

# Go GRASP: A Mobile Application to Facilitate Orchestration in Active Learning Classrooms

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**Abstract:** Dillenbourg-lanterns are *classroom augmentation* tools that help instructors orchestrate group-sessions. Instructors get ambient feedback on groups: ahead/behind class (Lantern color), need help (flashing Lantern), waiting longest (flash rate). Groups can use ambient feedback to determine which group is ahead and could help. We describe the design-based research development of an application called GRASP (Group Response Ambient Student Participation) that converts student's mobile devices into Lanterns. Data collected in GRASP could deepen our understanding of orchestration.

## Introduction

Student-centered active learning is an instructional model that was shown to be more effective than teacher-centered didactic teaching (Freeman et al., 2014; Meltzer & Thornton, 2012). However, active learning presents challenges that can prohibit widespread adoption. In teacher-centered classrooms, instructors control what will happen in 10, 20 or 30 minutes. In student-centered classrooms, instructors must respond to students' needs in a manner that is difficult, if not impossible, to plan. Different groups can have simultaneous needs. This places an orchestration load, on the instructor who must simultaneously respond to different groups (Dillenbourg, 2013; Roschelle, Dimitriadis, & Hoppe, 2013; Sharples, 2013). To reduce orchestration loads on instructors, Dillenbourg created the Lantern (Dillenbourg & Jermann, 2010; Dillenbourg et al., 2011). Lanterns help instructors manage group problem sessions by shining a specific color for each assigned question. A group shows it finished a question by changing lantern's color (each question being assigned a color). To call the instructor, students make the lantern flash, the flash rate increasing as wait time increases. Instructors thus get ambient feedback on which groups are: 1- ahead or lagging behind, 2- need help, 3- have been waiting longest. Groups can use ambient feedback to determine which other group is ahead and could help them. Furthermore, students no longer devote time to calling the instructor, so groups will often spontaneously solve their issue before the instructor arrives. We describe a design-based research development of an application called GRASP that uses student's mobile devices as Lanterns. A clickable prototype (<https://marvelapp.com/fehiid>) and preliminary functional version are available ([www.gograsp.org](http://www.gograsp.org)).

## Description of GRASP: Instructor view

GRASP differs in interesting ways from the original lantern. Foremost, Lanterns are assigned to groups. Each student with a mobile device has a GRASP Lantern. Only instructors need to create a profile (requires only name, institution and email). Instructors create a new session or retrieve data previously collected in GRASP (Figure 1a). New sessions require specifying the title, number of questions and sub-questions (Figure 1b). When a session is initiated, the screen of students' devices lights up, as lanterns do, and follow similar behavior (color changes with new questions, flashes to call the instructor).



Figure 1a. Create session.

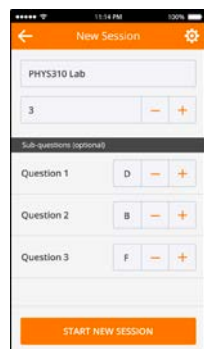


Figure 1b. New session.

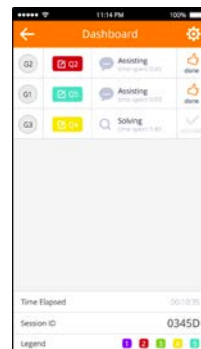


Figure 1c. Ongoing session.

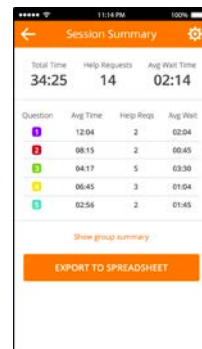


Figure 1d. Summary data.

In GRASP instructors have a dashboard that shows what each group is doing, prioritizes help requests for earlier questions and shows wait times (Figure 1c). After an instructor ends a session, a session summary providing all relevant information is displayed and can be exported (in csv format) to the instructor's email (Figure 1d).

## Description of GRASP: Student view

Our application was designed to be as simple and light as possible with minimal configuration. Instructors need not upload class lists. Hence, students can login using their name or an alias (Figure 2a). All that is required for a student to login is a name/alias and the session ID associated to the session their instructor created (see Figure 1c, session ID = 0345D). Students then join a group that has group members they recognize, or create a new group (Figure 2b). Once in a group, the screen of the mobile device stays on and shines a uniform color associated to the first question (Figure 2c). Should a student in the group decide to ask a question or pass to the next question, other members of the group receive a notice of a motion to change questions or request help. Another group member must approve the motion. This prevents individual students from moving forward without their peers or from requesting help from the instructor when someone else within the group can assist.

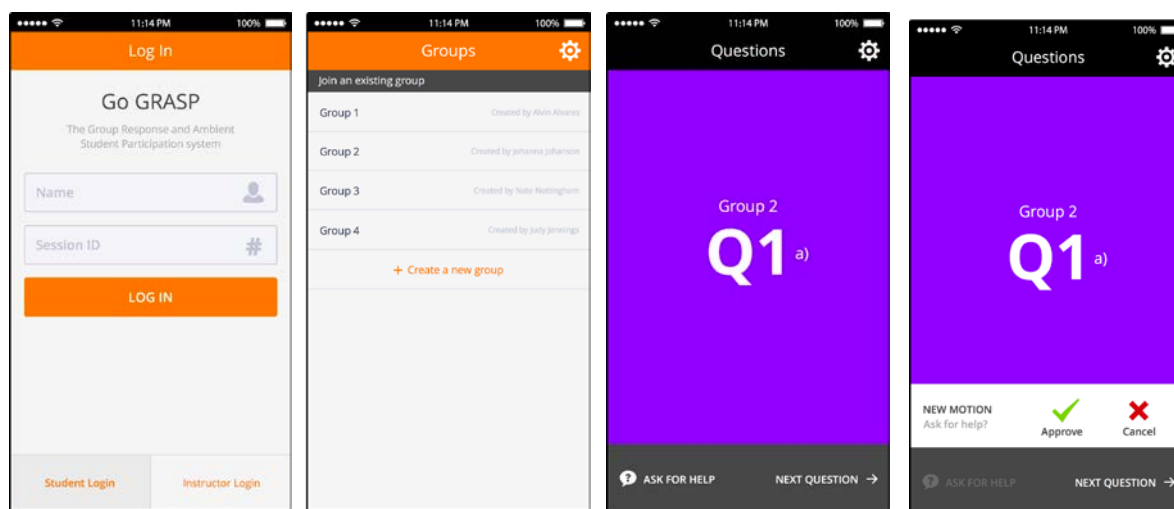


Figure 2a. Login screen. Figure 2b. Group selection. Figure 2c. Question. Figure 2d. Approval of motion.

Given that all data collected in GRASP can be stored and analyzed at a later date, our application provides more granular data. The designs presented here are first iterations of our design-based research project. We built the tool around orchestration load theory and are proceeding to implement its use in active and non-active learning classrooms. This should provide data that will reshape the design of the tool and potentially inform current theoretical frameworks on orchestration theory.

## References

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