
Communication Patterns in Collaborative Peer Learning around Interactive Tables

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Abstract

Despite many advances in technology, interaction and co-located collaboration, there is little knowledge of how children communicate around interactive tables. Key to the success of peer collaborations is the extent to which children communicate and the nature of the talk that contributes towards successful learning. Our work examines the communication patterns of children across various conditions of table-based interaction for different types of educational activities. We present two studies to investigate the communication patterns. Our findings provide insights into the design of interactive tables to support particular forms of social interaction towards understanding how the next generation of HCI will impact our children's education in the future.

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Keywords

Interaction techniques, tabletop, communication, collaborative learning and children.

ACM Classification Keywords

H5.3. Group and Organisation Interfaces

General Terms

Children, communication, learning, interaction techniques.

Introduction

With advancement in interactive tabletop technology and increased levels of affordability in recent years, there has been a growing interest in exploring their use within educational contexts. Central to this interest are arguments relating to demonstrated benefits of peer collaboration in children's learning that have led to such activities to becoming an increasing aspect of children's educational experience [6]. The aim of such experiences is to allow children to jointly explore particular areas, discussing and exchanging ideas and perspective and thereby facilitating their understanding. Key to the success of these peer collaborations from a learning perspective is the extent to which children participate in the collaboration [3]. In particular it is the extent to which peers talk and the nature of this talk that comprises this participation that is argued to be key to successful learning [4]. For example, successful collaborative learning has been

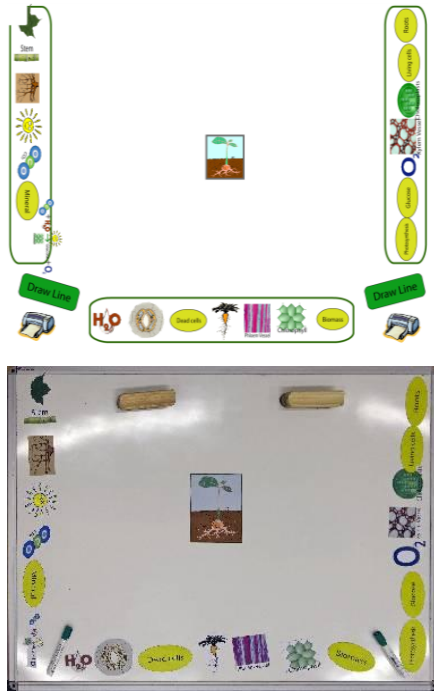


Figure 1a (top): Screen shot of the spider diagram task on the interactive table.

Figure 1b (bottom): Photograph of the spider diagram task on the non-digital table.

*Jamil, I, Alexander, J., Subramanian, S. and Barnes, S. Talking Teenagers and Tables: Communication around Interactive and Non-Interactive Surfaces. Technical Report, CSTR, University of Bristol.

demonstrated to happen when accompanying talk contains more explanations [5].

Building on these findings, and the arguments that particular types of talk within peer based collaborative learning are important [4], our concerns in this paper are with the impact of particular tabletop interaction techniques on the type of talk during collaborative learning. Surprisingly there is little in the way of empirical research that specifically examines the effects of the tabletop interaction techniques seen in Nacenta et al. [2] on patterns of conversation in collaborative learning scenarios. In another study, Harris et al. looked at single versus multi touch for this scenario but did not explore different interaction techniques within this context [1]. Furthermore, studies of interaction techniques for tabletops in real-world settings with ecologically appropriate tasks and configurations are still quite rare. The challenge that we aim to meet in understanding this problem space is fourfold:

1. Producing a research framework to systematically analyse communication patterns between different interaction techniques.
2. Producing a holistic coding scheme and analysis process based on existing literature to investigate the communication styles.
3. Producing applications that foster learning and group communication that are ecologically appropriate tasks suitable for real-world settings.
4. Producing a guide for designers when using different interaction techniques to produce collaborative learning tasks for children.

In exploring this area, we will be better able to understand the impact of interaction techniques on

communication during collaborative peer learning when using interactive tables.

Current research

We present two studies of 11-16 years old students performing collaborative learning activities with different tabletop interaction techniques. The activities were created in cooperation with teachers based on the class activities and curriculum. We then compare the effects of these techniques on patterns of conversational utterances.

First study

This study investigates the conversation styles of teenagers around interactive and non-digital tables*. We looked at five types of utterances: identification, proposals, responses, interdependence and instructions. We seek to examine the following points: 1) what type of conversation styles exist around these tables? 2) what are the different trends for proposal and response utterances? 3) do the participants identify themselves as individuals or as a group? 4) how are interdependence and instructions demonstrated? 5) what would be the topics of discussion?

To answer these questions, we performed a study that involved 39 teenagers (13 groups of three students) who worked in teams to produce a spider diagram. Figure 1 shows a snapshot of the spider diagram task. We recorded and analysed approximately 120 minutes of video of the participants completing the task. Teenagers working on the interactive and non-interactive tables exhibited different conversation styles. Overall, teenagers working on the interactive table talked longer and produced more utterances. This allows more time for latecomers to contribute their ideas and to be part of the decision-making process.

world. Perhaps culture might play a role in the outcome of the conversations of the children. Hence in May 2010, we deployed the interactive tables in two schools in Delhi, India.

Our initial analysis suggests a very different group communication and dynamics between the children in the UK and India. For example the children in India are very protective of their personal territory. They will physically remove any unwelcomed hands or fingers that enter into their space. In terms of manipulating objects, the children are comfortable working with objects that are close to them. For objects that are further away, they will move and repositioned themselves so that they are closer and within arm's reach. There is little conversation about passing objects between children. Meanwhile, children in the UK stayed at the same seating place throughout the task and asked for objects to be passed or manipulated for them if they are non-reachable. There are very little gestures or hand contact between them and very rarely do they physically move other children's hands away.

We also observed contrasting behaviours between the children at the two schools. This could be due to the differences in the demographics of the students that went to the two schools. We are currently investigating where the differences lie- whether this is an artefact of the culture or the combination of the culture, technique and task (due to the educational system). This provides us with the opportunity to study the communication patterns not only cross-continent, but also cross-culture and demographics. For this study, we are looking at a more holistic approach of the analysis to provide us with greater insights by looking at various aspects of communication (conversation, gestures and

participation). By understanding this, it would assist us in assessing the practicality of the tabletop configurations, techniques and tasks when this technology is deployed in other countries.

Conclusion

The classroom is a challenging environment for evaluation, thus now we believe that our current and future findings in deducing the communication patterns of collaborative peer learning tasks can be a valuable asset towards understanding how the next generation of how HCI will impact education in the future not only in the UK, but also in other continents.

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