Bridging Concepts as Intermediary Knowledge in Design: Productive Dialogues and the Talkwall Microblogging Tool

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Abstract: Talkwall is a freely available browser-based tool designed to support classroom dialogue and interaction. When aligned to an appropriate pedagogy, it is intended that Talkwall can encourage students to engage and share their developing ideas, and promote positive dialogic interactions. Research-practice partnerships and design-based research with teachers as co-designers is a key theme in this research programme. We argue the bridging concepts facilitate exchange both ways between theory and practice, and that the material outcome of the design incorporates and displays the ideas for future practice, and as such it contains the embryonic starting point of what 'might be'.

Introduction

Contemporary technologies such as microblogging can be integrated into, and are potentially transformative of, pedagogical practices that develop the 'complex competencies' today's students need (for instance, critically thinking about one's own ideas and how they relate to ideas of others through elaboration and reasoning).

Sociocultural perspectives on social and cognitive development (Vygotsky, 1962, 1978) consider language a central cultural tool for learning and a clear trajectory in academic discourse has been to consider dialogue as a particularly important tool for learning within classrooms (Barnes, 1976; Alexander, 2008; Howe & Abedin, 2013; Mercer & Dawes, 2014; Schwarz & Baker, 2016). Dialogue is 'more than just talk'; rather, there is a specific focus on sharing and evaluating ideas, building ideas collectively, reasoning, providing justifications and elaborations, and using evidence to support arguments.

The notion of 'bridging concepts', initially proposed by research on Human Computer Interaction (Dalsgaard & Dindler, 2014), is used to address the problem of translating theoretical understanding to the design of technology intended to support a specific classroom practice. This form of concept-driven design research is explorative in nature, aiming at manifesting visionary theoretical ideas in concrete designs. The intention is to 'bridge the gap' between generalized theories and design instances with intermediary forms of knowledge in the form of conceptual constructs. Building intermediary forms of knowledge is also an essential part of our DBR approach. This is because insights into pedagogically appropriate uses of educational technology for representative teachers in school settings can be limited. Further, there is often a problematic gap between what could be effective technology-enhanced learning (TEL) in theory, and what can be effective TEL in practice (McKenney, 2013).

A long term research programme have been developed, highlighting the importance of material artefacts and material enactments based on tools such as Talkwall. Design in this view continue in the classrooms as teachers are rehearsing future practices (Binder et al., 2011) integrating microblogging in their dialogic teaching.

A research programme for practice development

DBR is a practice-centered research method grounded in a collaborative partnership between teachers, researchers and technology developers (Roschelle & Penuel, 2006; Lund et al., 2012; Lund & Rasmussen, 2008; Rasmussen & Hagen, 2015). This systematic approach informs the developments of 'products', employing theory and research findings in combination with iterative use in real settings; data collection; analysis and evaluation; re-design and adaptation. Based on collaboration between researchers and practitioners, DBR leads to design principles, models and the adaptation of theory (Anderson & Shattuck, 2012).

During this research, all interventions (both dialogic and technology-based) are situated in real educational contexts with collaborating teachers taking part as co-researchers. This methodological approach bridges theoretical research and educational practice by (i) recognizing the lived experiences of teachers and students (ii) integrating their perspectives into the design of Talkwall.

Designing Talkwall has involved the alignment of three 'modes' of DBR (see Bell 2004): theories related to productive talk, a cultural-historical approach to understanding mediating technologies, and a situated understanding of limitations and opportunities in the classroom (articulated by teachers during the development process). Teachers have worked as co-researchers to tailor pedagogic approaches to subject discourses, trying,

exploring and developing new classroom practices, forming new tasks and activities, and adapting Talkwall and resources to their own needs. Theorizing thus strongly relates to real-life classroom contexts, and design principles and models 'reflect the conditions in which they operate' (Anderson & Shattuck, 2012, p. 17).

Bridging concepts

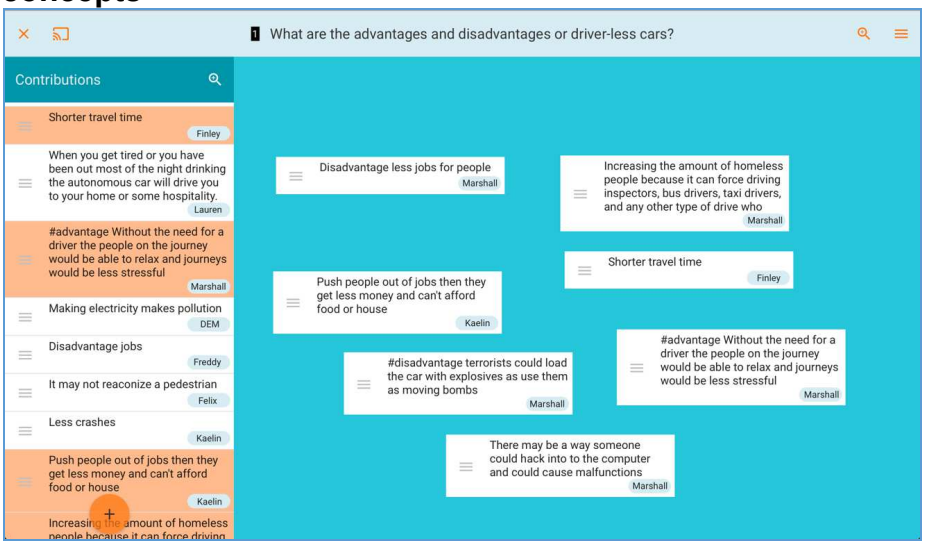

Figure 1. Talkwall with a feed (to the left), and a wall with contributions (centre).

