

Mobile Phones in the Classroom

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Abstract. *In the work herein introductorily presented we explored the use of mobile phones as tools in educational processes. In particular the usage of such devices in the classroom is discussed. The basic driving idea of this work is that today practically everybody, including children, has and uses mobile phones, which are in fact small computers. The possibility of being programmed offers a new functionality. Bluetooth technology allows collaborative activities to be performed by a whole group or even classroom. The mobile phones can be used as responders giving the immediate feedback to the teacher. They can also be used as multiple remote controls that could be employed to control interactive computer simulations, including in group activities. Besides these positive opportunities the dark side of usage of these popular devices in the classroom is also discussed.*

Keywords. Mobile Devices, Classroom Collaboration.

1. Introduction

The period from 2000 to 2010 is known as a “digital decade” which will be followed by the period of pervasive computing. One of the characteristics of these times is the increasing use of mobile devices, mostly phones which have more and more functionalities. They are in fact small computers with limited capabilities.



Figure 1. Mobile devices in the classroom

It is known that we can create and install small programs written in a restricted version of Java. Such programs are called MIDlets. They are usually developed on regular PC computers and copied to the mobile devices by wired or wireless connection. Considering the paradigm of mobile computing the question is raised how this technology can be used in the regular educational processes. In particular how the teaching and learning in the classroom can be affected.

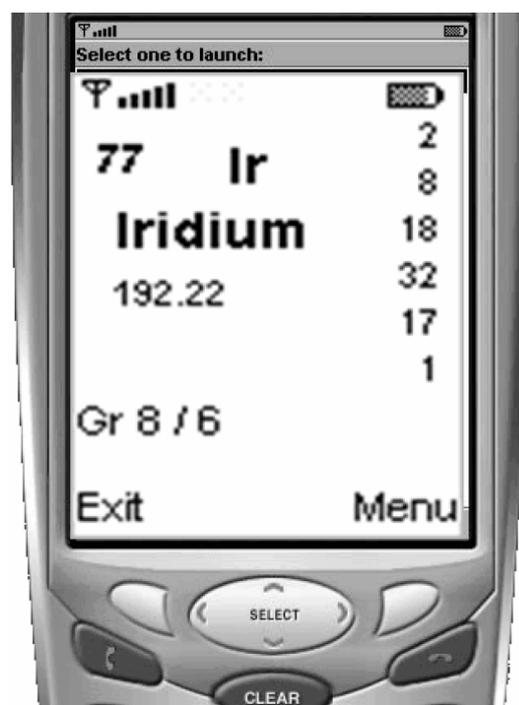


Figure 2. Periodic table on mobile phone

2. Sample educational applications for mobile phones

It is more known that mobile phones have extended functions like games and Internet browsing. There exist also some other applications which could be used also in education. For example we can have implemented vocabularies translating from one language to another. Of course the calculator can be useful in the classroom and assignment

works. More focused and problem specific educational applications are for the moment not so popular. In the domain of chemistry we can find some MIDlets presenting the periodic table of elements. Figure 2 shows a screenshot of such application.

Mobile devices could be used for the visualization of learning objects dedicated to natural sciences. Such example is the presentation of human digestive system on a phone display as shown in figure 3.



Figure 3. Visualisation of human digestive system on mobile phone

Looking a variety of educational applets which are available on Internet it would be interesting to have also simple simulators which could represent various physical phenomena. However at least for the moment we should take into account limited computational and graphical capabilities of mobile phones. But this will certainly change in the future.

3. Collaborative applications

For collaborative applications some kind of wireless interconnection between mobile devices in the classroom should be exploited. We should discard the usual communication capabilities with SMS or even dial up connections since the students (and also the teachers) are not willing to spend their private money for such activities.

More and more phones are supporting Bluetooth technology which permits cost free intercommunication between devices and their applications. An example of such application could be a system providing immediate feedback between the teacher and his students in the classroom. Such systems are known as "responders". Supposing that all learners own mobile phones with Bluetooth they can establish connection with teacher's computer which can act as a server. The teacher can open an electronic questionnaire which can be controlled by student's phones. Teacher's computer display is shown to the audience on a large screen. The students can answer to the presented question by means of their mobile phones connected to the computer via Bluetooth. Such system is presented of figure 4. Figure 5 presents the software modules on both sides.

