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Orchestration in a networked classroom: Where the teacher's real-time enactment matters

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A B S T R A C T

Designing for orchestration needs an emphasis on the criticality of the teacher's agency, skills and understanding of pedagogies and technologies in orchestrating the classroom beyond the provision of material scripts and technological supports. Drawing on data from the collaborative classrooms that use a collaborative technology called GroupScribbles (GS), we share the work of a teacher who successfully orchestrated the class activity. Yet at the same time, we noted that not all lessons were as well orchestrated like this despite using similar pedagogical and technological designs. The agency in appropriating and enacting these designs in the classroom lies in the attitudes, capacity and mind of the teacher and therefore must be a critical aspect of the overall plan in designing for orchestration.

1. Introduction

From a social constructivist perspective, the teacher's role is one of orchestrating a range of activities that lead to knowledge creation rather than a knowledge provider transmitting information to students (Beauchamp, Kennewell, Tanner, & Jones, 2010; Dillenbourg, Järvelä, & Fischer, 2009). According to Dillenbourg (2012), orchestration refers to the real time management of multi-layered activities and multiple constraints; it expands instructional design to cope with what he calls extrinsic activities and constraints. The author calls for design for orchestration as a means of traction for impacting educational practices in schools.

Dillenbourg presents four learning environments to illustrate the teacher's role of orchestration in regulating various activities (emergent, envelope, extraneous and infra) and constraints around the core activities. Indeed, Computer-Supported Collaborative Learning (CSCL) is embedded in social context which includes complex factors. Different core activity learning designs require different pedagogies and affordances of collaborative technologies, hence contribute to different activities and constraints. This, in turn, requires different ways of orchestration that bring out the real-time adaptive yet effective enactment of activities leading to desirable processes and outcomes.

In designing for orchestration, we emphasize the criticality of the teacher's agency, skills and their understanding of pedagogies and collaborative technologies in orchestrating the classroom beyond the provision of material scripts and technologies used for orchestration – an issue which is not well developed in Dillenbourg's position paper. This draws on our experiences with supporting teachers to run collaborative classrooms and mobile learning classrooms in Singapore (Looi, So, Toh, & Chen, 2011; Looi, Zhang, Chen, Seow, & Chia, 2011). In this short response, we will use some data from the collaborative classrooms supported by a collaborative technology called GroupScribbles (GS), to make our argument. We first present our core design, pedagogy and affordances of the GS collaborative technology, followed by the design for orchestration of the activities and constraints that expand this intended core design.

2. Core design of a collaborative classroom

Our core design is concerned with progressive inquiry supported by GS. The progressive inquiry approach is proposed by Hakkarainen (2003) for young learners' knowledge creation in a CSCL environment. Five principles are included in the core design, aiming at elucidating

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Fig. 1. GS classroom seating arrangement.

the processes and dynamics of collaborative inquiry and guiding the progressive inquiry pedagogical approach. The five principles are: (a) working on authentic problems, (b) encouraging diverse ideas, (c) making progressive inquiry, (d) providing collaborative opportunities, and (e) doing formative assessment.

3. Affordances of collaborative technology – GroupScribbles

A typical GS classroom is equipped with an Interactive Whiteboard (IWB), and each student in the classroom has a Tablet PC with the GS client software installed (Fig. 1). GS allows students to create, publish and edit lightweight multimodal expressions (text, drawing, and painting) for group activities. The GS user interface presents each student with a two-paned window. The lower pane is an individual work area, or a private board, with a virtual pad of fresh scribble sheets of different sizes. The upper pane is a group work area, or a group board. Students can draw or type on the scribble. They can also drag and drop the scribble into different screen arrangements on the group board in the upper pane. Other participants' screens are updated to reflect changes on the group board. The teacher can access the group postings on the public board.

4. Design for orchestration in GS-supported progressive inquiry classrooms

Making use of the GS affordances, the teacher's orchestration of the inquiry class can be designed holistically at three levels: individual, group and whole class activities (see Fig. 2). (S)he can orchestrate the multiple level activities interchangeably according to the pedagogical goals enabled by GS. As GS provides the teacher with a bird's-eye view of the participation and performance of individual students and groups, it helps the teacher monitor the ongoing process and performance of the students more effectively. Table 1 shows the design for orchestration at multiple-levels in a mathematics lesson on fractions in a Primary 5 class (Looi & Chen, 2010).

With GS, the teacher can orchestrate the activity from one level to another anytime to address different pedagogical needs such as:

- guiding the students to participate more actively in the discussion if the teacher finds fewer postings on the group board;
- asking students to perform tasks requiring multi-modal representational use if the teacher identifies that only one form of modality is used;
- encouraging groups to do more intra- or inter-group embedded assessment if the teacher finds few of such postings;
- complimenting the groups if the teacher finds the postings are multi-modal, adjacent and adequate so that the groups are motivated to perform better, and other groups can learn from them;

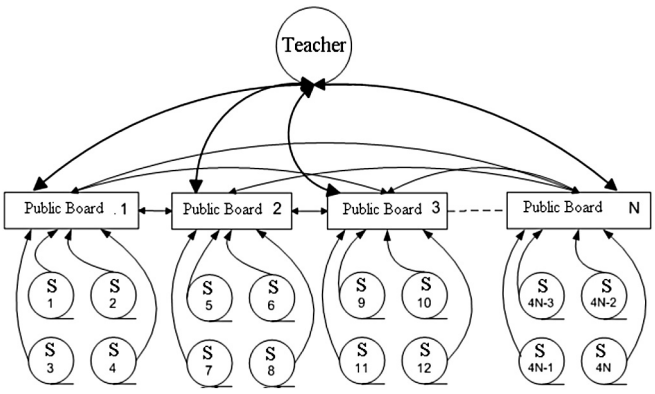

Fig. 2. Model for social interaction in a GS classroom.