Chapter 9
Contexts of Learning and Challenges of Mobility: Designing for a Blur Between Formal and Informal Learning

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Abstract The chapter will discuss challenges for design based on a context-dependent and complex understanding of mobile learning. The chapter elaborates on contextual aspects of learning and how these are related to mobility in terms of various issues involving physical space (locations), conceptual space (content), social space (social groups), technology, and learning dispersed over time. Through these aspects, mobile learning is emphasised as a complex social process that includes learning through communication between learners participating in multiple contexts mediated by personal, wireless, and mobile devices. Four challenges are discussed based on this complex understanding of mobile learning. Three of these challenges involve the relationship between learning and educational settings. The first challenge concerns how to learn at multiple intersections of physical locations and social groups. The second concerns the impact that personal, mobile, and wireless Internet-connected technology has on the monopoly of knowledge. The third concerns the blurring of the boundaries between formal and informal learning. To reach a coherent conceptualisation useful in designing for mobile learning, the chapter links these challenges to pragmatist and sociocultural ideas about the relationship between human beings and the surrounding context. These three challenges are embraced by a fourth challenge: to include the complexity of contextual aspects in conceptualisation and designing for learning. To meet these challenges, designing for mobile learning benefits from the deployment of concepts built from a transactional worldview. Such a worldview suggests the use of intersectional concepts that embrace several conceptual aspects of mobility in designing for learning.

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Mobility · Ontology · Transaction · Pragmatism · Seamless · Settings
Situated · Sociocultural · Social media · Space · Technology
Technology-enhanced learning · Time · Transaction · Transactional worldview
Tools · Ubiquitous · Worldview

9.1 Introduction

Since the 1960s and the first stages of development of the Internet, new opportunities for technology-enhanced learning have emerged and evolved at a fast pace. From the beginning, this development included geographically fixed technologies. However, during recent decades, mobile technologies—including devices, applications, and networks—have emerged that enhance learning in new ways (Castells, 2013). These new modes of learning involve technologies that support synchronous as well as asynchronous communication. In addition to extending communication in time, they also change the relationship between learning and space. This development has been a dynamic process that has changed the possibilities for learners to participate in interplay with aspects of the surrounding environment and other human beings. In other words, this development impacts the relationship between human beings and the contexts in which learning occurs.

The enhancement of learning through the use of mobile aspects to a great degree led to changing conditions for participation in formal and informal learning. These conditions blur the boundaries between these forms of learning by, for example, integrating work and life experiences into formal educational settings (Johnson et al., 2016). During recent years, scholars have discussed these conditions in terms of learning as a seamless (e.g., Milrad et al., 2013) and ubiquitous (e.g., Chen & Huang, 2012) phenomenon. From this position follows a potential change and extension of how the contextual aspects of mobile devices influence formal and informal learning.

The chapter aims at discussing challenges for design based on a context-dependent and complex understanding of mobile learning. Based on research about the contextual aspects of mobile learning, the chapter identifies four challenges. All these challenges also concern our understanding of the phenomenon of learning. Particularly, they relate to the relationship between learning and educational settings. They deal with how learning, as a complex social phenomenon, emerges and is designed for. The first challenge concerns how to learn at multiple intersections of physical locations and social groups. The second challenge concerns the impact that personal, mobile, and wireless Internet-connected technology has on the monopoly of knowledge. The third challenge concerns the blurring of the boundaries between formal and informal learning.

To reach a coherent conceptualisation useful in designing for mobile learning, the chapter links these challenges to pragmatist and sociocultural ideas about the relationship between human beings and the surrounding context. Moreover, these

challenges also relate to discussions and ideas of recognised scholars within the field of mobile learning. Together the three challenges, pragmatist and sociocultural perspectives (e.g., Dewey, 1916; Vygotsky, 1978), and scholarly discourse within the field of mobile learning form a foundation to discuss the fourth challenge—including the complexity of contextual aspects in conceptualisation and designing for learning. This foundation is used to illustrate the necessity for solid and well-reasoned concepts that can be applied in the design process. Before discussing the challenges, a few words need to be said about the contextual aspects of mobility.

