evans, K. (2009). Rethinking work-based learning. In *Proceedings of the WLE Conference, Institute of Education*.

Evans, K. (forthcoming). Work-based learning - setting the scene. In Pachler, N., Pimmer, C., & Seipold, J. (Eds.), *Mobile work based learning. A handbook for academics and practitioners*. Oxford, UK: Peter-Lang.

Evans, K., Guile, D., & Harris, J. (2010). *Rethinking work-based learning - for education professionals and professionals who educate*. In Malloch, M., Cairns, L., Evans, K., & O'Connor, B. (Eds.), *The SAGE Handbook of workplace learning*. London: Sage.

Evans, K., Hodkinson, P., & Unwin, L. (Eds.). (2002). *Working to learn. Transforming learning in the workplace*. London: Kogan Page.

Evans, K., & Kersh, N. (2006). Adults learning in, for and through the workplace. In *Proceedings of the British Educational Research Association Annual Conference,* University of Warwick, UK.

Evans, K., Kersh, N., & Sakamoto, A. (2004). Learner biographies: exploring tacit dimensions of knowledge and skills. In Rainbird, H., Fuller, A., & Munro, A. (Eds.), *Workplace Learning in Contex* (pp. 222–241). London: Routledge.

Felsetead, A., Gallie, D., Green, F., & Zhou, Y. (2007). *Skills at work 1986 to 2006*. Oxford, UK: University of Oxford.

Fischer, M. (1996). *Acquiring work process knowledge on the shop-floor level*. Paper presented at the Third Work Process Knowledge Meeting, Bremen, Germany.

Frohberg, D. (2006). *Mobile learning is coming of age: what we have and what we still miss*. Paper presented at DELFI: 4. e-Learning Fachtagung Informatik der Gesellschaft für Informatik.

Frohberg, D., Göth, C., & Schwabe, G. (2009). Mobile Learning projects. A critical analysis of the state of the art. *Journal of Computer Assisted Learning*, *25*, 307–331. doi:10.1111/j.1365-2729.2009.00315.x

Fuller, A., Hodkinson, H., Hodkinson, P., & Unwin, L. (2005). Learning as peripheral participation in communities of practice: a reassessment of key concepts in workplace learning. *British Educational Research Journal*, *31*, 49–68. doi:10.1080/0141192052000310029

Fuller, A., & Unwin, L. (2004). Expansive learning environments. In Rainbird, H., Fuller, A., & Munro, A. (Eds.), *Workplace learning in context* (pp. 126–144). London: Routledge.

Fuller, A., & Unwin, L. (2008). *Towards expansive apprenticeships*. London: Teaching and Learning Research Programm (TLRP).

Giddens, A. (1984). *Die Klassenstruktur fortgeschrittener Gesellschaften*.

Härtel, M., Gerwin, W., & Kupfer, F. (2007). *Der Beitrag arbeitsplatznaher elektronischer Informations- und Lernsysteme für berufliche Qualifizierungsprozesse. Abschlussbericht zum Forschungsprojekt*. Retrieved from http://www2.bibb.de/tools/fodb/pdf/at_34109.pdf

Hodkinson, P., Hodkinson, H., Evans, K., Kersh, N., Fuller, A., Unwin, L., & Senker, P. (2004). The significance of individual biography in workplace learning. *Studies in the Education of Adults*, *36*, 6–24.

Jacobs, R., & Park, Y. (2009). A proposed conceptual framework of workplace learning: implications for theory development and research in human resource development. *Human Resource Development Review*, *8*, 133–150. doi:10.1177/1534484309334269

Kersch, N., & Evans, K. (2006). *Competence development and workplace learning: An overview of the UK and Ireland*. Paper presented at the ASEM-LLL workshop, University of Innsbruck, UK.

Kersch, N., Pachler, N., & Daly, C. (2009). *The role of the new technologies in workplace learning: UK context*. Paper presented at the ICELW The International Conference on E-Learning in the Workplace 2009, New York.

