Exploring remote synchronous, collaborative interaction between learners using multi-touch tables and Skype

Background: This paper presents findings from a study of two groups of children, located in classrooms 300 miles apart who used Skype and an extensible multi-touch tabletop collaboration framework, to simultaneously collaborate on a single problem relating to coal mining and relevant to their respective history curricula. It builds upon the existing corpus of research from the *SynergyNet* project, specifically on: i) the advantages of multi-touch based collaborative reasoning activities compared to paper-based activities (Higgins, Mercier, Burd & Joyce-Gibbons, 2012); and ii) the role of the teacher in orchestrating the collaborative process at single group and whole-class levels (Joyce-Gibbons 2017). Recent developments in *SynergyNet* has enabled its deployment in multiple classrooms, supporting simultaneous, non-co-located collaboration between learners (McNaughton, Crick, Joyce-Gibbons, Beauchamp, Young & Tan, 2017). This paper reports the findings of this novel deployment relating to participant behaviours, participant recollections of their activity in delayed focus group interviews and teacher behaviours when managing the collaborative process.

Method: 24 participants in Year 5 (aged 9-10) from two primary schools in South Wales and the North East England. Learners were seated in groups of three around a multi-touch table, facing a screen with Skype linked to the partner classroom. The 'mystery' tasks were conducted with four different pairs of groups in each school and were distributed over the two multi-touch tables. Participants were able to share these using a 'flick' gesture – pushing the clue away from them, off the top end of the table-top screen. This clue would then simultaneously appear on the table-top of the partner group in the other school. Data was collected via audio-visual recording and was iteratively coded for teacher and learner behaviour. In addition, delayed post-hoc focus groups were conducted with participants (now in Year 6) after six months, where they were asked to reflect on their participation in the activities. This data was coded thematically based on emergent behaviours observed in the previous video data.

Participant Behaviours: All participants in each group showed at least initial peripheral engagement in group activity. Over the course of the activity participants developed clear organisational and intellectual leadership roles in each group. Frequently these were fulfilled by separate participants (Mercier & Higgins, 2013). Self-organising learning strategies were developed by the groups, such as a collective all-participant wave being interpreted as an urgent request for attention from the other group.

Teacher Behaviours: Despite evidence of participant self-organisation at the intra and inter-group levels, there was a clear and continuing need for teacher management of the technology and scaffolding of the reasoning processes. Teachers were instrumental at managing intra-group discussion to focus on salience and the uptake of group-member ideas (Barron, 2003).

Participant recollections: All groups in both schools identified that the affordances of the tabletops allowed them to solve the problem collaboratively by a mixture of discussion and sharing of clues through the flick gesture. The video analysis revealed the actual problem-solving discussion was largely within groups at each school, and clues were then shared either for verification or discussion between schools. The ability of the pupils to share content and then discuss (either intra- or inter-school) was important to their support their

collaborative working. There was also a strong social interaction theme underpinning the 'fun' element of the learning experience.

Conclusions: The *SynergyNet* framework provides an important potential tool for innovative and authentic collaborative learning by learners in primary schools. The learners showed sustained organisational and intellectual engagement in the tasks. Despite the participants' rapid progress in developing self-organising learning conventions, teachers remained an important part of the process when they focused on scaffolding reasoning and modelling questioning behaviours.

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