9.2 Contextual Aspects of Mobility

The link between human actions and contextual aspects is well recognised in the history of learning (e.g., Dewey, 1916; Vygotsky, 1978). Moreover, scholars linking mobility to learning emphasise the importance of such contextual aspects (e.g., Ally & Tsinakos, 2014; Traxler & Kukulska-Hulme, 2016). These aspects analytically link to mobility in terms of conceptual space, physical space, social space, technology, and learning dispersed over time (Kakihara & Sorensen, 2002; Kukulska-Hulme, Sharples, Milrad, Arnedillo-Sánchez, & Vavoula, 2011). Together they afford a dynamic contextual understanding of the relationship between learning and mobility.

Regarding physical space (from here on discussed in terms of locations) and social space (social groups), the dynamic flexibility of mobility affords learning to occur in various physical locations and social groups. This means that mobility links to formal learning occurring in educational settings located at institutions such as kindergartens, primary schools, or universities. Moreover, mobility also links to informal learning occurring during activities at work, at home, or in leisure settings. The mobility of technology relates to the portability of devices and applications. Further, it also relates to transferability of content. This aspect affords flexibility between different devices. Conceptual space (from here on discussed in terms of content) relates to content and how learners shift their attention between different content (e.g. between different learning episodes during a day). Learning is also a cumulative process dispersed over time where learners engage in lifelong learning across formal and informal educational settings. These contextual aspects emphasise mobile learning as a complex social process of participation together with other learners in a nexus of contexts. This includes learning through communication mediated by mobile and personal devices. These contextual aspects of mobility blur the boundaries between formal and informal learning and pose particular challenges for learning-related design. Below follows the first challenge.

9.3   Challenge 1: How to Learn at Multiple Intersections of Physical Locations and Social Groups

The first challenge concerns understanding learning as an intersectional phenomenon dependent upon various physical locations and social groups (Ally & Prieto-Blázquez, 2014). It is possible for learners to be physically located in various settings while learning. Humans also learn together with colleagues, co-learners, families, and friends. It occurs at work, at home, or on leisure time as well as in formal education. However, while learners participate in formal education enhanced by technologies, they are not fixed to a single location. In effect, mobile technologies afford participation in a nexus of locations. Such a nexus could, for example, comprise homes, local study centres, university campuses, workplaces, and other physical locations. Learning in these locations occurs among various social groups, such as colleagues at work, the family at home, and other learners at the university campus or in leisure activities.

In their educational settings, learners can combine these physical locations and social groups in many ways (Jaldemark, 2008; Keller & Stevenson, 2012; Milrad et al., 2013). Besides being at a fixed location, the complexity above also includes learning that occurs while on the move between physical locations and social groups. Such possibilities challenge the boundaries of earlier physical and social limitations and support learning in a physically and socially seamless and ubiquitous educational setting.

The nexus of contextual aspects, such as physical locations and social groups, creates a certain complexity in designing for educational settings enhanced by mobile technologies, which needs to be considered. Taking this complexity into account in the design process also includes embracing the idea that a diversity of technologies supports interplay between learners. In order to enhance learning, that complex situation has to include possibilities for learners to participate in different ways. Therefore, design needs to take into account learning that is situated in different circumstances and supported by different technologies. In other words, learners need to be able to take advantage of different contexts—technologies, physical locations, and social groups—in support of their learning.

9.4   Challenge 2: The Impact Technology Has on the Monopoly of Knowledge

Another challenge concerns formal educational institutions' monopoly on knowledge. Biesta (2007) links this challenge to scientific and technological developments within society. The emergence of this challenge is linked to achievements from higher education institutions and research regarding wireless mobile technologies. Personally owned wireless Internet-connected mobile devices allow users to incorporate technological applications into their lives in ways that are not

afforded by desktop technologies. Being portable, mobile devices afford learners to communicate within multiple intersections of physical locations and social groups. From a technological standpoint, such participation also relates to possibilities for communication through a wide range of different devices: from the smaller screens of smartphones to devices with much bigger screens.