The tool design is based on epistemological positions regarding learning and collaboration, and bridging concepts emerged during the research practice partnerships:

A **contribution** is a microblog, a digital representation of an idea. In Talkwall, a contribution is short, chosen to enhance oral interaction, and not substitute it. To allow the users more interactional control than what is often the case in other microblogging environments (e.g. Twitter) contributions are implemented by a card design. A contribution can be built on by someone else (e.g. extended, made more precise, etc.).

A **feed** provides mutual awareness of ideas. The blend of oral and digital contributions is central to Talkwall, and the feed provides awareness of participants' thinking, rather than a thread or sequence of ideas. The feed in Talkwall is shared on all participants' devices, as well as the teachers' screen, and offers means for students to effectively share their contributions with their peers. The feed is an awareness mechanism that may be used by students to acquire ideas from others and for the teacher to acquire both detailed information about how students are formulating their ideas, the sequence and emergence of ideas, and an overall idea of the dialogue in the classroom as a whole.

A **wall** allows for contributions to be promoted from the feed and be represented in a spatially organized surface. The feed and the wall are two different lenses to the contributions, the feed focuses on the temporal and emergent nature of ideas, while the wall is a means for selecting relevant contributions, and allowing spatial arrangement by means of direct manipulation of contributions in order to make connections, to aggregate and classify contributions, and to amplify means for synthesizing.

The bridging concepts can be regarded as a realization of a dialogic space (Wegerif 2015), as dialogue is mutually constructed by oral and digital contributions in the classroom. This hybridity, or combination of the oral and the written, poses new challenges both in how we understand the roles of technology in the digitalized classroom, but also in terms of how technology can be designed. By means of Talkwall, diverse voices are represented, made accessible over time, enabling the class to invoke and combine ideas, and to keep them alive in the dialogue.

Finally, **a space for the teacher** is a bridging concept that embody the empowerment of the teachers and has emerged from collaboration with teachers, and their own formulations of how they cope with new digital tools and materials in the classroom (Rasmussen & Lund, 2015). In Talkwall, the role of the teacher has been a key point in the design, and has promoted some privileges in the tool for teachers, such as access to all the participants' walls and ability to show any one of them on the shared screen in from of the class. Further, there are features that support the teacher as a leader of the dialogue, such as means to formulate tasks and to manage Talkwall sessions.

What the notion of bridging concepts enable is exactly the communicative work that is needed in the design work that aims to tailor a material product to a specific educational practice and drawing also on theoretical insights from this field of practice.

We argue the bridging concepts facilitate exchange both ways between theory and practice, and that the material outcome of the design incorporates and displays the ideas for future practice, and as such it contains the embryonic starting point of what 'might be' (Lund et al., 2012). Since ideas of what 'might be' are often volatile and hence hard to hold on to, teachers may find valuable a tool that inscribes significant aspects of dialogic theory and may be a 'digital companion' with potentially transformative impact for emergent dialogic practices.

Our translations of bridging concepts, into design articulations and a range of exemplars that demonstrate the scope and potential of their application (Dalsgaard & Dindler, 2014, p. 1635) have considered technology such as microblogging within a diverse set of educational context over many years. Thus, we draw from particulars to form more generalizable concepts for pedagogical practices that develop the 'complex competencies' today's students need.

Findings based on a theory and design-based research program

Talkwall is a result of longitudinal DBR involving collaboration with a total of nine schools over a period of five years. We have recorded 65+ sessions with Talkwall and analysed how teachers have aligned and enacted the tool with their intended dialogic teaching. The shared goals for this research program have their origin both in such situated experiences by teachers and in research, and can be summarized as follows:

- The technology should provide means for students to build on each other's thinking, as this is crucial for a dialogue that is characterized by elaboration and reasoning.
- There should be means provided for broad participation in the classroom to make sure a diverse set of voices are participating in the dialogue.
- Diverse means should be offered beyond the oral for contributing to a dialogue, such as allowing for multimodal interactions.

A key empirical finding was the importance of moves between individual, group, and whole class interactions, and designs that address such shifts. This is a particular feature with Talkwall, based on dialogic theory and experiences teachers bring to the design process. Central in the design for shifts between individual, group and whole class interactions are the specific design articulation based on the bridging concepts of the feed and the wall. We will present findings suggesting that frequent shifts of participant structures are beneficial for broad participation in the classroom.

Our research program clearly demonstrates how an alignment of a tool's development with a theoretical approach is valuable as intermediary knowledge emerge, in our case in the form of bridging concepts. These stimulates and guides the exchange between theory, design and classroom practices, and may be essential to bridge the gap between generalized theories, design instances and situated classroom practices.

As mentioned, the tool is enacted by competent teachers that will construct meaning of the artefact in a given and situated classroom context. The tool is designed for this meaning making to happen (Krippendorff 2005), and we associate some agency with the tool in this respect. In this perspective it is not productive to regard tools as theory free.

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