The Use of Mobile Computing to Support SMS Dialogues and Classroom Discussions in a Literature Course

Lars Bollen, Sabrina Eimler, H. Ulrich Hoppe
University of Duisburg-Essen, Germany
Faculty of Engineering
Institute for Computer Science and Interactive Systems
{bollen, hoppe}@collide.info

Abstract
In this paper we present a communication and discussion toolkit based on sending short messages designed for use in schools. This toolkit is the result of a student’s project at the University of Duisburg–Essen in collaboration with a local secondary school. Our approach uses PDAs in a wireless network to build an environment which emulates sending of short messages with mobile phones. The messages created by the students are collected in a database and establish a base for a discussion and analysis later on using Cool Modes, a graph based modelling and discussion system.

1: Introduction
The most common type of mobile and wireless devices is probably remote controls and mobile phones. Mobile phones have even created a new style or “culture” of communication through SMS messaging, particularly among young user communities [1]. This is an interesting phenomenon, also from an educational point of view, which is itself a potential subject of technology-supported learning. Inspired by the original idea of a secondary school teacher, we have designed a technical platform and framework which facilitates communicative classroom experience and reflective analysis around SMS messaging in school classrooms. The system design and development has been conducted in a project seminar with university students of Applied Media and Communication Sciences.

Modern cellular phones integrate more and more of the functionality of portable computing devices such as PDAs. They combine these functions with ready-to-hand communication services. Accordingly, mobile phones have been considered to be used instead of other networked computational devices for learning purposes (cf., e.g., [2], [3]). In our project, we are taking the inverse direction: We use PDAs to emulate SMS messaging and to support reflective and constructive learning processes based on these communications. A formal reason for not using mobile phones directly is due to current restrictions for using mobile phones in schools and classrooms. A methodological advantage lies in the potential of opening up the emulated SMS communication for detailed transcription and analysis.

Based on these premises, our concrete scenario consists of a set of PDAs which are connected through a WLAN. The PDAs can be assigned predefined user profiles or identities which have a special meaning a prepared role play context for the lesson. All messages are stored in a database and labelled with the profile ID’s of sender and receiver, the role play context or frame, time and duration.

2: Initial situation and requirements
Our COLLIDE research group participates in the European research project SEED (http://ilios.cti.gr/seed/) which aims at developing new forms of integrating interactive media in everyday classroom activities with and for teachers. The target group for innovation is predominantly the teachers and not in first place learners. The new ingredients are, e.g., ubiquitous computing technologies including pen-based interfaces as well as new net-based collaboration technologies [4]. Associated with the SEED project, we are working with a group of teachers who are willing and interested to take an active role in designing and implementing this kind of innovation in their classrooms. In some cases, the teachers have provided original stimuli from their subject specific needs which were then “orchestrated” with adequate educational technology.

The specific development reported here is based on such a suggestion by a teacher of German language and literature. The original idea was to contrast the reading and interpretation of the classical Werther letters (J. W. von Goethe) with related experience in SMS-based communication. Concretely, the teacher asked for a
possibility to send short messages to each other with the help of mobile devices. These messages should be collected in a database and be presented later on in a discussion scenario in which it is possible to discuss about and with SMS.

An envisaged task for the students would be to think of a situation in which they fell in love with somebody and want to tell it to a friend. The students will have to imagine a “real” situation and consider what to write. Another task could be comparing letters from Goethes novel (essentially a love story) with today’s SMS and thereby discover typical characteristics of SMS and how communication and language changed over the centuries and by the influence of media. Another possibility of using this framework in class is to give creative tasks, for instance to ask the students to prepare a SMS poem.

During these tasks, the students will be divided into different groups that are located in different rooms so they cannot see each other in order to create a situation that is as close to reality as possible. They will be given specific roles that they are asked to identify with so they are given opportunity to abstract from their own characters and feel free to say what they want.

These tasks should help the students to find out about the use and special characteristics of SMS themselves.

