

Towards a Theory of Augmented Place

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Abstract—This short paper is aimed at inspiring dialogue and debate around the theoretical perspectives underpinning research into learning in technology-enhanced augmented places, and the engagement by such learners with blended environments/spaces. The author argues that current theories do not fully model or explain our interactions with technology-enhanced physical environments and that a new theory that combines aspects of these may be required in order to fully understand the way in which we move, interact and learn within such surroundings.

Index Terms—Context awareness, ubiquitous computing, human computer interaction, cognition.

I. INTRODUCTION

UBIQUITOUS computing is now commonplace in the developed world, through the use of a wide variety of mobile devices such as smartphones, netbooks and tablet computers. Over the last two decades, researchers working in environmental science and affiliated disciplines have developed innovative approaches to using mobile technologies to assist with field work and *in situ* location-based learning (see e.g. [1-4]). However, these technologies that were once the focus of formally managed, educational experiences are now being used by a much larger segment of the general populace for general information provision and mobile communication ‘on the go’. Apps for smartphones and tablets often exploit a user’s location and can be used to provide context-aware services such as advertising/marketing; information about local events; guiding a user through an unfamiliar location; or simply for entertainment or leisure purposes.

It is clear that what was once cutting-edge technological innovation has now made the leap into widely-adopted and widely-available hardware and infrastructure. However it is not clear if the pace of our intellectual understanding of these interactions between people, technology and their environment – and the way in which they combine to enable learning – has managed to keep up.

II. LOCATION AS CONTEXT

Context can include many different aspects, such as time, resources, other people, one’s purpose in being at a specific place (or goals/interests/tasks) and the interactions that are capable of taking place.

A key construct of technology-enhanced augmented places is obviously the physical environment itself. The environment

may be natural or man-made, although this definition itself can be subject to debate, as it can be argued that even ‘natural’ environments may have been heavily shaped by man. The environment may be rich in visual aesthetics (for example, a grand cathedral or art gallery) or relatively poor (e.g. a desolate grassland or a site containing archaeological remains). What we need is a theory that joins up the physicality of the environment (e.g. buildings; architectural details; landscapes; viewsheds; “what-is-near-me” – visible or not within view; resources – people/shops/facilities etc.) with information and data delivered electronically to augment that environment. Can we – or should we – model these aspects of the environment and if so, how can we use these to frame, document and understand our learning that takes place in these settings?

III. THEORIES OF PLACE-BASED LEARNING

Human computer interaction (HCI) has for a long time sought to understand how people engage with computers in their immediate environment. Benyon *et al* [5] also talk about the merging of the physical and digital as ‘blended’ spaces. Some of the most pertinent theoretical perspectives that attempt to understand or model learning and knowledge construction in blended or augmented locations are described briefly next.

A. Situated cognition

Situated cognition suggests that knowledge is situated within physical, social and cultural contexts and cannot be separated from it. Social and cultural contexts are often well-described, although the physical location is often reduced to ‘classroom’, ‘lab’ or ‘field trip’ (although some researchers have explored notions of ‘affordances’ and the physical properties of the environment). Research into learning spaces [6] has likewise concentrated on mostly indoor spaces and has not fully explored the richness of outdoor environments.

B. Embodiment

Embodied cognition states that the movements of the body have a direct impact on the mind and related mental constructs. Within location-based learning, this can relate to how individual person moves through a physical space and the way in which they use their limbs, hands, feet etc. However when considering technology-enhanced augmented places, the focus of attention from this perspective emphasizes the role of the person rather than considering other aspects present in learning – in this case the external environment.

C. Ecology of resources

Luckin's 'ecology of resources' framework [7] considers contexts such as skills/knowledge, curriculum, resources, administration, organization and environment and suggests how these contexts are linked centrally to the learner. However, environment is again used as a broad term and a rather descriptive one (e.g. "home"), although a strong point of this model is the way in which environment is strongly interwoven into other aspects of the framework.

D. Other related works

Other viewpoints include externalism (the mind is a product of what is going on outside of the subject) and the related sub-field of enactivism (the mind is dependent on actions taking place in the world). However these are fairly controversial stances and again, have only a vague reference to what we mean by 'external'.

Cook's "augmented context for development" (ACD) [8] is an approach to learning design that consists of several elements, one of which is the physical environment. This is then integrated with the other elements to form a basis on which to frame learning interactions, particularly with mobile technologies. This is probably one of the most promising recent theories, extending Vygostky's Zone of Proximal development, which has considered environment as a core construct, yet it still does not fully consider all the properties inherent to our external surroundings.

IV. A NEW PERSPECTIVE?

Several of the theories mentioned above have been influenced by Vygotsky's sociocultural philosophy, especially when considering the collaborative aspects of learning and knowledge construction. These sociocultural aspects are not discussed in this paper; instead we focus more precisely on aspects of the physical environment. However, none of the most relevant theoretical viewpoints mentioned in the section above, that relate to one's learning environment, seem to model effectively the affordances (or 'properties') of that physical environment and the way in which we can interact with and make use of those affordances for learning.

Perhaps what we should be considering is a new, or extended, theory of learning that considers the resources and affordances contained within the physical environment and the way in which learners can engage with them, extending the work carried out by Dourish [9] into 'space' and 'place'. Evidently such a theory would need to take into account sociocultural perspectives, but it should also give a reasonable weighting to the richness of what surrounds us, turning at least some of the focus externally – a kind of "reverse embodiment" or maybe "embodied physicality". Some promising work has been done in the area of reality-based interaction [10] but this does not seem to have had an educational focus or drawn upon many of the aforementioned theoretical stances.

V. SUMMARY

This paper has explored, albeit very superficially, the way in which we theorise about learning in technology-enhanced augmented places. It has purposefully not gone into detail about socio-cultural aspects and this is a recognized limitation of the paper and one that is hoped to be addressed in a more detailed future publication. Another obvious limitation of this paper is that it has not sought to integrate together many other additional aspects of learning (e.g. organizational aspects/administration or matters relating to policy) with those of the augmented environment.

However, the author has attempted to bring together several related ideas of thought around situated learning, where a primary context is that of the immediate physical environments of the learner as a central resource. It is argued that we don't, as yet, have a way in which we can model the richness of the environment as a core aspect of the learning that may take place within it and that existing theories fall short of being able to integrate this successfully.

It is hoped that readers of this paper will be kind enough to provide constructive comments and feedback to the author in order to progress the thinking in this area. What seems clear is that we don't yet know what kind of impact the effective use of technology-enhanced augmented places may have on learning, and that being able to understand the theoretical basis of learning interactions seems to be a critical aspect of future work in this field.

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