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Multi-touch technologies and motivation in the classroom

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Background

The SynergyNet project is part of the Teaching and Learning Research Programme's Technology Enhanced Learning. It involves researchers from Computer Science, Education and Psychology in developing multi-touch computer environments for learners to investigate collaborative learning using single tables, and a networked environment

Research Questions

Work on collaboration with multi-touch tables suggests that they lead to more task focused conversation and to more equitable participation (Marshall et al., 2009) which may relate to greater engagement. These results suggest that multi-touch technology may promote interactions that are associated with increased engagement. However, the role of technology in influencing interactions and learning is complex, and understanding the interaction between technology, motivation and collaborative learning is incomplete.

Collaborative learning has been researched for many years (Wood et al, 1976) and we understand how the context of a task, group membership and interactions can influence learning, there is little research that explores how motivation influences collaboration (e.g.; Darnon et al, 2007). In particular, we understand little about how motivation influences decisions to engage in a task (e.g. Barron et al 2009) and how that impacts learning outcomes (e.g. Gabriele, 2007). It is necessary to explore how the tool and task can promote engagement and the types of engagement that lead to successful learning

Methods

The study was a 2x2x2x2 design (content area; technology/paper; gender of group; teacher). Each group of participants completed tasks in both content areas, the multi-touch table for one task and a paper-based version for the other; mode of presentation was counterbalanced. Each task was facilitated by a researcher, (an experienced primary teachers). Facilitators were also counter-balanced across modes and content.

Table 1: Order, mode and content for each group

		Task One			Task Two		
Group	Gender	Content	Mode	Teacher	Content	Mode	Teacher
1	F	History	Paper	1	Maths	MTT	2
2	M	History	MTT	2	Maths	Paper	1
3	F	History	Paper	1	Maths	MTT	2
4	M	History	MTT	2	Maths	Paper	1
5	F	History	Paper	2	Maths	MTT	1

6	M	History	MTT	1	Maths	Paper	2
7	F	History	Paper	2	Maths	MTT	1
8	M	History	MTT	1	Maths	Paper	2

Participants were 32 (50% female) 10-11 year primary pupils. Participants attended the lab in groups of eight and worked in same-gender groups of four.

Groups undertook activities that introduced them to the multi-touch table. The groups then divided: one completed a multi-touch version of a history task, while the other completed a paper-based version. The groups switched rooms, and completed a mathematical task on either the multi-touch tables or paper.

Both the mathematics and history tasks were designed using the Mysteries framework (Leat & Nicholas, 2000). Mysteries are a tool for the development and assessment of higher-level thinking, in which students receive items of information needed to determine a joint conclusion. Information is provided on pieces of paper, with a single guiding question for the group. The information provided can range from facts to relevant and irrelevant background information and abstract ideas. Students are expected to discuss the information in groups and come to a conclusion.

Frame

Transcripts were created using a playscript format (e.g. Derry, 2007). Aspects of engagement and motivation were highlighted in each transcript and video, with attention paid to the language and gestures of the participants. Transcripts were coded for types of contributions, and were matched with the engagement tracking.

Research findings

This paper explores high and low engagement, aiming to identify when each collaborator was motivated to contribute, and the interactions associated with pivotal moments in the groups' cognition. Comparisons in engagement across the two conditions (paper and multi-touch table) will be used to understand whether the use of technology influences motivation to collaborate, and the impact of any difference in the types of arguments that are made

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