



# Enhancing student learning and achievement through orchestration of group processes and group composition

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## Introduction

Fall is a time of new beginnings, when we consider the academic calendar, and yet it is also the time of year when we become aware of closings on the horizon as the year begins to draw to a close. Because of that, the Fall is an excellent time for reflection, and in this September issue of the International Journal of Computer-Supported Collaborative Learning, we reflect on the importance of productive collaborative processes, with an emphasis on feedback processes, and the scaffolding that upholds and promotes productive learning processes, whether it is explicit or implicit. In particular, this issue features four full articles, two of which focus directly on intervention studies with a focus on promoting productive collaborative processes through explicit scaffolding, and two of which focus on differential effects of feedback based on features of the feedback, in one case informing design of implicit scaffolding of processes through orchestration of group composition.

## The impact of supportive interventions promoting positive group processes

In the first article entitled “Exploring the Impact of Chat-Based Collaborative Activities and SRL Focused Interventions on Students’ Self-Regulation Profiles, Participation in Collaborative Activities, Retention, and Learning in MOOCs”, Georgios Psathas, Stergios Tegos, Stavros N. Demetriadis and Thrasyvoulos Tsiatsos present an investigation into a three condition intervention study situated within a Massive Open Online Course (MOOC) for teach-

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ing computer programming. Though MOOCs are of great interest to the CSCL community (Wise & Schwarz, 2017), and though they have been the topic of papers at our conferences as well as discussions in symposia, this is the first ijCSCL article presenting an analysis of data from an intervention study embedded within a MOOC. It is an excellent example of a valid experimental design embedded within a MOOC, where there are difficult challenges with respect to experimental control. As a twist on a prior approach to addressing attrition challenges by waiting for group assignment until after students have completed some individual work (Wen et al., 2017), the investigators were clever in waiting until students had completed a questionnaire, which not only addressed the attrition issue but also enabled identifying four common latent student profiles and then performing a stratified random assignment of students to conditions, with equal representation of the latent student profiles across conditions. This careful setup afforded an elaborate analysis of learning and retention as it related to important measures of Self-Regulated Learning (SRL) and participation in collaborative activities.

The goal of the study was to investigate the interplay between personal characteristics of students and supportive interventions on student participation in chat activities and subsequently their retention in the course. MOOC students were assigned to one of three conditions, namely: control, general intervention, and personalized intervention. The experimental manipulation happened outside of the collaborative-chat activities and determined the kind of support, if any, offered through email messages that occurred at regular intervals throughout the course. Students were all offered the opportunity to participate in chat-based collaborative activities regardless of condition. While prior work investigating the impact of chat activities on retention in MOOCs demonstrated that participation in the collaborative activities promoted retention, the majority of students in that past study did not choose to participate in the chat activities (Tomar et al., 2016). Thus, this current study that demonstrates the impact of an intervention outside of the chat activities that promotes student participation in the chat activities themselves is an important landmark.

The second article, by Yuyao Tong and Carol K. K. Chan, is entitled “Promoting Knowledge Building through Meta-Discourse and Epistemic Discourse Understanding”. This article presented a quasi-experimental design contrasting two classrooms, both using Knowledge Forum, but under different conditions. This study is one in a long history of Knowledge Forum studies featured in this journal (e.g., Zhang et al., 2020; van Aalst, 2009). While a great many past studies of Knowledge Forum presented analyses that focused on classroom communities where everyone experienced the same intervention, this study offers the opportunity for statistical contrast between students in a class where the intervention is present within the Knowledge Forum and a class where it was not present. The experimental contrast focused on enrichment of meta-discourse in the midst of knowledge building. An interesting aspect of the meta-discourse that students participated in was that they expressed their ideas about the discourse graphically through drawings.

A wide variety of data were collected throughout the study, including video, tests, and the discourse itself from Knowledge Forum. Analysis of the discourse collected during the study was supported through an analytics-based tool used in past studies of Knowledge Forum, referred to as KBDeX (Oshima et al., 2012). The analysis provides the opportunity to view through rich, qualitative analysis the impact of metacognitive reflection, principle-based inquiry, and idea development on inquiry in Knowledge Forum. Though study of discourse processes, how they can be scaffolded, and how they promote learning and other

collaborative outcomes is frequent in the CSCL literature, far less has focused on meta-level understanding of discourse or meta-discourse processes. This study demonstrates a clear impact of meta-discourse on collaboration that widened over time, which makes a compelling argument for the importance of this work to the community.

