Experiences Designing an Extensible Platform for Classroom Interaction Modeled on Local Culture

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ABSTRACT

Mischief is a low-cost, scalable technology whereby a standard mouse is given to each student, each connected to a single shared display is used at the front of the classroom. This paper describes the experiences deploying and training holding training sessions for Mischief in several countries. This includes design considerations to help foster a sustainable userbase as well as experiences creating a support network. The work concludes with a discussion of interesting avenues for future research.

Categories and Subject Descriptors

H.5.2: Information interfaces and presentation: User Interfaces.

General Terms

Human Factors.

Keywords

ICTD, education, classroom, single-display groupware, Mischief.

1. INTRODUCTION

Mischief [5] is a teaching system designed to support classroom-wide interactions with a remote or collocated instructor. It enables all students in the classroom to interact simultaneously with a large shared display by placing a wired or wireless mouse on each student's desk (see Figure 1). Each student, male or female, has equal amount of input into classroom activities.

On-screen, various interactive learning activities are displayed in succession as controlled by the instructor. The activities can vary widely in nature, in effect creating a platform for in-class technology use in classrooms that once needed a computer per child to apply the benefits of technology to their pedagogy.

The process of designing Mischief is highly iterative and user-centered. A summary of this process of presented including takeaways that can inform future researchers of such classrooms.

Figure 1. Using mice, a classroom full of students interacts with the shared system while sitting at their desks.

2. DESIGNING FOR SUSTAINABILITY

The relatively common and inexpensive nature of the hardware required by Mischief makes it a good candidate for developing regions. However, in these areas, low quality components can become a headache. Power is also a potential issue, as the mice must be connected to hubs that have external power and sometimes these classrooms have low quality outlets. Further, some low-quality hubs do not have AC power adapters.

Enabling local content creation, for us, meant leveraging existing teacher knowledge: PowerPoint. The Mischief system reads PowerPoint files modified to describe interactive components, in effect building on an existing practice. For example, an instructor can add a map of India to a slide and, using a PowerPoint add-in GUI, add metadata to the image to allow students to draw on or drag it. In this way, activities can vary widely and instructors can build off of one another using templates or slides copied from different decks.

By not requiring the teachers to learn a new metaphor or content development system, we conjecture we sped up our adoption rate significantly. Teachers were able to immediately create content that was readable by the Mischief system. Giving teachers examples of appropriate PowerPoint files was important because it is a medium that grows by using the content of others.

3. TEACHER TRAINING & SUPPORT

We held six training sessions that varied in duration from two hours to two days and in size from one to 75 participants. In these sessions, teachers were shown the system then able to use it to create content, administer sample classes, and act as students.

The most important concern of ours was to enroll teachers in our endeavor, set expectations, and make them part of our guerilla research team. To this end, we explicitly said we considered them

part of our team and to expect bugs during this process – but a high payoff when your ideas are incorporated into the application. In some countries more than others, enrolling the local government in the training and deployment sessions is extremely important as teachers are government employees and their endorsement was very important. As always, transparency was maintained, making sure all parties involved understood this was a research project and we are learning as we progress.

We strive to supply teachers with local language training material that is visual in nature yet is small size to make downloading from our US-based server as quick as possible.

As Kam suggested in [4], we attempted to recruit locals who had a vested interest in the project as facilitators. The best cases for training sessions occurred when we had trained a facilitator a priori who translated our researcher's instructions in real time, as opposed to the facilitator learning and translating during the training session. This meant the facilitator could anticipate difficulties teachers would have understanding the material given local classroom culture and address them without our researcher being aware.

The best method of distributing material (documents, software, media, etc.) was by USB drive rather than network. Viruses abound in these environments so it's important to safeguard data.

3.1 Building a Support Network
We anticipated the problem of teachers feeling 'stranded' when back at their schools with no support. We took a couple steps to address this and are in the process of determining its success.

First, we found a local facilitator or 'champion' in each country. Ideally, this person is a teacher who knows the needs of her peers and is technologically savvy enough to address some basic questions of her peers. She can always email our researchers.

Second, we developed a website [7] with a relatively easy-to-remember address that could serve as a portal. We used an open-source content management system that supports plug-ins. The reason for this is to eventually support multi-lingual content, but the dynamic nature of the content precludes translation. The content is presented in primarily text-form with some photos in a small-size format for efficient downloading.

The portal has a discussion forum that supports local language. However, we saw one group of local teachers move their discussion from the portal to a local social networking site. We attribute this to: 1) speed of connection being faster for the local site, 2) language, 3) leveraging existing user profiles, and 4) the idea was suggested by a local 'champion' teacher.

Figure 2. An example of a training session for teachers.

3.2 Updates and Upgrades
Due to the highly iterative nature of the Mischief research project, we plan to upload revisions to the site frequently. This poses a problem for the users because updating their copies is not completely trivial. It behooves researchers to ensure they have an easy upgrade scheme.

4. FUTURE WORK
The next steps of this research will use the software platform as a test-bed for both interface design and social psychology research in education. For the former, many questions must be answered about affordances for widgets that have multiple simultaneous users, text entry, and locus of control on-screen.

From a social-psychological perspective, there are many interesting questions about how to influence learning using this metaphor and how groups form and effectively function. How do the on-screen groups relate to the existing groups in class? What role does the students' identity play in their avatar on screen? We plan to use research on learning, psychology, and pedagogy to address research questions given the unique nature of the Mischief design: the participants are in physical and virtual groups simultaneously. The potential for new activities that take advantage of both contexts is also a possibility.

5. ACKNOWLEDGMENTS

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