Moreover, nowadays it is possible to deploy a wide range of applications to reach the same content. The consequence of this development is an enhancement of learning through applications, devices, and networks designed to support communication independent of the limitations of location and time. Bring-Your-Own-Device (BYOD) is a philosophy that suits such technological flexibility (Johnson et al., 2016; Sharples, Arnedillo-Sánchez, Milrad, & Vavoula, 2009; Sundgren & Jaldemark, 2016). The idea of BYOD affords the individual to use a personal device to access content, irrespective of the brand or type of mobile device. This means that it is easy for learners to carry and use smaller devices while participating in formal educational settings. For example, students of higher education can access wireless networks with laptops, smartphones, or tablets to search for information about content related to an ongoing lesson. The result of such searches could, for example, be used in discussions with fellow students or teachers.

The contextual aspects of mobility and their intersections with content afford a high degree of access to information and more possibilities for communication. Thus, they constitute a challenge to formal educational institutions to redefine the boundaries of the knowledge monopoly. Before this development, access to information and knowledge were to a high degree dependent on what was communicated about during teaching or in the mandatory literature. This means that learners have gained more power over content compared to what was possible in the earlier knowledge monopoly. The way this challenge is handled could lead to what Biesta calls the democratisation of knowledge, a state what he claims is a "crucial dimension of the knowledge society" (2007, p. 478).

9.5 Challenge 3: Blurring of the Boundaries Between Formal and Informal Learning

A third challenge concerns the boundaries of formal and informal learning. While the physical and social boundaries dissolve or blur, the boundaries between participating in these forms of learning melt. Laurillard (2009, p. xi) claims that "mobile learning blurs the division between formal and informal learning". Therefore, it is possible to claim that participation in mobile communication through a portable and wireless Internet-connected device affords the interplay between formal and informal learning (Mills, Knezek, & Khaddage, 2014; Sharples, 2000; Trentin & Repetto, 2013).

For example, it is common that students of higher education combine studies and work. If the content of their studies intersects with their work, they are in effect participating in formal learning at a higher education institution while they have access to contexts there they can process content through participation in working life. In the short term, such intersection could include the interplay between formal and informal educational settings during ongoing higher education programmes. In the long run, from a lifelong learning perspective, such interplay is a process that proceeds over time where individuals switch between different forms of learning (e.g., Ally & Prieto-Blázquez, 2014; Danaher, Moriarty, & Danaher, 2009; Johnson et al., 2016). This challenge to understand learning deals with how aspects of mobility afford experiences and knowledge learned in informal settings to influence formal learning and vice versa.

Given that mobile technologies help blur the boundaries between formal and informal learning, the challenge for the design of mobile learning is to support this blurring to help learners have high quality learning experiences. Among other things, such support needs to build a link between the content of the contexts (e.g. working life settings and higher educational settings) where formal and informal learning occurs. Moreover, contextual aspects need to build on each other to inform the learning process in an optimal way. This includes designs that support learning by allowing learners to use the most suitable physical locations, social groups, and technologies. Designs also need to be sustainable over time and support learning in different contexts.

9.6   Challenge 4: Inclusion of the Complexity of Contextual Aspects in Conceptualisation and Designing for Learning

In this chapter, contextual aspects of mobility illustrate the complexity of learning. The three challenges above are a consequence of this complexity and serve to illustrate it. These challenges concern participation in and understanding of educational settings where formal and informal learning intersect and blur. However, studies and results from research within the field of mobile learning also indicate another challenge for learning designs. This challenge concerns conceptualising and including the complexity of the contextual aspects of mobility in designing for learning (Vavoula, Pachler, & Kukulska-Hulme, 2009).

