Exploring video-based interactions around digital public displays to foster curiosity about science in schools

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ABSTRACT

In this poster, we describe our initial steps towards understanding how digital public displays in schools can be utilized in order to foster students' curiosity towards scientific topics. More specifically, this present work is part of an on-going research project (JuxtaLearn) that aims at provoking students' curiosity in science and technology through creative filmmaking and editing activities. In order to explore the design space concerning digital public displays for schools' contexts we conducted some initial workshops with science teachers in order to elicit their sensitivities towards possible features and interaction techniques, as well as to inquire about expectations and technology adoption.

Categories and Subject Descriptors

H.5.2 [**User Interfaces**]: User-centered design

General Terms

Design, Human Factors

Keywords

Digital public displays; participatory design; technology-enhanced learning; digital videos

1. INTRODUCTION

Fostering students' reflections on their own learning is an important approach in conceptual understanding. Allowing students to find motivating videos on important scientific topics may help learning by encouraging reflections on that content. Furthermore, recent research has identified that video editing can enhance the reflective process [6]. The success of video sharing platforms has led to a growth in online video and multimedia repositories for educational purposes (Khan Academy, iTunes U, WatchKnowLearn, TED).

This present work is part of an EU-funded FP7 research project, called JuxtaLearn[1], that aims to explore these recent trends to foster learners understanding of STEM (Science, Technology, Engineering, and Mathematics) topics. The idea is to identify "threshold concepts" and facilitate learners' understanding by allowing them to create explanatory videos and be able to share them.

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[1] http://www.juxtalearn.eu

We view digital displays as an important technology for many types of ubiquitous computing scenarios since it can provide a simple and effective way to bring digital information into our public spaces. Furthermore, providing interactivity in digital displays can be used to foster user-generated pervasive content back to the virtual world. Hence, within JuxtaLearn, we set ourselves the goal to explore how can digital displays be used to promote curiosity around STEM topics by enabling a set of interactive features around the sharing of videos in schools. However, designing digital technologies for schools needs a detailed understanding of contextual factors that will influence their adoption and actual use. In order to gain valuable knowledge regarding this complex weave of factors, we have been running hands-on workshops to engage with science teachers from secondary schools. These workshops enabled us to elicit teachers' expectations towards the technology and explore possible features that can fit our main purpose. In the remaining of the paper, we will briefly present some initial research questions, the methodology followed and some preliminary results arising from the workshops.

2. BACKGROUND

The latest developments in information and communication technologies (ICT) are changing the ways in which people communicate, collaborate, and learn. Learning has, with the widespread use and adoption of portable devices and high-speed Internet connectivity, become ubiquitous [3]. Furthermore, "digital competence" and practices such as "social networking" are today seen as central skills that citizens of the 21st century should have [7]. Recent studies, however, have shown that most of the innovations related to the use of ICT in schools have not impacted on pedagogical issues or school development [8]. [4] points to the fact that there is a shift in our sense of the spaces and contexts in which education takes place, as different learning activities are becoming more commonly distributed across a variety of contexts. The latest highlights a fundamental belief within JuxtaLearn that learners' creations can leverage learning between the personal and social as well as between different spaces and places in which learning takes place.

As referred above, public digital displays can be an important enabling technology for many types of ubiquitous computing scenarios for learning. Digital public situated displays have the potential to become a point of focal attention in public spaces and promote relevant shared experiences between the people. However, the type of interactivity that will be needed to allow situated displays to perform that role is clearly a challenge. Interaction support has been one of the most active areas in public displays research. There are now many interaction alternatives, with some studies focusing on schools contexts [2, 1, 5] but there are still not many specific interaction models for learning purposes.

3. INITIAL RESEARCH QUESTIONS

In order to explore the design space of digital public displays for schools framed by the particular goals related to the JuxtaLearn project, we have formulated the following initial research questions:

- How do teachers see the potential of these artifacts? Are they willing to promote their adoption among their colleagues?
- What particular interactive features do they think suit the school context?
- What concerns do they think we should take into account when designing the systems?

4. PARTICIPATORY DESIGN APPROACH

Our initial explorations involved a participatory design approach where we invited nine teachers (from three local secondary schools) to take part on a set of two design workshops, each of which was planned to last two hours. These design workshops were intended to give us some insights into the initial questions considered but also to be able to start managing expectations and engage with the teachers in a partnership that would facilitate the deployment and testing of prototypes in their schools. Hence, we considered important to foster ownership from the teachers regarding the design solutions to be presented. Three workshops are planned and the first two of them already occurred[2]:

First workshop goals and activities: (a) explain the goals of JuxtaLearn; (b) explain the goals of using digital public displays to encourage further exploration of the content and facilitate the creation of groups of interest; (c) run a hands-on activity where the teachers are invited to express their understanding of the potential of the technologies under consideration and their expectations regarding the project; and (d) hand out a questionnaire that inquires about the envisioned uses of such system within the school and possible expectations regarding outcomes of its usage.

Second workshop goals and activities: (a) involve the teachers in further refining of their ideas regarding the digital public displays; (b) small groups of teachers will create "paper prototypes" of digital displays; (c) the same groups will create a scenario based on the paper prototypes they developed, followed by a brief period of presentation and discussion of the prototypes and scenarios created; (d) hand out a questionnaire that inquires about the workshop activities and possible changes regarding the envisioned uses of such a system within the school.

5. PRELIMINARY RESULTS

The data collected in the two first workshops in the scope of three months in spring 2013 include: (a) notes from the conversations taken by the researchers present at the workshop; (b) the scenarios and paper prototypes developed; and (c) the answers to the questionnaires given. A preliminary analysis of the data allows us to consider:

- The teachers are receptive to the introduction of the digital displays and seem motivated to engage themselves in the activities, including the creation of videos to be shown.
- The features that the teachers envisioned can be further expanded in order to introduce two-way interactivities - displaying content and engaging students in the active

participation of sharing, commenting, taking ownership etc.
- Some concerns regarding the control of the content to be displayed put emphasis on the need to develop control mechanisms that take into consideration specific school organizational issues. In other words, the system needs to be flexible so that some degree of customization (depending on the school) is in place.

These results are encouraging because they show that the teachers share our views about digital public displays and can envision ways to foster curiosity about science topics.

6. NEXT RESEARCH STEPS

The next obvious step is to create a first high-fidelity prototype based on the requirements and specifications elicited in the first two workshops. This prototype will be implemented using web-based technologies. Then we will run a third workshop with the following goals and activities: (a) present the prototype; (b) small groups of teachers will be asked to discuss the design (highlighting the pros and cons they envision), comment to what extent this prototype corresponds to their initial ideas, and create a scenario based on one of the functionalities presented; (c) presentation and discussion of the scenarios created. This third workshop will encourage teachers' adoption, prepare the ground for the actual deployment of the prototype and enable us to run a long-term study that will focus on adoption and preferences. We view this as a highly iterative process and the first deployment will be followed by further refinements of the design and further similar long-term studies.

7. ACKNOWLEDGMENTS

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[2]Videos from the workshops: http://vimeo.com/58178273 and http://vimeo.com/59896640.