On the Importance of Spatial Configuration of Displayed Information

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Abstract

The spatial layout of information influences collaborative interactions. We compared two awareness tools which give information on the status of participants in a collaborative work, one displaying it on a single screen and the other distributing it in the room.

Keywords

Ubiquitous computing, collaborative learning

ACM Classification Keywords

H5.m. Information interfaces and presentation: Miscellaneous.

Introduction

We developed two awareness tools tailored for recitation sections (i.e. when students work on their assignments in small teams with the help of teaching assistants). The first tool, called *Lantern*, is a small lamp that uses color, brightness and blinking frequency to convey the status of one team: which exercise the team is working on, whether they called for help, and since when. Each team has a Lantern placed on its table. The other tool, called *Shelf*, uses the same visuals elements and displays the status of all teams on a single screen, which is visible to everyone.

This paper focuses on the interaction between teams and compares our awareness tools in that term. First, we define two concepts. We say that two teams *Interplay* if one's progress affects the other's. A *Cluster* is a set of teams, such that every team in a Cluster Interplays with at least another team in that Cluster. We observed 18 actual recitation sections and analyzed teams' interactions in three different conditions: (1) no awareness tool is used, (2) Shelf is used (3) Lantern is used.

Observations

In genuine situations, the only means of Interplay is verbal communication. In a class with 20-30 students, 3-5 clusters are distinguishable. Our awareness tools add two other ways of Interplay: (1) knowing that how much the other teams have progressed may cause competition between teams (2) knowing that a team found a solution that another team is trying to find promotes collaboration. The significance of each of these new ways of Interplay varies depending on the tool. **With Shelf, a remarkable level of competition emerges throughout the classroom, such that the progress of one team affects the performance of the other teams, and the whole class becomes one Cluster.** This competition is explained by the fact that juxtaposing teams' statuses on the screen makes an implicit connection between teams' performances which automatically inspires competition. **In contrast, Lantern keeps the shape of clustering, and promotes collaboration inside Clusters.** The collocation of each Lantern with its user makes it be perceived as an augmentation of the team's characteristic. On the other hand, the more students know about each other the more they collaborate.

Tools

Both tools use the same visual grammar: (1) *Color:* each color corresponds to one exercise, (2) *Intensity of color:* indicates the time that has been spent on the current exercise, (3) *Blinking:* indicates a call for help, (4) *Blinking frequency:* the faster the rate of blinking the longer the time since help request.

Lantern: consists of five pairs of LEDs installed on a stub-shaped PCB and covered by a blurry plastic cylinder, a microprocessor to control the LEDs, and a USB port to download the logged data. Users turn the Lantern to choose the exercise they are working on and press it to call for help.

Shelf: uses one wide screen as output and infrared remote controls as input interface. Colored bars labeled with letters referring to the teams simulate Lanterns.

figure 1: Lantern (up), Shelf (down)