The dynamic and seamless character of the relationship between mobility and learning demands approaches and conceptualisations that discuss learning as a phenomenon that emerges in different social settings; occurs in multiple contexts or on the move between different contexts with various physical conditions; is dispersed over time; includes communication between learners; and is supported by personal, portable, wireless Internet-connected, and mobile devices. Nevertheless, this complexity of learning is not restricted to mobile learning. The contextual

character of learning is not a new phenomenon; rather it is the case that support by a mobile device "exposes methodological complexities that need to be addressed" (Pachler, 2009, p. 2).

From this dynamic, seamless, complex, and contextually linked idea of learning, research about the relationship between learning and mobility points to an ontological issue—the essence of learning. This issue touches upon which point of departure in the relationship between human beings and the surrounding environment is needed to reach a coherent analysis and description of learning. In the wake of the answer of this ontological issue lies a challenge for designers of mobile learning to find approaches and conceptualisations that embrace the dynamic, seamless, complex, and contextual character of learning. In the following sections, consequences for designing for learning unfold. However, before addressing the issue of design, the chapter discusses the ontological departures for learning.

9.6.1 Ontological Departures

Historically, the ontological discussion of learning starts either from a dualistic or non-dualistic position. Dualistic positions include the idealistic philosophy, represented by Plato and others, and empiricism, popularised by Francis Bacon and others during the seventeenth century. Idealism locates the minds of human beings as the place where the real world exists. Empiricist philosophy emphasises the mind of human beings as a separate mental world, which is subject to influences from external experiences. The dualistic basis of idealism and empiricism separates the mind, body, and surrounding environment from each other. These two philosophical positions clash with the non-dualistic positions taken by scholars from the pragmatist and sociocultural movements, among others.

Dewey (1916), one of the leading scholars within the pragmatist movement, rejected the dualistic positions of idealism and empiricism. He claimed that these positions embrace isolation between human beings and separate them from the communities in which they exist. In his arguments, he emphasised the importance of the physical and social aspects of the environment for understanding human beings. From this point of view, human action is inseparable from the surrounding environment. In effect, the environment is a condition for the emergence of the human mind.

Influenced by Hegel (e.g., 1821/1990) and Marx (e.g., 1867/1990), sociocultural scholars such as Bakhtin (1935/1981) and Vygotsky (1978) expressed similar thoughts about the inseparability of the mind, body, and the surrounding environment. This movement highlighted the link between human activity and cultural, historical and social transformation. In claiming that "the influence of nature on man, asserts that man, in turn, affects nature and creates through his changes in nature new natural conditions for his existence" Vygotsky (1978, p. 60) emphasised a non-dualistic position. Human life is a complex, dynamic, and ecological phenomenon that embraces cultural, historical, and social patterning of the world.

Bakhtin (1935/1981) emphasised the inseparability of man and the surrounding world by claiming that man is in a constant dialogue with the world. In this dialogue, understanding and response dialectically merge "and mutually condition each other; one is impossible without the other" (Bakhtin, 1935/1981, p. 282). Therefore, human life means participating in intertwined responses of dialogues.

Dewey and Bentley (1949/1960) discussed different conceptualisations of the relationship between human beings and the surrounding environment in terms of a distinction between interactional and transactional worldviews. These two worldviews have different consequences for understanding the relationship between learners and contexts in mobile learning.

Transactional worldviews (Fig. 9.1), such as those built on pragmatist and sociocultural ideas, reach across time and space. They are dynamic and ecological and emphasise the relationship between learners and context as a complex phenomenon (Dewey & Bentley, 1949/1960) meaning that "there are no separate elements … the whole is composed of inseparable aspects that simultaneously and conjointly define the whole" (Altman & Rogoff, 1991, p. 24). Such worldviews emphasise situations in terms of intersections of action, context, learners, and the environment.