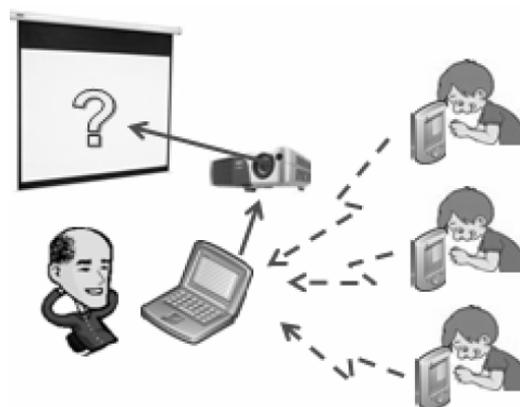


Figure 4. Electronic answering system

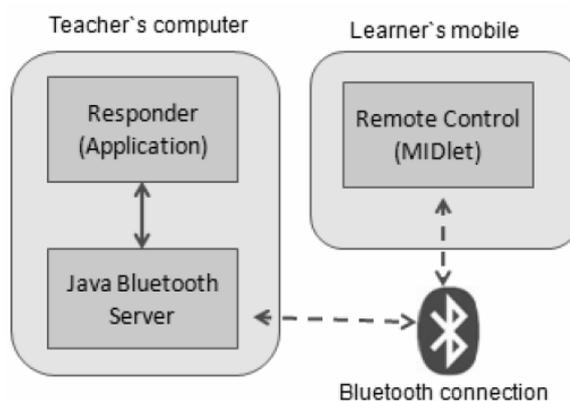


Figure 5. Software modules of electronic answering system

In such a way the teacher could get immediate (on-line) answer if his lecture is appropriate or too difficult. Or he could put more specific questions and see if the students really

understand the subject. The typical characteristic of such answering system is that it is anonymous and therefore the individual students are not afraid sending their feedback. Of course such electronic answering systems are already known for many years but usually they require (expensive) equipment and software support. In the case of mobile phones the required "infrastructure" is already present, the Bluetooth communication represents no cost and it is sufficient to have the needed open source software supporting this.

4. Digital simulations and interactive collaboration

The wireless interaction between a teacher's computer and student's mobile devices (phones or computers) can be also exploited in the case of simulation programs which should be adapted accordingly. This is possible in the case of open source programs where interaction with the simulation should be enriched with commands received by the accompanying server program. Such possibility was tested with some java applications and applets. One example of such adapted program is JTics which permits simulation of electric circuits. The figure 6 presents a screenshot of this program.

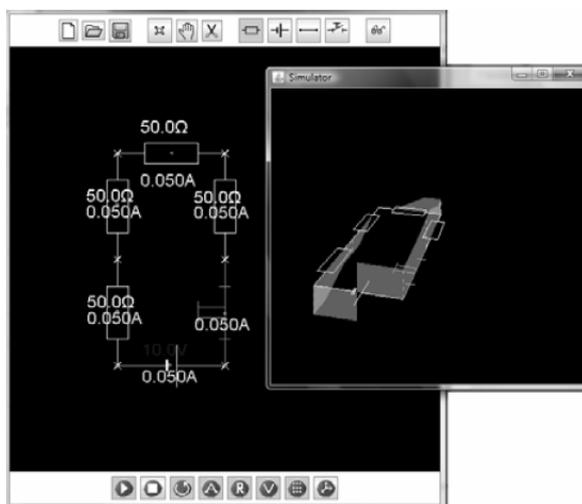


Figure 6. Simulator of electronic circuits

6. Dark side of mobile devices in the classroom

The use of mobile devices in the classroom raises also some problems. One already known from computer equipped classrooms is of course that the children could be distracted by games

and internet browsing. Another which is more related to the mobile devices is that they can establish their "private" *ad hoc* networks which could be easily *exploited* during written examinations. Since the mobile devices are getting smaller and smaller it is really difficult to suppress such undesirable communications. On long term the only possible solution is to influence on the moral character of the involved participants.

5. Conclusions

The use of mobile devices in the classroom offers new teaching opportunities. As personal equipment they could enable students to independently experiment and explore concepts as they are taught. As communication devices they allow the establishment of *ad hoc* communities useful during lectures and group hands-on activities. On the other side this will certainly represent a problem, in particular during written examinations, to be overcome by appealing and raising students moral standards in this matter.

6. References

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