

Re-designing Learning Contexts

Technology-rich, learner-centred ecologies

Rosemary Luckin



Foundations and Futures of Education

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For James and Catherine

First published 2010

by Routledge

2 Park Square, Milton Park, Abingdon, Oxon, OX14 4RN

Simultaneously published in the USA and Canada

by Routledge

270 Madison Avenue, New York, NY 10016

Routledge is an imprint of the Taylor & Francis Group, an informa business

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Typeset in Galliard by

Pindar NZ, Auckland, New Zealand

Printed and bound in Great Britain by

CPI Anthony Rowe, Chippenham, Wiltshire

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British Library Cataloguing in Publication Data

A catalogue record for this book is available from the British Library

Library of Congress Cataloging-in-Publication Data

Luckin, Rosemary.

Re-designing learning contexts: technology-rich, learner-centred ecologies / Rosemary Luckin.
p. cm.

Includes bibliographical references and index.

1. Active learning. 2. Intelligent tutoring systems. 3. Interactive computer systems. I. Title.

LB1027.23.L82 2010

371.33—dc22

2009039989

ISBN13: 978-0-415-55441-1 (hbk)

ISBN13: 978-0-415-55442-8 (pbk)

ISBN13: 978-0-203-85475-4 (ebk)

Acknowledgements

In this book I discuss the concept of context and develop a design framework for technology-rich learning that is based upon a model that recognizes the key part played in any learner's progress by the other people with whom he or she interacts. The process of writing this book has been a learning experience for me and it has certainly relied upon a great deal of support from a range of people, without whom there would be no book. The flaws in the end product of this book-writing activity are of course my own responsibility.

I would like to thank my colleagues at the London Knowledge Lab and at the Ideas Lab, for providing such fertile and stimulating research environments; the teams who worked on the projects that I report in Part 2 of the book and the students, teachers and parents who made the empirical studies possible: Katerina Avramides, Ben du Boulay, Wilma Clark, Daniel Connolly, Amanda Harris, Joe Holmberg, Lucinda Kerawalla, Erika Martinez-Miron, Robin Mudge, Darren Pearce, Lydia Plowman, Genaro Rebolledo-Mendez, Richard Siddons-Corby, Hilary Smith, Hilary Tunley, Roland Tongue, Joshua Underwood and Nicola Yuill; colleagues who have read various book chapters and offered invaluable feedback, in particular: Madeline Balaam, Michael Reiss and Michael Young. Wilma Clark, Fred Garnett and Joshua Underwood also deserve a special thank you for their insightful and intelligent comments in the formation of the design framework as well as a great deal of chapter reading. The members of the Learner Generated Context research group and the Becta Research Advisory Group have been a great source of refreshing ideas and enthusiasm that has roused my sometimes flagging energy to complete the book-writing task; and my friends have been brilliant at putting up with me during the writing process and asking at just the right moment how it's all going: Barbara Bush, Ann Fletcher, Kim Issroff, Lynne Murphey and Carol Shergold. I also thank Catherine and James not only for their careful and conscientious data analysis, but for being them, for being there, and for adding meaning to my life.

Abbreviations

AI	Artificial Intelligence
CSCCL	Computer Supported Collaborative Learning
CSCW	Computer Supported Collaborative Work
HCI	Human Computer Interaction
ITS	Intelligent Tutoring System
MAP	More Able Partner
SDLC	South Downs Learning Centre
ZAA	Zone of Available Assistance
ZPA	Zone of Proximal Adjustment
ZPD	Zone of Proximal Development

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Part 1

Background

1 Contexts for learning

My first job after completing my doctoral thesis was as a research fellow on the Multimedia, Education and Narrative Organization (MENO) project, which explored the relationship between narrative and teenage learners' use of multimedia resources to support their learning in school. I worked alongside Lydia Plowman who drew my attention to the concept of 'Lines of Desire', a term borrowed from architecture and planning that refers to the routes that people take through open or semi-open spaces, in preference to those marked out as paths by planners. These can be seen, for example, on housing estates and in parks, where people are allowed some freedom to wander. I found this concept offered an appealing metaphor as I considered how learners might be able to look around them and find out enough information about the people, buildings, books, pens, technologies and other artefacts within their landscape, to chart a learning trajectory that would meet their needs. I still find this concept to be a useful one when I consider the design of technology-rich learning activities. I also find it offers a useful analogy for my own attempts to understand more about the concept of 'context', as I explore the different ways in which various communities of researchers talk about context.