## Group composition effects on supportive feedback processes

The second pair of articles in this September issue focus on features of feedback that affect the quality and impact of the feedback, for example, in one case the type and depth of feedback, and the other case the source of feedback in terms of the relative skill level of provider and recipient of the feedback. In the first case, the feedback under investigation occurred between members of different collaborative groups within the same classroom, as part of a computer-supported collaborative learning activity. In the second study, the data came from a peer review activity within a classroom that occurred after individual students completed a writing assignment on their own. Considering these articles together, we are reminded that feedback between students is valuable both in collaborative and individual learning settings. In both cases students offer cognitive scaffolding to one another in their interaction, even if the interaction is not synchronous (i.e., through peer feedback on writing, where each contribution to the discussion occurs at a distinct time point, namely, the time of article writing, the time of feedback writing, and the time of feedback receipt).

The first of this second pair of articles is by Jesmine S. H. Tan, Wenli Chen, Junzhu Su and Guo Su, entitled “The Mechanism and Effect of Classwide Peer Feedback on Conceptual Knowledge Improvement: Does Different Feedback Type Matter?”. In that article a qualitative analysis of feedback processes is conducted as an exploratory case study after a CSCL activity employing the Spiral Model of collaboration (Chen et al., 2021), which was determined to be successful in producing significant pre-to-posttest gains in knowledge as measured by a test. During the activity, students offered feedback to one another through a structured, peer critique interface. The connection between feedback, knowledge improvement, and learning is investigated in the analysis. A script prompts students to push for deeper and deeper feedback and discussion. Results showed that feedback that probed for deeper conceptual understanding were particularly effective, though they were cognitively more demanding.

The final article of this September issue is by Zheng Zong and Christian D. Schunn, entitled “Does Matching Peers at Finer-Grained Levels of Prior Performance Enhance Gains in Task Performance from Peer Review?”. In this article, a secondary data analysis simulating an experimental study is presented of data collected from 3 large classrooms where a peer review activity with the Peerceptiv system (Wu & Schunn, 2022) was conducted. Results from the study could inform development of an automated algorithm to group students for interaction based on a policy considering skill level of the students, in this case to offer one another feedback on writing. As in the Tan et al. study, feedback was offered through a structured peer feedback interface, which is a form of explicit scaffolding for processes. However, in contrast, interventions that group students in order to promote productive learning processes can be regarded as implicit scaffolding for collaboration (Wang et al., 2017).

The research aimed to identify the optimal level of detail regarding assessment of skill for the purpose of assigning students to effective pairings. Past work on pairing based on

skill level with a coarse grained approach failed to demonstrate an impact of this intentional pairing. In this study, both a coarse grained and a fine grained approach were evaluated and then contrasted. The analysis of results demonstrated that fine grained matching is needed in order to yield a significant effect. An interesting feature of the analysis of results is that the impact of the intervention was evaluated both at the whole class level as well as at the subset level (e.g., within ability level groupings). Since fine-grained matching by ability level was demonstrated to be optimal except in pairs where both are at the very low ability level, it is necessary to consider the relationship between effects of differently nuanced policies from the receiver level and the giver level, as measured within ability level groupings and over the class as a whole in order to make an informed decision for a specific class, with its own unique distribution of skill levels across students.

## Conclusion

The four articles of this September issue of the *International Journal of Computer-Supported Collaborative Learning* are interesting as a set in that they highlight a multiplicity of different research methodologies employed by CSCL researchers. These methodologies span from quantitative to qualitative to mixed-methods approaches, in most cases with new data, but sometimes including secondary data analysis, as in the final paper of this issue. Types of data include the gamut from video, to drawings, to tests and questionnaires. Within this diversity of methodological practices, common themes related to student learning through the cognitive scaffolding they offer each other run throughout this issue.

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