Mobile Notes: Mobile Devices in Creative Discussions

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Introduction

The trendy notion of "mobile learning" has different connotations: On the one hand, it can be understood as "learning on the move" – often referred to as "learning any time anywhere". Of course this interpretation relies on specific kinds of technological enabling, but the definition aims at the general setting of learning activities. Particularly, it includes informal learning settings (cf. [1]). A second interpretation sees mobile learning somewhat more pragmatically as learning with mobile devices. This may include formal learning in the classroom. Here, mobile devices may enable a one-to-one orchestration with learning devices (one device per learner, cf. [2]).

This workshop contribution clearly bases on the second view in that it explores the use of mobile devices in classrooms. The one-to-one assumption (see above) raises a couple of questions which need more exploration. Among these are the questions of ownership (*who owns the personal device – the institution or the student?*) and homogeneity (*will one device be used throughout different subject matters?*).

In this context, we explore device heterogeneity even in one specific setting. This setting includes personal mobile devices (PDAs) as well as a publicly visible interactive screen connected to a PC. Similar mixed device scenarios involving tablet PCs and bigger interactive screens have been studied by Liu and Kao [3].

Based on the findings of Liu and Kao, we believe that, as a next step, dedicated classroom scenarios with heterogeneous devices should be designed and orchestrated. Here, "dedicated" means an orientation towards specific types of learning activities in which different types of devices would be integrated based on different functional assignments. Evidently, the functional assignments should reflect the specific strengths and potential complementarities of the different devices. E.g., following Liu and Kao [3], public interactive displays complement the lack of shared visual focus with smaller personal devices.

In our own previous work, we have explored extending collaborative visual modelling tools to PDAs [4]. In one "light weight" version, we used PDAs to graphically annotate models without replicating the functionality (or "operational semantics") of the modelling environment on the PDAs. The fully fledged modelling environment would run on a PC and would be shown on a large interactive display. On the PDA, an area of the visual modelling space could be selected and annotated using and hand writing and drawing. These annotations were directly transferred to the public display. This type of interoperability could be characterised as synchronous bitmap sharing with graphical annotation. But this usage scenario also suffers from a problem of shared visual focus, due to the necessary switching between the PDA view and the public view. It is also somewhat clumsy to adjust the viewing area on the PDA. This environment decreases the problem of switching focus from the PDA to a shared display area, since here the PDA is only used as an input device; upcoming discussions are still conducted with the help of a large, shared display.

In this contribution, we focus on an application in which the function of PDAs is more limited but more focussed: The PDAs are used as as input devices in a quasi-synchronous mode. The usage scenario is a face-to-face brainstorming discussion in which contributions are prepared on the participants' PDAs. When a contribution (either text based or a hand written sketch) is completed, it is sent to a database from which it can be retrieved and transferred to the public

display application. The transfer of a contribution to a public display is done either instantaneous (synchronous) or it can be selectively controlled by a discussion moderator, in which case the transmission would be delayed and asynchronously. All public discussions would only refer to the public display area.

Mobile Notes

Building on the conceptual background described in the previous section, we designed and implemented an application to support classroom discussions with mobile devices and electronic whiteboards similar to what has been presented in [5] and [6].
The environment - we called it "Mobile Notes" – is based on FreeStyler [7] and Cool Modes [8][9], two applications that have been developed at the University Duisburg-Essen. These applications support interactive and collaborative modelling with heterogeneous semantics (e.g., Petri Nets and concept maps) in computer supported classroom scenarios.
Mobile Notes' main functionality is to use PDAs to write short textual contributions, to draw sketches or to participate in a vote and submit these products to a central server in order to display and arrange them on an electronic whiteboard and to initiate further discussions and collaboration.
Mobile Notes' main components are:

- A computer running FreeStyler with the Mobile Notes plug-in (the server).
- Mobile devices acting as input clients.
- A database as communication interface between the clients and the server.
- An interactive whiteboard used as the common output device for all the clients. This board is based on the FreeStyler application.

Figure 1 shows a typical arrangement of these components.
Following the concept of functional assignments (see above), the mobile devices is designed *not* to copy or emulate what is shown on the screen. Being aware of the limitations as small screens and the lack of conventional input devices as full size keyboards, our approach was to develop a custom interface that enables an easy interaction between user and system.