I quote Michael Cole (1996) at the outset of my account of my personal line of desire through work that talks about context: 'I will not aspire to a definitive treatment of context in this book.' Rather I will look at the different ways of talking about context and, like Cole in his pursuit of a cultural psychology, I will attempt to extract some useful conceptual tools to guide my development of a context-based framework for the development of technology-rich learning activities. Nardi (1996) highlights the wide range of work that has illustrated that it is impossible to understand how people work or learn without also taking into account the people and artefacts that are part of the completion of their work or learning: 'Thus we are motivated to study context to understand relations among individuals, artefacts, and social groups' (Nardi, 1996: 69). I note, however, that pinning down what we mean by context is not an easy task. Nardi (1996: 69) states the problem clearly: 'How can we confront the blooming, buzzing confusion that is "context" and still produce generalizable research results?'

I confront this problem by looking across a range of ways in which context is talked about, and within this chapter discuss work that has been drawn from different disciplines, including geography, architecture, planning, anthropology,

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psychology, education, cognitive science and computer science. I acknowledge that each of these disciplines works within its own frame of reference with its associated and differing language, philosophy, concepts and methodologies. I also acknowledge that I run the risk of using these tools inappropriately as I blend them together in order to try and understand more about how best we might talk about, and use, the concept of context. I consider this a risk worth taking in order to avoid the narrow perspective that I believe has not served research into educational technology well.

One thing that became very clear to me as I explored the research landscape was that there were common themes of concern that transcended disciplinary boundaries and many excellent examples of interdisciplinary research. I do not, therefore, divide the text that follows exactly according to the disciplinary home from which it emanates. There is, however, a narrative that begins with work drawn from geography and architecture, that moves into discussions about research from anthropology and psychology and onto work drawn from education and computer science. There are many points of overlap along the way, in particular where digital technology is a feature of the research.

Discussions about context can be found in texts from the multiple sub-fields within geography research. This includes political, social, education, cultural and human geography. The importance of context is clear within this literature, as are the vastly different ways in which the term is used. In their evaluation of the impact of Information and Communication Technologies (ICTs) on everyday activity, Schwanen *et al.* (2008, 520) argue that:

while geographers have made many contributions to the understanding of how ICTs mediate everyday life, perhaps the most significant of those is their emphasis on the spatial and historical contingency in the effects of the Internet, mobile phone and related technologies: context always matters . . .

They also note that researchers define context in diverse ways: for example, in relation to institutional arrangements, or with respect to the configuration of physical infrastructure. However, there is general agreement that the effects of the ways in which ICTs mediate everyday life 'cannot be separated from the contexts in which they are situated' (Schwanen *et al.*, 2008: 520).

This work by Schwanen and colleagues is explicitly about ICT use. Their views, however, resonate with similar sentiments expressed in work that is not about the use of technology. There is a variety of different ways of, and purposes for, using the term 'context'. In the social sciences we talk about the 'cultural turn' as a point of cross-disciplinary shift. Across geography and many related disciplines there has also been a move towards a greater attention to culture and meaning in preference to large-scale scientific approaches. This is referred to as the 'spatial turn' (see Soja, 1989), and is reflected in seminal work completed by Doreen Massey, who argued that space does not simply reflect the social relations of society but that the spatial and the social are mutually constitutive (Lambert and Morgan, 2009). From this spatial turn geography 'has emerged as a key point of reference within

this disciplinary convergence' (Cosgrove, 2004: 57). As a consequence 'space' has become a major focus of attention and the subject of a diverse range of conceptual perspectives and a variety of analytical methods. Clearly, I can only scratch the surface of this huge debate here and I focus in particular upon work that discusses space alongside context, in order to try and extract some useful themes.

