

Interaction Heuristics for Context-Sensitive Mobile Learning

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1. Introductions

This paper examines a case of location-aware context-sensitive learning. We examine in some detail Dourish's (2004) notion of context, highlighting six principles to guide our work. This is followed by a brief overview of a case study that the authors are engaged in as part of the EC funded CONTSENS project. This case is used to propose a set of 'interaction heuristics'; these are rules of thumb that should in future systems be able to guide a mobile learning system's responses as learners operate within a learning context.

Mobile learning is increasingly able to make use of the GPS feature of devices to enable location-based and context-sensitive learning. Location-aware systems are already used by emergency services to detect the exact physical location of mobile devices. Context-sensitive systems in contrast are also aware of the activities of learners and can thus offer to give assistance in the form of appropriate learning content.

2. A view of context

According to Dourish (2004) the determination of contextuality cannot be made a priori. It is an emergent feature of the interaction, determined in the moment and in the doing. In other words, context and content cannot be separated. Context cannot be a stable, external description of the setting in which activity arises. Instead, it arises from and is sustained by the activity itself. (Dourish, 2004). Dourish presents a "model of context ... in which context and activity are mutually constituent" (p.14). Dourish's model of context follows (keywords are in bold):

"Contextuality is only a relational property that holds between objects or activities. It is not simply the case that something is or is not context; rather, it may or may not be **contextually relevant** to some particular activity." (Dourish, 2004, p. 5)

Context cannot be defined in advance but is **defined dynamically**.

"Context is particular to each occasion of activity or action. Context is an **occasioned property**, relevant to particular settings, particular instances of action, and particular parties to that action." (Dourish, 2004, p. 5)

"Context **arises from the activity** being maintained and enacted in the course of the activity at hand." (Dourish, 2004, p. 5)

"If activity is the site of contextual manipulation, then this move argues for a link between action and meaning as the primary concern of ubiquitous computing. We find the link between these two in the

concept of **practice** ... the concept of practice is one that unites action and meaning. It describes how the world reveals itself to us as one that is meaningful for particular sorts of actions, and as a result of our participation in communities.” (Dourish, 2004, p. 9-10)

“What is crucial to the **interactional** (rather than representational) view is to see practice as a dynamic process. It evolves and adapts. As technologists, then, our concern is not simply to support particular forms of practice, but to support the evolution of practice – the “conversation with materials” ... out of which emerges new forms of action and meaning.” (Dourish, 2004, p. 10)

Defining and building models of contextual learning is still an active area of research. The purpose of the work described in this paper is to contribute to this field by explicitly interrogating the construction and formation of contexts in a field trial of location-aware learning. Indeed, we question whether Dourish is being too narrow in his approach to the construction of context. Winters and Price (2005) argue that Dourish does indeed create an unstable and elusive notion of context which may well hinder any ambition to build interactive systems for context sensitive learning.

3. Case study

The mobile learning application is being used with students of Education Studies and also trainee teachers to explore their knowledge and understanding of urban education in a meaningful context (Smith, Cook and Pratt-Adams, 2009). An urban area close to London Metropolitan University is being used to explore from 1830 to the present day how schools are signifiers of both urban change and continuity of educational policy and practice.

4. Heuristics for enhancing emergent interactions

For us the context is emergent and not predetermined by events; centrality is placed on practice, which can be viewed as a learner’s engagement with particular contexts.

This section will outline our findings. For example, one question in our interview with the tutor in our case study was as follows: Question. What do you think it added for the students? For example, did the facilities provided by the phone change way they undertook the tour and the tasks they were asked to complete? The tutor responded as follows:

- They were very engaged and excited.
- The students could have developed some of the tasks more. We could encourage them to spend longer on tasks.
- The tasks on the mobile tour are more structured which give students the opportunity to get beneath the surface of the tasks and actually get collaboratively involved. On the tutor guided tour, tasks mainly consisted of the tutor asking the students questions.
- Because they were in small groups on the mobile tour, there was a more productive form of pedagogy.
- You can engage with their learning more on the mobile tour. The mobile tour is much more focussed and you can get students to develop their learning in more productive ways.

Based on this and all the evaluation data initial heuristics for our learning enhancement system are that we need to:

- Encourage students to spend longer on tasks.
- Vary the form of interaction: one student commented in the field that our system should have some form of talking head, like “brain-trainer software”, to provide a more personalised view and motivator to engage with the task.
- Improve indexing (being aware of all the content that was available in the system to view at any time)
- Improved digitisation of content (especially the archive material which students claimed was grainy and of poor quality)
- Support for the evolution of practice (students claimed that it would be good to fit this practise into a larger context of being able to see the same area over time and to be able to choose the time-scale to be investigated on the tour).
- Have greater granularity around the location including placing sensors in the environment (comments and instances of the unreliability of GPS prompted this heuristic)
- The ability to perform deep customisation including level of detail, preferences and order of presentation (some students were at different conceptual levels and would have benefited from this ability to tailor the content to their individual level of interest)
- Provide video and audio searching facilities (one student said they wanted to skip to a part of the video even search a video for a specific building which would have to be tagged to find its location in the clip).

5. Conclusions

Future work aims to examine whether such heuristics (successful interventions) can go further and feed into a model for guiding interactions in other learning contexts.

References

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