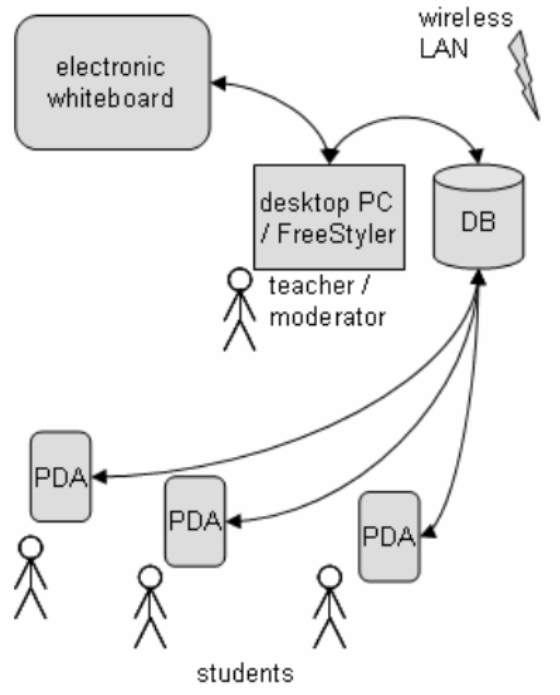

Figure 1. Typical arrangement of Mobile Notes' components

Typical use cases for this architecture are e.g. teacher presentations with comments from the audience, brainstorming scenarions with participants freely collecting ideas and comments or test questions, that are prepared by a teacher / moderator that have to be answered by students. Figure 2 and Figure 3 show a handwritten annotation in the PDA and its representation in FreeStyler and a typical FreeStyler workspace during a Mobile Notes session. This screenshot originates from a recent usage of Mobile Notes during the "Big Issues in Mobile Learning Workshop" in Nottingham, UK, in June 2006.

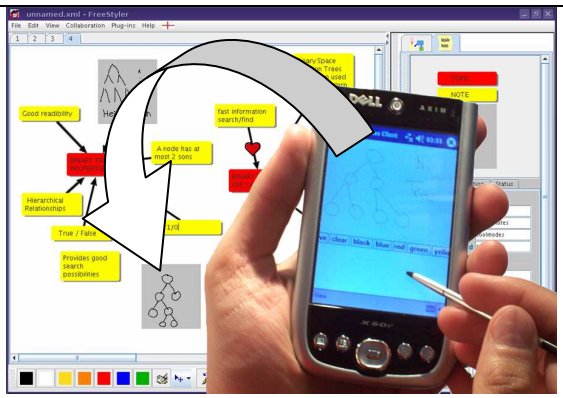

Figure 2. Creating handwritten notes and sketches for use in FreeStyler

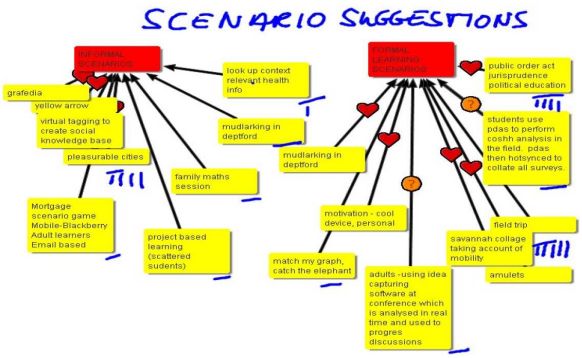

Figure 3. Screenshot of a Mobile Notes workspace

System Demo

The envisioned system demo consists of an interactive and productive discussion between the workshop participants while using the hardware and software described above. Figure 4 shows a situation simular to what is planned for the system demo.

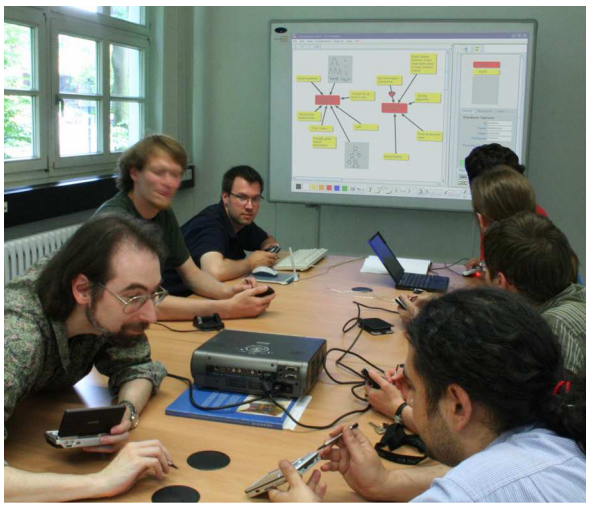

Figure 4. Using Mobile Notes in a discussion.

For this purpose, we will bring several (5-7) PDAs and a laptop to the workshop. Participants will be able to use the PDAs in a moderated discussion as input devices. The laptop will be used by the moderator to run a discussion support application (FreeStyler). We will need a video projection to be connected to the moderator's notebook.

Additionally, we will need an open wireless network. If a wireless network is not available, we could bring our own access point.

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