Orchestrating Handhelds in the Classroom with SRI's ClassSync™

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ABSTRACT

In our interactive experience, we address the problem of a teacher or other leader managing the use of electronic communication devices by their students. We have embedded the control elements into the physical class structure itself so that the teacher may control the interactive system by moving about the classroom and interacting with the devices therein. We have shifted control from a teacher-controlled display in a static location to a teacher's dynamic control that is interactive with items spatially distributed in the room. Our demonstration shows how this orchestration can be accomplished with low-cost infrared communications as opposed to more expensive radio-based solutions.

Keywords
Handhelds, design, wireless networking, classroom workflow

INTRODUCTION

In the next few years, advances in handheld computing, and wireless networks will enable portable 1:1 classroom computing with ubiquitous networking. Even more so than with desktop computers, technology employing Wireless Internet Learning Devices (WILD) enable individual learners to participate in synchronous collaborative learning experiences. However, this technology will undoubtedly shift the role of the classroom teacher. Whereas in traditional lecture classes the teacher is often characterized as the "sage-on-the-stage" and in modern CSCL contexts as the "guide-by-the-side," a new metaphor is needed to capture the role of the teacher in a WILD classroom.

WILD classrooms will demand that teachers manage real-time performance of classroom activities. Management tasks include (a) distributing and collecting work, (b) enabling students to collaborate in groups, (c) monitoring real-time progress with respect to learning objectives, and (d) controlling cheating, note-passing, and other disruptive communications. All of this must be accomplished without overburdening the teacher, compromising the already limited handheld battery life, or pushing the cost out of the reach of the educational market.

In our demonstration, we explore a new metaphor where the teacher is a "conductor" or "orchestrator" of classroom performances involving their students. The teacher attends primarily to group performance, not to each individual student. Moreover, the teacher, like the conductor, has responsibility for choosing and sequencing the material to be performed (the curricular activities), interpreting the performance, and guiding it toward its desired end. As in rehearsal, the conductor might direct groups of students to practice something alone, or in small groups. During performance, the teacher will work to ensure that all parts are "heard," that everyone gives their best performance—directing attention towards the students who need the most encouragement while keeping the overall performance moving forward. Moreover, like a conductor, the teacher will want to monitor individual participation to ensure that all the students are productively contributing to the classroom performance.

CLASSSYNC

We have drawn on SRI's expertise in mobile ad hoc networks, handheld devices, security, learning sciences, and educational technology research and development to assemble a suite of technologies collectively known as ClassSync™. ClassSync makes it possible, for the first time, for teachers to orchestrate the flows of work and conversation among wireless classroom participants in a manner that transparently maps onto how teachers routinely manage classroom work and conversation flow.

Teachers interact with ClassSync at a high level by creating groups and assigning activities to them. ClassSync automates the details of creating a group by notifying students that they now belong to a group, by making resources available to the group, and enabling resource sharing and messaging. ClassSync automates the details of activity assignment, assigns roles to members, and transitions to the next activity when the activity completes.

As a sample ClassSync-enabled application, we have created, for the Palm PDA, a version of the classic Gopher client and enhanced it with text and image editing as well as revising the protocol for infrared beaming. We use this sample application to illustrate the key ideas of our system. The Palm-based ClassSync also demonstrates how orchestration can be accomplished with low-cost infrared communications as opposed to more expensive radio-based solutions (e.g. Airport or IEEE 802.11b.)

ABOUT THE INTERACTIVE EXPERIENCE

The objective of the interactive experience is to give participants a hands-on sense of what it would be like to be a teacher or student in a WILD classroom. Participants will each be given a Palm device and asked to take part in a role playing activity. One will be selected as the teacher and the rest will assume the role of students. The activity will involve the following 5 phases:

1. Introduction Phase

The goal is to introduce basics of Palm operation including turning on and off, choosing menus and applications, and using the pop-up keyboard, and introduce the beaming concept by creating a business card and beaming it to a neighbor.

2. Take Attendance Phase

The goal is to introduce the notion of beaming points, illustrate switching beaming point configurations on the fly, illustrate a take-attendance capability, insure all participants have Gopher installed with appropriate contract, familiarize the participants with Gopher basics, and illustrate the concept of contracts

3. Preparing Teams Phase

The goal is to introduce the process of posting documents with the Gopher application, introduce the notion of share pair contracts, show basic typical operations involved for a teacher to form a new group, and introduce differentiated beaming points and how their configuration can be switched on the fly.

4. Collaboration Phase

The goal is to illustrate the use of beaming in a collaborative activity, and demonstrate the fun side collaboration and illustrate how it can be controlled.

5. Quiz Phase

The goal is to illustrate the mass distribution of contracts, illustrate the element of 'consideration', and show how the system can dynamically limit access.

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