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SynergyNet Into Schools: Facilitating Remote Inter-Group Collaborative Learning Using Multi-Touch Tables

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Abstract: The availability of more mobile large factor touch-screen interfaces has allowed for research into collaborative learning that has previously taken place in single laboratory environments to be carried out at multiple schools in the real world simultaneously. This research focuses on a study which used the framework to investigate collaboration between groups of students at two geographically separate sites. The groups from the separate sites worked together to complete a task using video-conferencing and a novel flick gesture provided by the SynergyNet framework to transfer materials to each other. This paper details initial findings and the steps being taken to robustly analyze the data collected.

Introduction

Despite the proliferation of tablet computers in schools, there is still a great deal of potential for multi-touch tables which support optimum learner participation in face-to-face collaborative activity (Stahl, Koschmann and Suthers, 2014; Dillenbourg and Evans, 2011). As such, large touch screen interfaces offer opportunities for collaboration between learners either when the interface is shared or when two or more co-located interfaces are networked together allowing for the transfer of materials. This study builds on prior research into the observed behaviors of learners (10-11 years) collaborating in small groups in History and Mathematics problem solving activities. An interdisciplinary EPSRC/ESRC (UK) funded research project, SynergyNet, identified important technical and pedagogical challenges in the development of multi-touch technology. The project successfully explored issues of classroom talk and emergent leadership (Higgins et al. 2012), adaptive expertise (Mercier and Higgins, 2014) and teacher dialogue (Joyce-Gibbons, 2016).

Study design

The original SynergyNet study was limited to use in a laboratory built to emulate a classroom rather than in regular school environments. This was necessitated by the constraints of the technology. Recent developments of more portable and robust multi-touch tables mean that recent research using the SynergyNet framework can take place in real-world school settings. However, rather than simply replicate the previous configuration of co-located groups working together, the researchers sought to use the capabilities of the SynergyNet tool to their fullest potential by developing shared learning practices between small groups of learners (9-10 years old) in two schools, working simultaneously on a project. Despite their distance apart (approximately 300 miles), Durham City in England and Caerphilly in Wales have a shared industrial and coal mining heritage. Both have recently undergone privations in dramatic de-industrialization. The impact this has had on young learners has been one of disassociation. They struggle to equate their own reality with the initial *raison d'être* of the villages in which they live. To help support the development of a shared sense of learner belonging and historical perspective, groups were asked to collaborate on a History mystery classroom task (Leat and Higgins, 2002). This activity centers around a complex problem, multiple possible answers were contained in 20 clues shared between the two groups, one in each location. The task was to reconstruct the events leading up to an accident in a mine involving a 10 year old boy and to apportion blame for his misfortune.

These learners were linked by Skype, to support communication, and by the tables, through which they could share data via a feature called 'Network Flick'. This feature allows learners to transfer content from one table to another using a flicking gesture. 'Flicking' shared clues between locations gave a sense of spontaneity and fluidity which typical file-sharing methods do not allow (McNaughton *et al.* in press). It also scaffolded groups in negotiating salience for the clues on their table. The clues they perceived as important were flicked and those deemed less salient were not.

Preliminary findings

Initial data suggests that the remote nature of the groups did lead to meaningful collaboration but in a very different form to that observed in the original studies which focused on intra-group rather than inter-group collaboration. In the early study, groups organized their thoughts using representations on the table to negotiate shared understanding. In the recent study learners immediately share key information with the partner group, leaving only information they have decided is unimportant on their table. Learners easily created a joint attention space, particularly around information sent by the remote group. However, this led them to an over-focus on individual pieces of text rather than on developing a general understanding.

Groups in both locations easily established joint working practices aimed at sharing important information with each other and attracting the attention of the other group. If one participant waved at the partner group, it was generally ignored as erroneous. However, if all members of the group waved together the viewing group knew to initiate dialogue. There were conscious exchanges involving procedural and solution focused discussion. There were also clear sub-conscious communication processes involving mirrored body language and modulation of intonation to match unfamiliar accents.

Teacher behavior was focused in two areas. First helping groups establish better physical collaborative practices to more effectively use the tables. This entailed changing their position in relation to the camera used for Skype or suggesting improvements to their technique when performing multi-touch gestures on the table interfaces. Second, teachers helped learners shift their focus from the specific (a single clue sent by learners in the other group) to the general (understanding the place of this clue in the wider context of developing a plausible solution to the task).

Delayed interviews with participants, conducted seven months later, indicated that the students remembered some aspects of the activity very vividly, particularly interacting with the partner group through flicking gestures and through skype. Typical comments include: i) "It was like being in a house full of strangers"; ii) "We communicated like we were really there."

Further analysis

Currently, teacher dialogue is being analyzed using an adapted version of the Engle and Conant (2002) framework. This is being used to explore the extent to which the participating learners were able to support and scaffold both successful collaboration and successful task completion. Learner behavior is being explored using the metaphors of participatory learning, knowledge acquisition and knowledge construction (Lipponen et al. 2004) as a framework for interpreting individual's experiences of collaborative working. This work is due for completion in April 2017.

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