Visualising Socio-Material Practices in Knowledge Creation

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Abstract: This poster presents a technique for analysis and representation of socio-material knowledge creation processes for a case-based study of tertiary student groups. Plotting objects, actions and focus on a timeline creates a visualisation of emerging epistemic agency. This visualisation complements ethnographic description and multimodal analysis. The research for which pilot data is presented below aims to inform learning design by investigating the interplay of student actions, constructed objects and learning environment.

Keywords: knowledge creation, epistemic objects, socio-materialism, student learning, analysis

Theory
The theoretical basis for the research lies in the knowledge creation metaphor (Paavola & Hakkarainen, 2005) and its concepts of shared epistemic agency and the social construction of objects. Shared epistemic agency refers to how people create knowledge socially: how they create shared epistemic objects, but also how they organise and construct the conditions for effective collaborative work on those objects (Damşa, Kirschner, Andriessen, Erkens, & Sins, 2010; Muukkonen, Lakkala, Kaistinen, & Nyman, 2010). Agency is ‘situated’: it takes place with a particular problem, in a particular environment, using specific tools, practices and shared objects. It is the shared objects that form the locus of interaction. Objects can have varying roles in interaction: as the focus of knowledge work—an ‘epistemic object’—or as a supporting ‘technical object’. An epistemic object is an artefact, inscribed or not, that expresses contested, emerging or negotiated knowledge (Ewenstein & Whyte, 2009; Knorr Cetina, 2001) and is acted upon and changed. It may be a document under collaborative construction or a concept under dispute. By contrast, a technical object (Ewenstein & Whyte, 2009) is static and tool-like, for example a textbook diagram of the epidermis—and generally taken at face value.

The objects, actions and tools used by the group make up their specific environment or infrastructure for collaboration. This happens in the context of a constructed, relational and situated learning environment (Ellis & Goodyear, 2013) that is a ‘laminate’ (Goodwin, 2013) of available options, both formal and informal.

Method
Video, audio and object (eg notes, resources, photographs) data were collected as a pilot from groups in a 90-minute session in an undergraduate Science Education course. Discussions were transcribed and videos observed for the use and creation of objects. Actions, categorised using Damşa et al.’s (2010, p. 175) schema, and objects as well as the focus of the groups were plotted on a timeline and analysed for focus or higher-level actions (Norris, 2004). I looked for the things that became visible in interaction, dealing with the ‘issue at hand’ (Barab, Hay, & Yamagata-Lynch, 2001). The actions were coded using using ‘E’ for epistemic actions, ‘R’ for regulative or group management actions, numbers for categories within those divisions and the final letter to specify codes (the key is available on the poster).

To complement the graphical representation, I applied elements of multimodal interactional analysis (Norris, 2004) in a textual description of the observed collaborative session, using her concepts of ‘fluid’ actions that take place in real time and ‘frozen’ actions that are represented in objects (Norris, 2004). Modes of communication—eg ‘visible,’ ‘audible,’ ‘fleeting’ or ‘persistent’—were also applied. This analysis also describes actions such as ‘creating space for others’ contributions’ (R3c, ie a regulative action in the category ‘relational’) that are evident in physical and verbal cues.

Representation
The objects and actions of a group in a sample 15 minute period are represented in Figure 1. In the process of mapping objects and actions, I referenced Norris’ (2004) concept of ‘higher-level’ actions made up of a series of ‘lower-level’ or elemental actions, as well as the idea of an ‘overarching’ action. In my analysis, I have thought of the overarching action in terms of an epistemic object, an emerging construct under negotiation. In Figure 1, the observed overarching epistemic actions included: making the experiment appropriate for students (the series ‘Experiment’ and ‘Handouts and activities’); and creating a schedule that allows for student engagement within time, data and equipment constraints (‘Lesson planning/timing’). In this episode, scientific and pedagogical concepts were used by students. Another diagram might use other categories, trace individuals or contract time intervals to gain a view of interaction over a longer period.
Figure 1. Excerpt from representation of Group 2 interaction, showing actions, focus and objects. The letters and numbers represent categories of actions indicating shared epistemic agency from Damşa et al. (2010).

Discussion and implications
The developed visualisation technique offers a way to represent the organisation of actions and objects within a group collaborative project. This allows us to see the group’s focal points and ongoing development of their project, aiding recognition of overarching epistemic objects and changing patterns. It is an interpretive representation that aids in pattern and theme recognition, helping trace and compare how groups exercise epistemic agency. It helps to contextualise detailed multimodal or ethnographic exploration of shorter sequences of interaction, enabling a rich understanding of what is happening within a group project.

References

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