Postprint

This is the accepted version of a paper presented at *EUNIS, Umeå, 2014, 11-13 June*.

Citation for the original published paper:

Emergent Technologies in Higher Education: Google Glass and Telepresence Robots.
In: *Supporting Teaching and Learning in the Digital Age*

N.B. When citing this work, cite the original published paper.

Permanent link to this version:
http://urn.kb.se/resolve?urn=urn:nbn:se:umu:diva-109113
EMERGENT TECHNOLOGIES IN HIGHER EDUCATION -
GOOGLE GLASS AND TELEPRESENCE ROBOTS

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Keywords
Technologies, Teaching, Learning, Higher Education, Empirical Study

1. SUMMARY
In this paper, we demonstrate the use of new emergent technology in higher education. We present two examples, first, Google Glass in dental education, secondly, telepresence robots for communication among teachers and students across spaces. With both of the cases, we want to illustrate how technology can be adopted for education when a re-design of teaching and learning takes place. Moreover, the two empirical cases show that we need to radical think through our established concepts of ICT-enhanced, technology-enhanced learning ways from course-based learning into learning expeditions.

2. INTRODUCTION
The use of ICT, hard- and software programs, is increasing more and more and doesn’t stop in the front of our classrooms. Technological concepts turn into our ordinary daily life. The new devices are small, flexible and portable, and moreover, our “friends” can also appear in different kinds of cyborgs. There is no need any longer, to think of a separate and optional virtual world to make short visits by login-procedures. “We are probably the last generation to make any difference between online an offline” (Luciano, 2007). Computing is really becoming wearable with Google Glass and with personal telepresence robots and avatars representing remote people and can become agents in our near physical environments. What implications do this have, especially for teaching and learning?

3. GOOGLE GLASS
Google Glass belongs to the category of wearable technology and is a head-mounted, voice-controlled device that the user wears like a pair of glasses. Through the prism on the right side (eye) graphical supported information is projected, so-called augmented reality, for such things the user currently observes. In other words, the person sees the real world and in addition some further information. For instance, the users see a street and the name of the street will be shown in Google Glass. It is also possible to take pictures, video filming, send messages, make phone calls, take notes, read and reply to emails, search for information and conduct video calls etc., all with voice commands. One advantage is that you command it with the voice and have the hands available for other things. The device is meant to delivery additional information just-in-time for the user. It is not possible, for example, to browse for old emails.

We started to integrate Google Glass as a device in dentistry program at Umeå University in Sweden. In particular, we focused on those activities where dentist students have their clinical practice with the patients. In this project, we are exploring how Google Glass may facilitate the communication between the students and their teacher during the student’s clinical practices with the patient. 18 dentist students and one university teacher participated in the project. Data for the study has been
collected through observations, video recordings where the students are reflecting on their experience. Interviews were held with the teacher.

- **Before Google Glass.** The dentist students had patients in a booth. When a student needed help from the teacher, they wrote the number of the booth on a white board where they are located with their patient so the teacher would know, looking at the white board, that a student needed help with something.

- **With Google Glass.** The dentist students have patients in a booth. The students use mobile devices (e.g., media tablets, iPads) and the teacher uses Google Glass to communicate with each other. The students send emails or a Google Hangout message to the teacher. The teacher gets a notification through a sound, while wearing Google Glass. The teacher then able to read the message through Google Glass and reply to the student by a voice message.

During this project, both students and the teacher expressed that the communication between students and the teacher has been better facilitated through the integration of mobile devices and Google Glass. The students expressed that it feels good not to leave the patient alone when they need help from the teacher. They also mentioned that they get help faster than before and specifically they get in contact with the teacher faster since the teacher is able to reply to the students messages directly from Google Glass regardless of where in the clinic the teacher is. From the teachers reply via Google Glass, the students know when they can expect help, for example, soon or if they have to wait for a while and meanwhile can go on doing something else.

The teacher in this study pointed out that it is possible to prioritize which student need help first due to the content of the messages sent via the mobile device to Google Glass. Before, when only the booth number was written on the white board and not what kind of help the student needed, it was not possible for the teacher to make a priority. The teacher also said that when helping a student it is possible to know if there are another student waiting for help or at least want to be in contact with the teacher since a notification of a sound is given when a message is sent.

Even if both students and teacher express that communication is faster and facilitated there are some challenges occurring. First, sometimes when a student has sent a message to the teacher it takes longer than expected for the massage to arrive to Google Glass. That could make the students feel insecure if the teacher has got the message or not. Therefore, it is important that the teacher reply to the student when the message has arrived. Secondly, both the mobile device and Google Glass is in great need of a wireless network that is working properly. When the signal is fluctuating the messages sometimes are not coming through.

### 4. Telepresence Robots

Three telepresence robots in pilot testing and educational research on Umeå University main campus in Sweden during 2013/2014 have been presented and showcased. The first is a roaming robot (the Double) the second is a seminar robot (the Kubi). Both use media tablets, such as iPads. The smallest and cheapest is a seminar robot that uses Iphones (the Galileo) and has some interesting other functionality. Experiences of use in educational situations and more generally on campus will be presented and discussed at EUNIS 2014. The experiences of persons on another location attending by robot presence in an ordinary face-to-face meeting are exemplified as well as the social experience of having a robot in an ordinary seminar or meeting. This emergent technology cuts through many earlier separate discourses as videconference, webinars, Skype conversations and virtual reality, but carries many limitations and problems as well, such as fear for surveillance, the development of humans into cyborgs and unclear understanding and use of identities. The philosophical and practical implications of personal proxy embodiment, access to other bodies at other locations for remote interaction, are reflected upon and discussed with the help of new ontological discourses in information science.

As we believe that present products are only to be seen as prototypes for coming more streamlined technology, ideas for future uses are discussed in interaction with participants using an audience response system. A provocative concept for an integrated use in a larger scale on campus is presented in draft and discussed, with its limitations as proportionalities between different
embodiment types. The January 2014 issue of ELI:s series “7 things you should have known about” is about telepresence robotics.

5. DISCUSSIONS

It is too early too sketch first lessons learned. We just started with using the emergent technologies in different contexts and settings. Although, we already see some challenges and problems, we also see the advantages with such technology and that they can have a huge impact on re-imagining and re-designing higher education.

- Wearable technology and tele-presence robots are in great need of wireless networks in order to work properly (infrastructure).
- Teachers should be able to reply on the use of technology that it really works or that they at least have access to quick support so that they can design their teaching with technology. Otherwise there is a risk that teacher do not choose to use technology because of lack of support.
- It takes some time of practicing using new types of technology that a person is not used to (for example using voice command on Google glass). That can be perceived as time consuming in the beginning and there is a risk that old routines seems to be easier to stuck to even if the teacher is experiencing the benefits of wearable and remote-controlled technology.
- A teacher needs to have a clear purpose for the technology, what it will support or facilitate in an activity when designing the teaching activity. The add-on of a technology needs a clear benefit within a teaching and/or learning activity.
- One must be prepared to that bringing IT and new forms of technology into known work processes often generates the need to change old routines and/or adapt the work processes to new ways of working, teaching and learning in higher education.
- A teacher needs to be flexible and have different solutions when problems occur; teachers become jongleurs of different design elements - didactical and technical solutions.

6. REFERENCES


7. AUTHORS’ BIOGRAPHIES

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