# Fostering flow and feedback in the classroom: increasing the successful implementation of active learning instruction

**Elizabeth S. Charles[1], Rhys Adams[2], Michael Dugdale[3], Kevin Lenton[2], Yann Brouillette[1], Phoebe Jackson[3], Nathaniel Lasry[3], Chao Zhang[4]**

*[1] Dawson College, 3040 Sherbrooke St W, Montréal, Québec, Canada, H3Z 1A4*
*[2] Vanier College, 821 Ste Croix, Montréal, Québec, Canada, H4L 3X9*
*[3] John Abbott College, 21 275 Rue Lakeshore Road, Sainte-Anne-de-Bellevue, Québec, Canada, H9X 3L9*
*[4] McGill University, 845 Sherbrooke St W, Montréal, Québec, Canada, H3A 0G4*
*E-mail: echarles@dawsoncollege.qc.ca; adamsr@vaniercollege.qc.ca*

**Abstract:** We present three case studies focused on different types of feedback scenarios, each featuring a different technological tool. Results show greater student participation and engagement, and facilitation of teacher orchestration of active learning pedagogy. 

## Introduction

Feedback plays a critical role in learning, even more so when students are asked to engage actively in the process. Active Learning (AL) is an instructional approach that engages students in activities that provide opportunities for students to give feedback to each other, i.e., peer feedback, for example in peer assessment and peer review scenarios. Peer feedback is shown to foster the development of higher-order cognitive and metacognitive skills such as critical thinking, problem solving, evaluation and decision-making [1].

While the evidence points to clear benefits of giving feedback, there is a paucity of research on how to design activities to leverage the full scope of this reciprocal process. For one, it remains unclear how best to promote the uptake of, and the acting on, the feedback received. This entails *transactivity* — the sharing and refining of one's thinking based on comments from others, critical for successful collaborative learning [2]. Furthermore, there remains much to learn about the ways in which we can leverage the affordances of modern instructional tools to better support the implementation of AL activities and the instructor's management and orchestration of them.

Our team of researcher-practitioners examined these issues by way of three case studies, each case representing a college science instructor highly experienced in using and designing AL activities. These used varying degrees of a Design Based Research (DBR) [3] approach to implement different forms of peer feedback activities. Each used a different web-based platform — Visual Classrooms, Perusall, and myDALITE — which allowed us to investigate the ways in which these tools' affordances may be leveraged to support feedback and activity orchestration (or flow). Data collected include activity designs and artifacts, student surveys, instructor and student interviews, and the students' course work.

## Case study 1: Reflective writing using Visual Classrooms

Case study 1 involved the design of a reflective writing activity, repeated weekly throughout the semester. The activity was embedded in the Visual Classrooms platform. This tool affords the building of individual and group knowledge through a collection of threaded postings that become visible, or public to others in the class, only after the student's contribution is submitted. This activity, engaging students in both giving and responding to feedback, had been iteratively improved over the period of several semesters to include a system of strong scaffolds. These consist of rubrics and prompts that provide clear guidance and modeling of the dialogical questioning students should generate between others (peer feedback) and within themselves (metacognitive thinking). Results show that the majority of students engaged increasingly in both aspects of feedback, these patterns correlating with the repeated practice and early introduction of the system of scaffolds that were then faded over the semester. Leveraging the individual and public affordances of the tool appears to have encouraged the development of self-directed learning as well as collaboration among peers, i.e., building a community of learners. At the same time, the instructor reported the tool helped her to both orchestrate the AL pedagogy and manage individual student learning.

Sixteenth Conference on Education and Training in Optics and Photonics: ETOP 2021,
edited by A. Danner, A. Poulin-Girard, N. Wong, Proc. of SPIE Vol. 12297, 1229709
 · doi: 10.1117/12.2635510

### Case study 2: Social annotation using Perusall

The second case study was a collaborative sense-making activity using the social annotation platform Perusall. The activity involved peers giving and receiving feedback to their public annotations of readings and problem sets uploaded weekly by the instructor. This activity made use of the tool's ability to make visible the self-regulatory processes questioning oneself and relating new ideas to prior knowledge, both actions that are associated with deep learning [4]. The context of this case was different from the others in that the course usually has a small cohort of about 15 students instead of the typical 35 - 40. The instructor, then, used the activity and this tool to encourage students to work collaboratively as a single group, the methods refined iteratively over the course of three DBR cycles. Results show that as the instructor progressively positioned students as the central participants — what he called a "hang-back" approach — the more students engaged with each other, taking up the practice of asking one another for feedback on their annotations. This collaborative and collective form of participation, made visible by the tool, facilitated the instructor's orchestration of his lessons, allowing him to see where students could not resolve the conflict in their understandings and where he needed to intervene.

### Case study 3: Error detection tasks using myDALITE

Case study 3 was the most extensive of our case studies. It included several DBR cycles and a quasi-experiment with a treatment and comparison group. The activity was designed into the myDALITE platform [5], which has affordances for promoting students' self-explanation, reflection and improvement, asynchronously. The activity was centered around giving feedback to a fictional peer on answers or problem solutions that contained errors, i.e., *error detection* questions; an earlier iteration of this research was described previously [6]. Results show that students engaged in this activity provided more correct and complete physics explanations in their feedback to peers than those in a control group. In addition, the activity and myDALITE facilitated the instructor's orchestration of the flipped classroom approach by providing him with more detailed feedback on students' understanding.

### Discussion

Each case study designed a different activity in which peer feedback was positioned as the central task. Each activity benefited from several iterations of DBR, with each cycle increasing the probability that students would engage more deeply and, in two instances (case studies 1 and 2), more collaboratively. Those latter cases showed that their activities benefit from the tools' affordance to make student thinking public. Along with the repeated nature of the activity, this appears to have encouraged the development of a classroom culture that valued learning together as a community. Meanwhile, case studies 1 and 3 showed that scaffolds — including rubrics, worked examples and prompts — may be essential to getting students to think more deeply about the process of using feedback, both in its giving and its uptake. Lastly, each platform's affordance for making students' thinking visible and tractable facilitated the instructor's efforts to orchestrate their implementation of active learning pedagogies, respectively.

### References


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