These special features are for instance a restriction of characters that forces the “author” to bring a maximum of information in a minimum amount of data, the use of so-called emoticons to transmit personal and emotional aspects into the message (also for a better understanding) and reductions. Also typical for SMS are ellipsis and a special kind of writing such as writing every beginning of a word in capital letters without using blanks between the words in order to save space.

The following list gives a brief summary of the teacher’s demandings:

- Find suitable mobile devices for communication in the classroom.
- Realize sending and receiving SMS-like messages with these devices.
- Make it possible to work with different “roles” on the same devices.
- All SMSs written and sent shall be collected in a database to be analysed later on.
- Integrate a discussion tool in this scenario.

The teacher endues a well equipped computer integrated classroom in her school. This classroom is provided with several hexagonally formed desks with integrated computers and a projected, large scale display for the teacher’s computer (see figure 1).

In recent years, this teacher already made students communicate over small notes using pen and paper. Now, knowing that students are very cooperative and enthusiastic in using and exploring new media, we picked up this idea and transferred it into a computer-enriched environment.

3: Implementation

In this chapter we will describe the hardware we used and the software we implemented to meet the demands from chapter 2.

This involves
- PDAs,
- a wireless network,
- a database server,
- software on the PDAs to simulate a mobile phone,
- software on a notebook to administrate the PDAs and view the collected messages,
- a purpose-built palette for Cool Modes (see chapter 4).

Figure 1: A Computer Integrated Classroom (CiC)

3.1: Why using PDAs?

When going into the realization phase of this project, we had to choose what kind of mobile device to use. Certainly, the use of real mobile phones was the most obvious option. But for several reasons, we chose PDAs as an alternative to mobile phones.

First of all, in most German schools the use of mobile phones is prohibited – especially during the lessons.

The next issue to consider are the costs of sending SMS with real mobile phones using the public telephone network. Each SMS sent would have caused costs charged to the kid’s account.

As already stated in the introduction, one of the most serious reasons not to use mobile phones but PDAs has
been the necessity to have access to, to monitor and to analyse the messages. These options were essential to fit the requirements mentioned in chapter 2, but they cannot be achieved easily by using mobile phones.

Another point is the flexibility of a PDA – considering soft- and hardware equipment. On a PDA you can choose between several operating systems, programming language environments and PCMCIA cards. This makes a PDA much more valuable in many different scenarios than a real mobile phone (even if it is Java-programmable).

Considering size and appearance, the most mobile phone-like device is a PDA. When using a PDA combined with a wireless network, you can simulate SMS communication quite easy while having full access to all data exchanged.

3.2: Sending SMS with PDAs

Since PDAs lack functionalities of sending short messages among each other (and storing them in a database), we needed to develop some software ourselves. For this reason, we implemented a Java application with a graphical user interface that comes very close to the user interface of a real mobile phone (see figure 2). The user simply writes a short message just like on a mobile phone. To make the mimicry as complete as possible, we also emulated and integrated T9-functionality (automatic word recognition).

After typing the desired message the user simply has to choose a number from the “telephone book”, in which all other available PDAs are registered and listed and the message will be sent to the specified receiver.

Technically speaking, the iPaq puts the message with all relevant information (sender identification, receiver identification, time stamp, scenario information etc.) via wireless LAN into a MySQL-database which is running e.g. on the teachers notebook.

All other running iPaqs (in our scenario up to a maximum of six) query the database each minute for new messages. Potentially new messages are downloaded automatically and the receiving device will inform its owner accordingly. This type of architecture with a central data repository used for communication between different devices is akin to a blackboard architecture [5] and is chosen for several reasons: on the one side due to the heterogeneity of devices and platforms used it is easier to communicate indirectly through a central data storage, such as a database, than a direct communication would be, where all components would have to use a uniform protocol.

3.3: Administrative aspects

To have a first look on the SMS sent by the learners and to organize and to administrate the PDAs and the roles which are assigned to the learners, we also implemented an administration tool that is supposed to run on the teacher’s notebook. In this tool you can define roles, add descriptions of these roles and associate them with specific PDAs.