Casey (2001: 683), for example, describes space as 'the encompassing volumetric void in which things (including human beings) are positioned'. He distinguishes this from place, which is described as 'the immediate environment of my lived body – an arena of action that is at once physical, historical, social and cultural' (Casey, 2001: 683). In this sense, 'place' is presented as dominantly subjective and experienced: 'there is no place without self and no self without place', whilst space is presented as an abstraction. He argues that place and space can be further distinguished from one another by considering landscape, which acts as both the context for, and as an attribute of, place. He draws attention to the fact that landscapes have horizons, whereas places are enclosed and as individual entities have no such horizon. It is when places are connected that they gain horizons, which draw attention to new possibilities as well as closing off what the eye can see.

The complexity of context is evident in the work of Williams (2002) in a review of the changing geographies of care between hospital and home settings. She portrays 'context' as complex, social, interactional and institutional. She links the notion of context to a notion of 'place identity' and suggests that a synthesis of the subjective and objective dimensions of place is framed by the 'context of action through which individuals trace paths and institutional structures are sedimented' (Williams, 2002: 145). Koskela (2000) discusses the social shaping of 'space' in a study of urban video surveillance. Human interactions and processes frame particular spaces, as does the physical reality of the architecture of a space. This means that the notion of 'space as container' is important for understanding how space frames social interaction. She argues that power and emotion are negotiated differently in terms of how surveillance affects people. The conceptualization of space as 'container' is useful in her view, because it shows how this framing and negotiation occurs by positioning the actors in relation to each other, to artefacts or objects within their environs and to general conceptualizations of social space. Cummins *et al.* (2007: 1830) also consider the complexity of context and suggest that in order to make progress, future research should consider 'individual exposure to multiple "contexts" in time and space'. Here, they tie the notion of context to action spaces, and culture and temporal units in a concept they describe as 'time-space biographies', that map out 'an individual's movement around a more or less regularly frequented "action space", over meaningful units of time (such as a day, week or month)' (Cummins *et al.*, 2007: 1830). Discussions about time in relation to context are frequent. Kapler and Wright (2005), for example, track military activity across time and space and identify connections between activity spaces to produce a geographic and temporally situated narrative. Their visualization, called 'GeoTime', is relational and allows connections to be made between entities (people or things), locations (geospatial or conceptual) and events (occurrences, facts or action times).

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Knowledge is also discussed alongside context, in particular with respect to tacit knowledge. Gertler (2003) focuses on the relationships between tacit knowledge and institutions, arguing that existing work has limited tacit knowledge to experiential and cognitive considerations and given insufficient attention to the 'role and origins of social context' and the foundations of context and culture. This emphasis upon the social can be found again in Gertler and Wolfe (2005), where context is equated with local, proximate interaction and dialogue. Pain (2004), too, is concerned with knowledge, but from the slightly different perspective of the methods that can be used to encourage local participation in research. She describes social geographers as having a 'particular sensitivity to context' and emphasizes that participatory research is 'designed to be context-specific, forefronting local conditions and local knowledge, and producing situated, rich and layered accounts' (Pain, 2004: 2).

I am struck by the extent to which much of the discussion so far, whilst not about education, deals with issues, such as institutions and social interactions that are relevant to education. There are also, of course, consistencies with work that talks specifically about notions of context, space and place, specifically with respect to education and from a geographer's perspective. Gulson & Symes (2007), for example, suggest that the treatment of space and place in educational studies is underexamined, undertheorized and underdeveloped. They describe context as something that needs to be integrated with space and argue that through its scientific, geo-mathematical abstracted conceptualization 'space' has been 'uprooted from its contexts'. Descriptions of space as 'an empty vessel within which action took place, or as an effect of social, political and economic relations' (Gulson & Symes, 2007: 100), have been unhelpful for the social sciences and have impeded the appreciation of space as a social entity 'where it is what individuals and societies do with space that 'counts'.

