Designing A Collaborative Problem-Solving Activity to Prepare Students for Flipped Classroom

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ABSTRACT: Despite flipped classroom's potential positive influence on students' learning experiences, lack of student pre-class preparation has been a widely reported issue. To address this issue, we have designed a collaborative problem-solving activity to promote students' pre-class online engagement and to get them better prepared for flipped classroom learning. With this approach, students are motivated to engage actively with online learning materials, and instructor and/or tutors are enabled to provide timely support to students before class. Experiments have been conducted to verify the effectiveness of the activities, with results showing that student engagement in the experimental group was strikingly higher than in the control groups.

Keywords: Flipped Classroom, Collaborative Problem-Solving, Student Engagement.

1 INTRODUCTION

The flipped classroom (FC) approach has received remarkable consideration in higher education during the past few years. By moving didactic learning materials online and distributing them before class, FC allows face-to-face (F2F) class time for interactive learning activities. This instructional approach has been proven to positively influence students' learning performance. Nevertheless, students' poor preparation before class has been a major challenge in this area, and such inadequate preparation has a negative influence on students' in-class performance and overall learning outcomes. To resolve this issue, a collaborative problem-solving activity is proposed to better engage students in pre-class learning. This activity is student-centered, teacher-facilitated, and data-informed, with great potential to be generalized in flipped classroom learning.

2 ACTIVITY OVERVIEW

The collaborative problem-solving activity consists of 4 stages of implementation as depicted in Figure 1. The following elaborates on the teaching team's detailed execution in each stage:

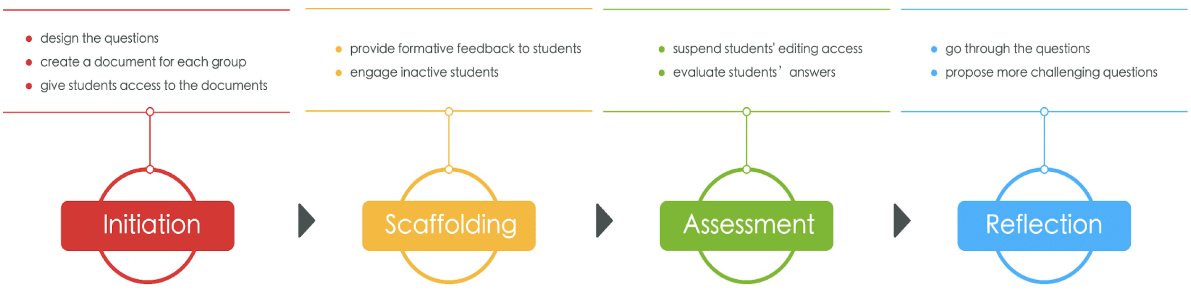

Figure 1: The workflow of the proposed collaborative problem-solving activity

- **Initiation:** designing high cognitive demand open-ended questions for students' collaborative problem-solving. The questions are distributed via an online collaborative editing tool (Google Docs in this study), which serves as a group learning space for students to discuss, comment on and construct responses.

- **Scaffolding:** providing support and feedback to student groups to facilitate their collaboration. Referencing each individual's editing records stored in Google Docs, instructor and/or tutors would perform two types of real-time interventions: 1)formative feedback to students' collective response to the open-ended questions; and 2)reminders to inactive students who are not engaged in group work.

- **Assessment:** assessing students' contribution, collaboration, and cognitive performance with reference to their responses and editing records.

- **Reflection:** resolving common issues among student groups to facilitate students' reflection, which can be followed by more challenging questions for knowledge consolidation.

3 EXPERIMENT AND RESULTS

We conducted experiments in an undergraduate General Education course that was conducted in a fully-flipped format with 123 students to verify the effectiveness of the proposed activity. In this course, students are required to watch a series of online lecture videos before attending the F2F class activities. Students from the third cohort is the experimental group, whom were assigned the collaborative problem-solving task before each F2F class. Students from the first two cohorts without such requirement serve as control groups. Their online engagement data was collected, and the video access rate data is displayed in Figure 2. In the heatmap, each row represents a student and each cell stands for the student's lecture video access rate (number of videos accessed divided by the total number of videos in the topic). The higher a student's video access rate is, the darker the corresponding cell is. As can been seen from the figure, students in the experimental group had higher online engagement level compared with the control groups.

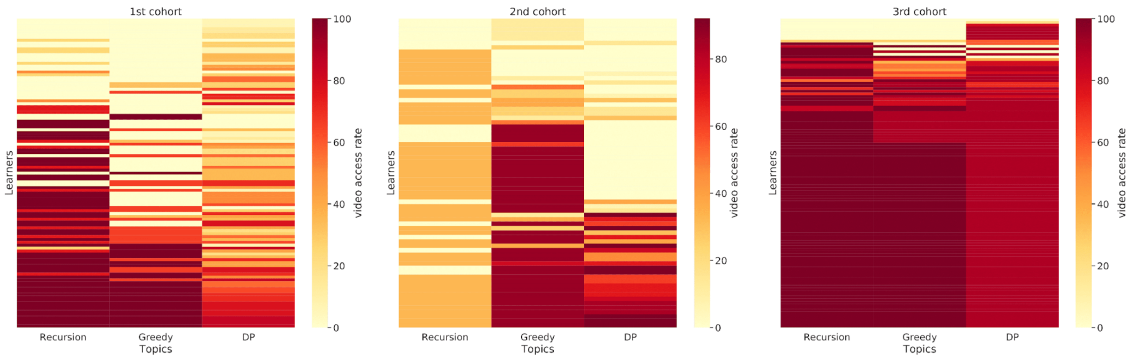

Figure 2: The heatmap of video access rate

REFERENCES

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