The left side of Figure 3 shows the part of our architecture dealing with the PDA-to-PDA communication. The dashed lines symbolize wireless LAN connections; the direction of the arrows shows the flow of data. In this diagram, the software simulating the mobile phones is supposed to run on the PDAs and the administration tool is supposed to run on the database server.

Since all applications are written in Java, you can replace the PDAs by any type of device with networking and Java functionalities. So – instead of using PDAs and a wireless LAN, you can use a mixture of wireless and cable connections and mobile computers as well as desktop computers to have our applications running, which makes our architecture even more flexible and usable with the hardware available in the environment.

Figure 2: Writing a short message on a PDA

4: Integration in Cool Modes
Cool Modes (COllaborative Open Learning and MODElling System) is a framework designed to support discussions, collaborative work and cooperative modelling processes. [6]

In Cool Modes, you can mix different types of languages or representations, ranging from free-hand drawings over concept maps to semantically defined modelling languages (Petri Nets, System Dynamics), in one workspace by using so called “palettes”, which provide necessary objects for the specific visual languages. These different languages, also called reference frames [7], can easily be “plugged” into Cool Modes.

Additional semantics and functionalities like the connectivity to a database as it is needed in this project can be implemented by implementing a plug-in designed for this special purpose – the Cool Modes framework itself remains untouched.

Thus it is very advantageous to use Cool Modes as a starting point for discussion support as demanded in chapter 1 – relevant reference frames for supporting discussion are already available. Further more, the local teacher already knew Cool Modes from other projects and usages in her lessons.

4.2: Retrieval of messages

In order to analyse the communication processes and the messages themselves, it would be very helpful to have access to the messages sent by the learners from within a tool supporting discussions like Cool Modes.

For this purpose, a special “SMS-palette” has been created. This palette connects to the database mentioned above and displays available messages. The messages can be sorted by sender, receiver, time, scenario etc. After selecting the desired messages, the user can create a bunch of cards containing these messages in the active workspace with a few clicks.

With this feature, it is very easy to obtain all messages from a specific dialogue between learners and to create according text cards in a workspace. So you can easily view, arrange and work with collected SMS in Cool Modes.

Thereby, these message cards can now establish a base for further discussions in Cool Modes with short messages and about short messages.

4.3: Discussion Support and Collaboration

As stated in many other papers, discussions can be viewed as an integral part of learning. Methods like “self explanation”, critical inquiry or scientific argumentation are important strategies to share knowledge with others or to construct new knowledge.

Similar to other approaches like Belvedere [8] or the CardBoard [9] environment, Cool Modes supports discussions by offering elements like text cards and different types of edges to visualize the flow and results of a discussion.
Figure 4 shows a screenshot of an ongoing discussion in Cool Modes. Several palettes have been used: the ShortMessagePalette, the DiscussionPalette and the HandwritingPalette. You can see text cards on the left which have been created by using the database connectivity. The discussion text cards and edges have been created in the discussion that followed the creation of the message text cards. Additionally, some elements are highlighted by handwritten elements.

Several students and the teacher worked collaboratively in a shared workspace when discussing about these messages. This shared workspace environment with synchronized objects is realized by a MatchMaker TNG server [10], which provides an environment for building working groups of students in a very flexible way by allowing joining and leaving a session at any time for any student or teacher. Thus, it is possible to work at specific tasks collaboratively and to share the results with others.

Figure 3 shows some technical aspects of the Cool Modes / MatchMaker architecture on the right side. The symbols used follow the same semantics as stated in chapter 3.3

5: Conclusion and Outlook

In this future, a situation like this is imaginable: In a seminar at the university the professor initiates a discussion. He uses Cool Modes to support the discussion and asks the students to bring in their opinions. Some of the students use their own notebooks or a tablet PCs with Cool Modes running and a wireless LAN connection to add text cards directly into the shared workspace which is projected onto the wall. If -- for some reason -- our software is not running, even a simple browser can be used to create messages. Students without a notebook can produce input by sending a SMS with their mobile phone or by sending a message with a PDA. All the students’ contributions appear in the same shared workspace and are part of the discussion.

6: References