Kolb, D. (1984). *Experiential learning: Experience as the source of learning and development*. Upper Saddle River, NJ: Prentice-Hall.

Kukulska-Hulme, A., Sharples, M., Milrad, M., Arnedillo-Sánchez, I., & Vavoula, G. (2009). Innovation in mobile learning: a European perspective. *International Journal of Mobile and Blended Learning*, *1*(1), 13–35.

Laurillard, D. (2002). *Rethinking university teaching: a conversational framework for the effective use of learning technologies*. London: Routledge. doi:10.4324/9780203304846

Laurillard, D. (2007). Pedagogical forms of mobile learning: framing research questions. In N. Pachler (Ed.), *Mobile learning: towards a research agenda* (pp. 153-176). London: WLE Centre, Institute of Education. Retrieved from http://www.wlecentre.ac.uk/cms/files/occasionalpapers/mobilelearning_pachler_2007.pdf

Lave, J. (1996). The practice of learning . In Chaiklin, S., & Lave, J. (Eds.), *Understanding practice: Perspectives on activity and context*. Cambridge, UK: Cambridge University Press.

Lave, J., & Wenger, E. (1991). *Situated Learning. Legitimate peripheral participation*. Cambridge, UK: University of Cambridge Press.

Lave, J., & Wenger, E. (1991). *Situated learning: legitimate peripheral participation*. Cambridge, UK: Cambridge University Press.

Lee, T., Fuller, A., Ashton, D., Butler, P., Felstead, A., Unwin, L., & Walters, S. (2004). *Learning as work: teaching and learning processes in the contemporary work organisation*. Leicester, UK: Centre for Labour Market Studies, University of Leicester.

Livingston, A. (2004). Smartphones and other mobile devices: the Swiss Army knives of the 21st Century. *EDUCAUSE Quarterly*, *27*, 46–57.

Mazzoni, E., & Gaffuri, P. (2009a). *Personal Learning environments for overcoming knowledge boundaries between activity systems in emerging adulthood*. Retrieved from http://www.elearningpapers.eu/index.php?page=doc&doc_id=14400&doclng=6&vol=15

Mazzoni, E., & Gaffuri, P. (2009b). Personal learning environments as boundary objects for bridging the distance between schooling and work activities. In A. Méndez-Vilas, A. Solano Martín, J. A. Mesa González, & J. Mesa González (Eds.), *Research, reflections and innovations in integrating ICT in education* (Vol. 3, pp. 1404-8). Badajoz, Spain: FORMATEX. Retrieved from http://www.formatex.org/micte2009/book/1404-1408.pdf

Mulholland, P., Ivergård, T., & Kirk, S. (2005). Introduction: contemporary perspectives on learning for work. *Applied Ergonomics*, *36*, 125–126. doi:10.1016/j.apergo.2004.09.010

New Media Consortium & EDUCAUSE. (2009, 2010). *The Horizon Report. New Media Consortium / EDUCAUSE Learning Initiative*. Retrieved from http://www.nmc.org/horizon

Nonaka, I., & Konno, N. (1998). The Concept of 'Ba': building a foundation for knowledge creation. *California Management Review*, *40*(3), 40–54.

Pachler, N. (2010). The socio-cultural ecological approach to mobile learning: an overview. In Bachmair, B. (Ed.), *Medienbildung in neuen Kulturräumen: Die deutschsprachige und britische Diskussion* (pp. 153–167). Berlin: Wiesbaden VS Verlag für Sozialwissenschaften.

Pachler, N. (2010). Mobile learning, the transforming media landscape and schools. *London Digest, 6*, 19-20. Retrieved from http://www.leru.org.uk/publications/london_digest/

Pachler, N., Bachmair, B., & Cook, J. (2010). *Mobile learning: structures, agency, practices*. New York: Springer.

Pachler, N., Pimmer, C., & Seipold, J. (Eds.). (forthcoming). *Mobile work based learning. A handbook for academics and practitioners*. Oxford, UK: Peter-Lang.