Catling (2005) appears to distinguish between 'environment' as physical and 'context' as social in his descriptions of the role and impact of the school environment. He suggests that the school environment emphasizes the provision of 'an orderly environment and context to engender good and "right" behaviour' (Catling, 2005: 341) with respect to what the school considers to be the child's learning, and on what external authorities deem as necessary requirements and controls, rather than with the child's lived experience. He distinguishes between the fixed, cartographic entity of the school environment and buildings, and the dynamics of the school setting as a 'social, cultural and political space for enacting, deepening and developing the meaning and interplay of people in place' (Catling, 2005: 341). Such descriptions of the school environment introduce the power and politics of the way that space is managed, an issue that is also noted by other researchers looking outside of education. P. Rogers (2006), for example, discusses the way in which spatial management of new urban spaces can generate 'tactical legislation' and prescriptive categories of acceptable behaviour and activity, thus introducing a layer of governance that puts property-holders and developers at odds with the provision of spaces aimed at youth. From an urban informatics perspective, Klæbe *et al.* (2009) offer a way in which this tension can be tackled in

their review of the impact of urban renewal strategies. They suggest that narrative networks between real and virtual spaces have the capacity to influence urban design and participation over time, by contributing ongoing data that frames ways in which physical spaces are conceived, perceived and lived in.

Literature drawn from researchers with an interest in urban settings and the built environment reflects plenty of discussions about space and place and introduces an emphasis upon affect. Stenglin (2008), for example, describes space in its broadest sense as that which encompasses ‘the organization of indoor and outdoor spaces as well as built spaces and spaces in the natural environment’ (Stenglin, 2008: 426). Stenglin is also concerned with issues of affect and argues that affect in three-dimensional spaces ‘can delight, calm, awaken and overwhelm us’. She argues that understanding affect is important for understanding interpersonal relationships within the built environment, and that it provides ‘emotional entry points for interacting with the different spaces we encounter in our daily lives’ (Stenglin, 2008: 441). There is an emphasis upon affect, subjective experience and social behaviour within work that explores the built environment. This resonates with the earlier discussions of work by people such as Williams (2002), and Gulson & Symes (2007). It is also linked to discussions of embodiment that crop up later in this chapter through work by Dourish (2001) written from a Human Computer Interaction stance. Jones (2005), in a study of a cyclist’s interactions with the urban environment, proposes an intense relationship between people and their environments. He uses notions of embodied negotiation of space and makes a clear distinction between the notion of affect as emotion, and affect as embodied experience, arguing that the latter provides for a much deeper understanding of the self in its interactions. Jones links embodied action to a tool, in his example a bicycle, the environment, which for him is the urban landscape, and the physical and emotional experience of action. He presents a somewhat unusual framing of context as performance. Kraftl & Adey (2008) argue that affect is a ubiquitous and a vital part of the urban landscape of cities, which allows emphasis to be placed on ‘encounters with spaces of practice’ in a more reflective, reflexive manner.

The physical and the digital environment

I opened my discussion of the geography literature with work that was concerned with ICT. I return to that theme now to consider the crossover between concerns with the built environment and with the digital environment, or the blended physical and digital environment, before standing back to consider what can be learnt from the discussion so far. Kerckhove & Tursi (2009: 53) observe that: ‘The proliferation of the microchip renders the everyday spaces of our existence alive, capable of interacting and reacting to our passage’. Manovich (2006) discusses augmented space from the point of view of both urban space (built environment) and human constructed space, or what Manovich terms ‘cellspace’. Cellspace is defined as ‘physical space that is “filled” with data, which can be retrieved by a user via a personal communication device’ (Manovich, 2006: 221). The data that fills this cellspace comes from networks and embedded objects. He questions whether

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spatial form in its physical manifestation becomes a minor irrelevancy that purely acts as a support for information spaces that are manifested digitally or whether, in fact, the two combine to produce an entirely new experience which lends primacy to neither one nor the other; a 'phenomenological gestalt'. This is a question that becomes pertinent once again when I discuss embodied interaction.

Benyon (2006) draws on cognitive psychology to contribute to the debate on the distinction between 'space' and 'place' in his comparison of navigation in physical and digital space. He argues for the personal nature of an individual's interaction that 'seeks to subjectively centre themselves in a space attempting to reach a focus'. This activity, he argues, leads to the creation of places that 'contain actions, activities and social interactions'. He emphasizes the importance in the design of permeability, which he argues is about support for the movements of individuals. 'The availability and use of paths depends both on their physical existence and their visual appearance. Permeability is also dependent on public and private space, the connectivity of routes and the nature of the environment' (Benyon, 2006: 12).