Interactional worldviews (Fig. 9.2), such as idealism or empiricism, emphasise the relationship between learners and context as a rather simple and fragmented phenomenon. Such worldviews derive from Newton's law of motion, meaning that what occurs in a context is a question of action and reaction. Based on this distinction, interactional worldviews demarcate human action in one context from that in other contexts. They also separate between the human mind and body from the surrounding environment. The implications of such worldview for the relationship

Fig. 9.1 A graphical representation of transactional worldviews. *Arrows* represent non-dualistic intersections in terms of the interplay between learners, contexts, and aspects in the surrounding environment
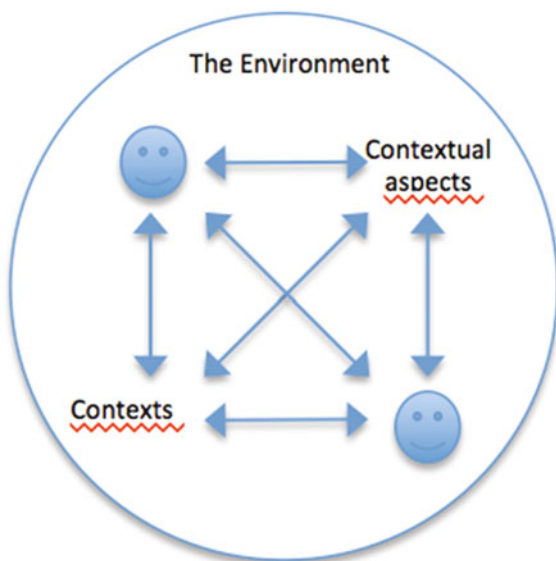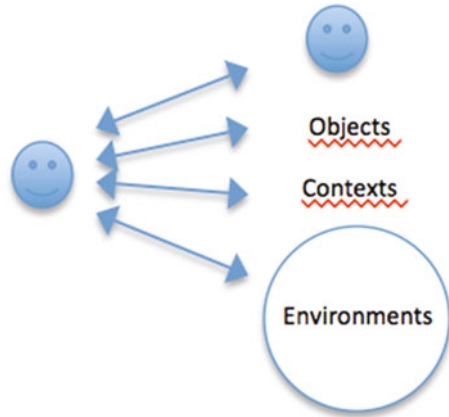
Fig. 9.2 A graphical representation of interactional worldviews. *Arrows* represent dualistic interactions between a learner and other features in various contexts and environments, e.g. objects and other learners

between mobile learning and contexts is that experiences and feelings are not necessary to understand learners' actions and that online and offline features of mobile learning are separate and can explain mobile learning without each other. If mobile learning and its relationship to context are understood as complex phenomena, interactional worldviews represent a disadvantage in understanding and designing for mobile learning.

Using a non-dualistic transactional worldview as a point of departure would emphasise the complexity of the relationship between mobile learning and contextual aspects. Therefore, it is better suited to meet the challenges identified above. Such a worldview allows an understanding of the relationship between mobile learning and context as participation in a nexus of multiple settings that embraces processes of change as well as spatial and temporal aspects of learning.

In addition to the philosophical arguments above, reasons for building on a transactional non-dualistic worldview can be found in the mobile learning literature. This is particularly true if the departure point for understanding mobile learning is the five contextual aspects of mobility (Kakihara & Sorensen, 2002) that many leading scholars within the field highlight (e.g., Kukulska-Hulme et al., 2011). That departure point emphasises a strong relationship between mobile learning and the surrounding environment. Among these scholars, Milrad et al. (2013, p. 95) discuss mobile learning as a cross-contextual phenomenon that "can enable a continuous learning experience across different settings, such as home-school, or workplace-college". In other publications it is discussed as a phenomenon where context is a "construct that is shaped by continuously negotiated dialogue between people and technology" (Sharples, Taylor, & Vavoula, 2016, p. 64).