Parslow, P. (2009). *Blog comment*. Retrieved from http://www.pontydysgu.org/2009/12/vygotsky-activity-theory-and-the-use-of-tools-for-formal-and-informal-learning/comment-page-1/#comment-38587

Parslow, P., Lundqvist, K., Porter-Daniels, E., & Williams, S. (2008). *Folksonomical reification*. Retrieved from http://www.lulu.com/items/volume_64/60430000/6043166/2/print/6043166.pdf

Pimmer, C. (2009). *Work-based mobile learning in the health sector: concept of a mobile learning system exemplified by educational scenarios of junior doctors*. Paper presented at the 3rd WLE Mobile Learning Symposium: Mobile Learning Cultures across Education, Work and Leisure WLE Centre, IOE London, UK.

Pimmer, C., & Gröhbiel, U. (2008). *Mobile Learning in corporate settings. Results from an Expert Survey*. Paper presented at mLearn2008, The Bridge from Text to Context.

Pimmer, C., Pachler, N., Gröhbiel, U., & Genewein, U. (2009). *Arbeitsintegriertes Lernen im Gesundheitswesen. Konzept für ein mobiles Kollaborations- und Lernsystem am Beispiel der ärztlichen Weiterbildung.' bwp@ Berufs und Wirtschaftspädagogik*. Retrieved from http://www.bwpat.de/ausgabe15/pimmer_etal_bwpat15.pdf

Polanyi, M. (1958). *Personal knowledge*. London: Routledge.

Polanyi, M. (1967). *The tacit dimension*. New York: Anchor Books.

Rainbird, H., Munro, A., & Holly, L. (2004). The employment relationship and workplace learning. In Fuller, H., & Munroe, A. (Eds.), *Workplace learning in context* (pp. 38–53). London: Routledge.

Sawchuck, P. (2010). Researching workplace learning: an overview and critique. In Malloch, M., Cairns, L., Evans, K., & O'Connor, B. (Eds.), *The SAGE Handbook of workplace learning*. London: Sage.

Schön, D. (1983). *The reflective practitioner - how professionals think in action*. London: Temple Smith.

Schön, D. (1987). *Educating the reflective practitioner. Toward a new design for teaching and learning in the professions*. San Francisco: Jossey-Bass.

Seipold, J., & Pachler, N. (2010). MoLeap - The Mobile Learning Projects Database. A pool for projects and tool for systematic description and analysis of mobile learning practice. In *RCET*. Retrieved from http://www.rcetj.org/index.php/rcetj/article/view/87/192

Sharples, M., Taylor, J., & Vavoula, G. (2005). *Towards a theory of mobile learning*. Paper presented at mLearn 2005: 4th World conference on mLearning, Banff, Alberta, Canada.

Sharples, M., Taylor, J., & Vavoula, G. (2007). A theory of learning for the mobile age. In Andrews, R., & Haythornthwaite, C. (Eds.), *The Handbook of E-learning Research* (pp. 221–247). London: Sage.

Suthers, D. (2006). Technology affordances for intersubjective meaning making: a research agenda for CSCL. *International Journal of Computer-Supported Collaborative Learning*, *1*, 315–337. doi:10.1007/s11412-006-9660-y

Traxler, J. (2007). Defining, discussing and evaluating mobile learning: The moving finger writes and having writ. *International Review of Research in Open and Distance Learning*, *8*(2). Retrieved from http://www.irrodl.org/index.php/irrodl/article/view/346/875.

Tynjala, P., & Hakkinen, P. (2005). E-learning at work: theoretical underpinnings and pedagogical challenges. *Journal of Workplace Learning*, *17*, 318–336. doi:10.1108/13665620510606742

Unwin, L., Felstead, A., Fuller, A., Bishop, D., Lee, T., Jewson, N., & Butler, P. (2007). 'Looking inside the Russian doll: the interconnections between context, learning and pedagogy in the workplace. *Pedagogy, Culture & Society*, *15*, 333–348. doi:10.1080/14681360701602232

Unwin, L., & Fuller, A. (2003). Expanding learning in the workplace: making more of individual and organisational potential. In *IACE*. London: NIACE.

