

Practices and technologies for collaborative informal learning in Remote Schools

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Abstract— Project CULT aims to create a cooperation platform (hardware/software/practices) for the benefit of schools that reside in remote (rural, islands) areas. For this purpose, we are employing both established and novel interaction and communication technologies. Moreover, we are working closely with schools and teachers, in order to leverage their ability to adopt and adapt technologies in ways that are suitable for their skills and needs. In particular, we have shaped our understanding about remote schools by means of an extended cultural probes study, which was administered during the first part of the research. Then, we have established a series of local workshops that involved teachers in the adoption and adaptation of novel technologies in ways that are suitable for them. Moreover, we have developed and evaluated novel user interfaces for interactive whiteboards that facilitate collaborative learning, as well as a video assisted distance learning system.

Keywords—school; technology; education; informal; video; ubiquitous,

I. MOTIVATION

In contrast to higher education, primary and secondary education establishments should remain distributed, in order to maintain a balance of urban and rural life in the developing and the developed world. In rural communities, schools are usually sparsely populated, there are only few educators (who might not stay there for more than a couple of years), and students might be disadvantaged in terms of communication and cultural exchange opportunities. All over the world, there is a significant number of rural school establishments that are very remote, especially in the case of primary and secondary education. Rural schools are distributed in several villages that are at a significant distance from an urban center, and sometimes very difficult to access on a regular basis. As a matter of fact, students' social skills lack encouragement, and their learning abilities are not challenged, due to the limited cultural diversity and sociability of their geographical setting. Several research programs have focused on cultural exchange actions within educational settings (e.g. Comenius, eTwinning) and have offered the respective web-based ICT tools. Nevertheless, previous research has focused mostly on technology without much regard to the practices of students and teachers and most notably has assumed that learning, communication, and collaboration takes place in a lab with desktop computers.

II. METHODS AND FINDINGS

Project CULT has emphasized the particular needs and everyday practices of remote learning communities, and it has considered human-computer interaction beyond the desktop computer. In particular, we have produced the results outlined in the next paragraphs, which are also thoroughly documented in the respective publications.

In the beginning, we proposed a broad conceptual framework [1, 2] that outlines the motivation, the system architecture, the user interface modalities, and the practices of education, as found in related work. The conceptual model of the system builds upon the familiarity and usability of television. Just like traditional broadcast TV the screens of the system remain always-on and broadcast the same audiovisual content across linked schools, thus creating a shared experience.

During the user requirements collection, we shaped our understanding about remote schools by means of an extended cultural probes study [3, 4]. Cultural probes have emerged as an effective user requirements capturing toolset for sensitive environments, such as domestic and educational settings. Previous efforts with cultural probes have been done on a small scale with no more than 20 users and have mostly considered urban environments. In contrast, we have collected cultural probes from more than ten remote schools and involved more than 100 students and teachers. We have found that some of the original analog probes might be already outdated in the face of contemporary digital tools and technologies, even in places that have remained greatly unaffected by modern life.

Then, we have established a series of local workshops (schoolit10, schoolit11) that involved teachers in the adoption and adaptation of novel technologies in ways that are suitable for them [5, 6, 7]. Notably, we video recorded the lecture and discussion sessions and we made the videos available online, in order to benefit anyone who could not make it to the actual event.

Afterwards, we conducted a series of experiments in order to evaluate several learning media in different contexts. In particular we seek to investigate the benefits of interactive whiteboard [8] and serious games [9] capabilities in school context. In addition to the school context we tried to understand the social media effect in children behavior [10, 11] and the perspectives of portable technologies in an outdoor informal learning context [12, 13].

Moreover, we have developed and evaluated novel user interfaces for interactive whiteboards that facilitate collaborative activities. We presented an updated set of experimental tasks and measures for large multi-touch (MT) input devices [14, 15, 16]. In addition to a multi-user condition, we have employed an updated set of representative user tasks, as well as subjective measures for user enjoyment. In the two-user condition, we found that performance and enjoyment was always higher than the single-user conditions, regardless of input device and task. Thus, interactive surfaces (whiteboards and tabletops) should emphasize collaborative applications.

In addition, we developed a video assisted distance learning system and we proposed a technique for improving the navigation of how-to and lecture videos on the web. Previous research in user-based techniques has assumed an extra effort from the users, such as video replies, comments, tags, and annotations. The SocialSkip system improves sense making of web videos by visualizing the simplest form of user interactions with video, such as pause, and seek [17, 18]. We suggest that if the users are actively seeking for information within a video (e.g., lecture, how-to), then the user activity graph could be associated with the semantics of the video. In this way, lecture videos are augmented with a dynamic table of contents that could be personalized to learner profiles.

Most notably, we collaborated with Microsoft Research on the evaluation of the VideoPal tool, which connects distant students with asynchronous video messages [19, 20]. Pen-pal programs for connecting students from around the world through letter writing have been popular for generations. However, traditional technologies have several limitations in supporting pen-pal activities. In this study, we explored the potential of video-based asynchronous messaging in supporting the development of children's cross-cultural friendships. The results from that work highlight the important benefits video provides compared to its text counterpart -email.

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