Leading scholars in the field emphasise mobile learning as a social and situated phenomenon linked to various contexts. Similar to state-of-the-art research in learning, scholars within the field emphasise learning as an emerging communicative process depending on various tools (in terms of technologies and devices) that link to contextual aspects of situations and settings (e.g., Ally & Tsinakos, 2014; Hwang, Yang, Tsai, & Yang, 2009; Pachler, Bachmair, Cook, & Kress,

2010; Traxler & Kukulska-Hulme, 2016). These scholars link to ideas of Dewey (1916) and Vygotsky (1934/1987, 1978) and their modern successors such as Engeström (1987) or Lave and Wenger (1991).

9.6.2 Designing for Learning from a Blurred Mobile Perspective

The argument in this chapter suggests that designing for learning should avoid concepts that derive from or link to an interactional worldview. One reason for such a suggestion is that the use of concepts built on interactional worldviews limit our understanding of learning as a "passive acquisition or absorption of an established (and often rigidly defined) body of knowledge" (Koschmann, 1996, p. 5). The interactional rhetoric brings such limitations to the design process. Another reason for avoiding interactional rhetoric in the design process is also to avoid the indistinctness of unclear applications of key concepts (Jaldemark, 2012).

A limited understanding of learning is absent in a transactional rhetoric because such rhetoric embraces intersectional concepts that afford a complex understanding of learning. Such understanding is applied below in the discussion about suitable concepts in designs for learning. This chapter suggests that design for mobile learning benefits by utilising concepts that fit within a non-dualistic ontology. Conceptualisations that embrace an intersectional character secure a coherent link between mobile learning and the contextual aspects of mobility. Moreover, embracing such concepts in the design process is a way to meet the challenges discussed above.

The relationship between human beings and the surrounding environment is a critical ontological issue. The concepts of transactional rhetoric highlight the inseparability of learners and the environment. Using the concept of the environment as a singular phenomenon would secure such non-dualistic link. In other words, the environment is conceptualised from the ontological departure that there exists only one environment. This conceptualisation avoids the dualistic trap of discussing the environment in terms such as learning environments, online environments, and offline environments. Deploying such concepts in mobile learning derives from the dualistic idea that there exist online and offline worlds. Such a dualistic idea suggests that mobile learning is understandable without one of these worlds. Mobile learning becomes a fragmented and simple phenomenon that needs limited links to contextual aspects. Transactional worldviews avoid such a simplified idea of the relationship between learners and the environment. Instead, the environment is an inseparable phenomenon that consists of aspects of an intersectional character. Therefore, design for mobile learning benefits from transactional worldviews by utilising concepts such as contexts or settings; these are concepts that avoid ontological ambiguities.

From the earlier discussion in the chapter, it is obvious that the concept of interaction is problematic. Nevertheless, it is widely applied in research about

learning. However, that is not a good reason to use it. In addition to the ontological issues related to the deployment of this concept, the incorporation of it in designs for learning gives rise to other issues that need to be dealt with. Interaction is a concept with different meanings. So and Brush (2008, p. 331) claim that it is a reciprocal "process between human and human or between human and non-human". This double meaning brings an ambiguous and unclear understanding of the concept to the design process. Therefore, possibilities for confusion are inherent in using the concept of interaction in designing for educational settings. Deploying one concept for human/human processes and another concept for human/non-human processes is one way to facilitate a distinct understanding in designs for mobile learning.

Designing for mobile learning faces other ambiguities concerning human and non-human processes. These ambiguities relate to the relationships between humans and content and between humans and technology. If the departure for design is a complex worldview that embraces contextual aspects of mobility, use of interactional rhetoric limits understanding of these relationships. Through the lens of complex transactional and non-dualistic worldviews the human/content relationship typically in effect involves a relationship between human beings. The intersection of time and content inevitably brings a human being into the production of content. In other words, there is usually at least one author behind products such as texts. This author communicates asynchronously with the listener or reader. Or, in other words, the listener or reader participates in an ongoing time-separated dialogue with the speaker or writer. Technologies mediate this dialogue independent of time or physical location. This is particularly true in the context of mobile learning, given its seamless and ubiquitous character.