Vavoula, G., Pachler, N., & Kukulska-Hulme, A. (2009). *Researching mobile learning: frameworks, tools and research designs*. Oxford, UK: Peter Lang.

Wali, E., Winters, N., & Oliver, M. (2008). Maintaining, changing and crossing contexts: an activity theoretic reinterpretation of mobile learning. *ALT-J: Research in Learning Technology*, *16*, 41–578.

Warschauer, M. (1997). Computer-mediated collaborative learning: theory and practice. *Modern Language Journal*, *81*, 470–481. doi:10.2307/328890

Watson, T. (2003). *Sociology, work and industry*. London: Routledge.

Wenger, E. (1998). Communities of practice. Learning as a social system. *Systems Thinker*. Retrieved from http://www.co-i-l.com/coil/knowledge-garden/cop/lss.shtml

Wenger, E. (1999). *Communities of practice. Learning, meaning and identity*. Cambridge, UK: Cambridge University Press.

ENDNOTES

1. See for example mlearn (http://www.mlearn2009.org), Handheld Learning (http://www.handheldlearning2008.com), WMUTE (http://www.wmute2008.org/), Mobile Learning (http://www.mobilelearning09.org), IADIS Mobile Learning (http://www.mlearning-conf.org/), ICALT (http://www.ask4research.info/icalt/2007/), IMCL (http://www.imcl-conference.org/), International Journal of Mobile Learning and Organisation (http://www.inderscience.com/browse/index.php?journalCODE=ijmlo).

2. Mobile Learning: A Handbook for Educators and Trainers (2005), Innovative Mobile Learning: Techniques and Technologies (2009), Literature Review in Mobile Technologies and Learning (2005), Looking Toward the Future of Technology Enhanced Education: Ubiquitous Learning and the Digital Native (2009).

Christoph Pimmer is a research fellow at the learning.lab/Competence Center E-Learning at the University of Applied Sciences Northwestern Switzerland. He graduated with a degree in social and economic sciences with a focus on learning and information systems. He has coordinated and worked on several projects in the field of technology enhanced learning and information management. For example, he acted as a project manager in the study mLeap: mobile learning and performance conducted in co-operation with several Swiss universities and enterprises. He has published in the fields of technology enhanced learning, mobile learning and information systems. Christoph's current research interests include work-based and mobile learning with a focus on the clinical sector and organizational transformation.

Norbert Pachler is Professor of Education and Pro-director: Professional Education at the Institute of Education, University of London. Among other things he has a research focus in the area of new technologies in teaching and learning. He has published widely, carries out funded research and supervises in this field. In 2007 Norbert founded the London Mobile Learning Group (http://www.londonmobilelearning.net), which brings together an international, interdisciplinary group of researchers from the fields of cultural studies, sociology, semiotics, pedagogy and educational technology and which he convenes. Books in the field of mobile learning include: Pachler, N. (2007) (ed) 'Mobile learning: towards a research agenda'. WLE Centre: London; Vavoula, G., Pachler, N. and Kukulska-Hulme, A. (2009) (eds) Researching mobile learning: frameworks, tools and research designs. Oxford: Peter Lang; and Pachler, N., Bachmair, B. and Cook, J. (2010) Mobile learning: structures, agency, practices. Springer: New York.

Graham Attwell is a researcher working for the Wales-based organization Pontydysgu and an Associate Fellow of the Institute of Employment Research, Warwick University. His areas of research include work-based learning, informal learning, the use of social software and Web 2.0 for learning and knowledge development and mobile learning. He is particularly interested in the development of Personal Learning Environments. Graham speaks regularly at international conferences and workshops and has published extensively in books and journals. However his preferred means of publication is through his blog, the Wales Wide Web - http://www.pontydysgu. org/blogs/waleswideweb.