In my appeal to the 'lines of desire' metaphor at the start of this chapter I drew on an artefact from architecture and wanted to use it to consider how individuals might build something coherent around their learning needs through the possibilities within their environment. Benyon's work seems particularly relevant to this analogy. He defines navigation as a way of finding out about, and moving through, an environment. He links navigation to notions of location and meaning and suggests that objects in an environment may have different meanings for different people. He also highlights the possibilities of social navigation and suggests that we 'use a wide range of cues from the behaviour of other people and the traces of their behaviours, to manage our activities' (Benyon, 2006: 14). In this manner, we find our own way by talking to or by following others. In order to attach our own meaning to a space and in so doing to create our own place, we need information or feedback about the environment or 'signposting'.

At this point I want to take a moment to consider what I can learn about context from the discussion so far. Clearly context matters and its significance needs recognition. It is complex and for some it is not a singular entity, but rather a multiplicity to which we are serially exposed. The language that surrounds the use of the term 'context' makes reference to local issues, local conditions, local knowledge, acknowledgement of social, interactional and institutional elements and a sense of history through 'sedimented structures' (Williams, 2002). Context is associated with action and time, emphasizing that it is a dynamic entity and is associated with connections among people, things, locations and events in a geographic and temporally situated narrative. It is distinguished from the physical environment and described as social. It is discussed in the language of emotions and affect, as performance, and as linked to culture and to tacit knowledge.

Discussions that link context to space and place are frequent and we see space portrayed as an abstraction, an encompassing void that contains people and things, as a container within which people and artefacts can be usefully related to one another; and as something that needs to be integrated with context in order to

ensure that it is seen as a social entity that is shaped by what people do. Place, however, is more immediate and more connected to people and their subjective lived experience. Place is something that is framed by form, function, human interactions, design and legislation; and defined by power, policy and politics. We also see the introduction of the term ‘landscape’, as a context and attribute of place, which brings with it the notion of a horizon and boundaries. Discussions that link the physical and the digital recognize the significance of the changes that technology can make to the potential of everyday spaces and what can be learnt from linking our interactions across the physical and the digital.

Context and culture

I have already introduced the subject of culture and return to it again here, because it has an important role to play in my understanding of context. I take time to consider Michael Cole’s (1996) illuminating text on cultural psychology. His aim is to reconstruct the cultural-historical approach to development and in so doing to create a conception of culture that can constitute a cultural psychology. As part of this process he discusses context at some length. Cole discusses two approaches to culture: the internal approach, which looks to the interpretation of the internal psychological structures for the sources of coordinated cultural activity; and the external approach, which looks to the visible manifestations of human action for coordinating artefacts, such as routines and rituals. Cole uses the dual nature of mediated artefacts to formulate an explanation that takes him beyond this division. He links artefacts to schemas and scripts as a way of conceptualizing the ‘context-specificity of thinking’ and of grounding cultural theory in people’s everyday activities. He suggests that the combination of people, roles, objects, sequences and relations in scripts can serve as ‘guides to action’. Cole notes the simplified nature of schemas, which require considerable user interpretation, and proposes that in order to formulate an account of culturally mediated thinking, both the mediational artefacts and the circumstances in which they mediate thinking need to be specified. The identification of the role of circumstances grounds the introduction of the term ‘context’ as a potential descriptor for these circumstances.

Cole acknowledges the difficulties and complexities associated with context: a term that is ‘perhaps the most prevalent term used to index the circumstances of behaviour’ (Cole, 1996: 132). He states the limitations of his aim as being to ‘distinguish between two principal conceptions of context that divide social scientists’ (Cole, 1996: 131) and to identify some useful guiding concepts. The first conceptualization of context is as ‘that which surrounds’. This is often represented in diagrams as a series of concentric circles with a particular activity of interest at its centre. For example, two children playing a computer game in their bedroom, with layers of concentric circles that surround this activity that represent the game-playing episode, the organization of the bedroom, the organization of the family, the organization of the home, and so on. The aim with this conceptualization is to understand how the activity at the centre is influenced by what is depicted in the surrounding concentric circles. This way of talking about