The relationship between humans and technology is a complex phenomenon that needs a clear conceptualisation in designs for mobile learning. However, technology needs to be linked to other concepts that afford a relationship to the contextual aspects of mobility. Without human beings, technology is just a thing. As such, it could be useful as a concept in design for learning. Nevertheless, in its use, it becomes part of the context of learning. Such use includes technologies such as applications, devices, and networks, which include offline as well as online aspects. Therefore, the contextual aspects in design need to include links between learners and technologies. Examples of such concepts are mobile learning, social media, technology-enhanced learning, and tools.

From the point of view of transactional rhetoric, learners who participate in mobile learning are in a constant dialogue with the context, and particularly in dialogues with other learners. In design, such understanding implies the need for concepts that link learners to each other. In the mobile learning literature, such concepts are widely applied, for example, in definitions including the terms conversation (Sharples et al., 2016) and communication (Pachler et al., 2010). Another concept that might indicate such interplay is dialogue (e.g., Berge & Muilenburg, 2013). Moreover, to emphasise gatherings of learners, concepts such as communities of practice, computer-mediated communication, learning communities, or mobile learning communities might be useful (Cochrane, 2014; Danaher et al., 2009;

Jones, Scanlon, & Clough, 2013; Kukulska-Hulme, 2012). Such concepts highlight the importance of understanding learning as a collaborative endeavour.

The discussion above embraces examples of intersectional concepts based on a transactional worldview. They are included because they secure the link between learning and contextual aspects of mobility. It makes them suitable for deployment in designing for mobile learning. Other concepts not discussed above might also be suitable. However, the message from the chapter is to be conscious of contextual aspects of mobility in designing for learning. Such consciousness builds on concepts that share a common worldview.

9.7   Conclusions

The rapid pace of development within the field of information and communication technology has blurred the boundaries between formal and informal learning. In particular, this blurring relates to the impact mobile applications, devices, and networks have on the relationship between learners and context. This relationship is complex and emphasises aspects of locations, social groups, technology, and time as well as content-related aspects. This development poses challenges to understanding and designing for mobile learning. To meet these challenges, designing for mobile learning benefits from the use of concepts that derive from a transactional worldview. Such a worldview suggests the use of intersectional concepts that embrace several contextual aspects of mobility in designing for learning.

Glossary

Formal learning Learning linked to participation in formal educational settings. Such learning occurs in institutions built for learning as the primary activity.

Informal learning Learning linked to participation in everyday, leisure, or work settings. Such learning is a spin-off while participating in everyday, leisure, or work activities.

Interactional worldview A dualistic worldview that de-emphasises contextual aspects of human actions. It separates mind, body, and the surrounding environment from each other. Such a worldview is less complex and is built around the Newtonian idea of action and reaction.

Intersection Used to describe an inseparable link between two or more aspects of a particular phenomenon.

Transactional worldview A non-dualistic worldview based on the idea that mind, body, and the surrounding environment are inseparable. It emphasises that human action is situated within and has a dependent relationship to context.

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Author Biography

Jimmy Jaldemark is Associate Professor at the Department of Education, Mid Sweden University, Sundsvall, Sweden. He has worked within the field of technology-enhanced learning (TEL) for more than 20 years. He is the leader of a research group called Higher Education and E-Learning (HEEL). In addition to researchers from Mid Sweden University, HEEL also involves scholars from Umeå University and the Royal Institute of Technology, Stockholm. The research within this group focuses on networked, mobile, and collaborative aspects of learning in higher education. Since 2013 Jaldemark has led an international virtual research seminar that he founded. This seminar embraces issues within the field of TEL in higher education. Within the field of TEL, he is engaged in writing, editing, and reviewing scientific papers in eleven scientific journals. Currently, he is working on a special issue with the theme "Collaborative learning supported by mobile applications", to be published in early 2018 in the British Journal of Educational Technology. In earlier work, he has focused on various issues, such as participation in computer-mediated communication, designing for learning, educational technology, online supervision of student dissertations, social media as a tool for learning, and mobile learning.