

A new agenda for research on higher education and information technology

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Abstract. There is a need for a more timely agenda for research on teaching and learning, and the use information technology in higher education. It is here claimed that many of the prior research issues within this area are obsolete. Information technology infrastructure previously provided solely by the institutions of higher education is now successively replaced by the students own technology which they bring to the educational context. The new agenda should orient towards (i) integration of students own technology in educational activities, and integration between on and of campus learning activities (ii) tools for supporting activities in classrooms such as presenting, visualizing and simulating, and (iii) issues of availability to participate in alternative ways, making educational activities available to new groups. The suggested agenda is discussed using a number of anecdotes collected in various educational settings.

Introduction

This paper suggests an alternative agenda for research on learning and IT. The reason why some issues within research on IT and learning are outdated is changes that have taken place outside of the educational system, and the drivers of these changes are not educational initiatives. Previously IT in higher education has been controlled by teachers, emphasizing issues concerning IT as a tool in education and on learning to use computers in educational situations. When IT becomes omnipresent and everyday we have to focus how the conditions for the university, for teaching, and for being a student is reformulated. How students learn, take part in educational activities, as well as relate to educational institutions is have changed fundamentally with the introduction of IT.

The formation of research communities around this topic have taken place within a context where computers, networks, various input and output devices, were relatively uncommon. This in turn means that many of the learners using the technology as well as the teachers involved in the activities where using new and unfamiliar technology. Newness might be a positive aspect – using new things might be fun and exciting, in particular to students. In the same time teachers are more often reluctant to adapting their current methods for teaching: “It remains easier for academics within higher education to follow accepted practices than to carve out new paths (Roberts, 2005).” (Jones & Gregor, 2006)

Knowledge about, ability to manipulate technology and also introducing it into new settings is also a display of power, of who have the authority to induce change within this setting. When educators, or design researchers introduce new technologies intended to support learning they have the power of defining how the technology is to be involved in the learning activities, often they (or we) have ideas of how good and bad use might look, as well as how technology is properly handled. This have framed the view of technology when defining such fields as Computer Aided Instruction (CAI), Intelligent Tutoring Systems (ITS), Asynchronous Learning Networks (ALN), Computer Supported Collaborative Learning (CSCL), to mention just a few. All these communities have in common that they have started formulating their problems in a setting where technology was something that they could bring to the learners. However, this has changed dramatically during the past years.

One might also, with all right, argue that the research perspectives presented here is treated as somewhat isolated related to other changes in how we understand and research on learning and teaching. Of course there have been changes in how we understand students’ learning, teaching methods, other support than IT, etc. It can also be argued that these changes are part of the same thing, i.e. methods evolve as technologies change, at the same time as we understand learning in new ways. The classroom cannot be digitalized without changes in teaching, and learning. The methods affect how IT might be involved.

And respectively how we understand learning affect how we might involve different methods and IT in our teaching (if we are teachers) or learning (when we are students) (Leidner & Jarvenpaa, 1995). It is also the fact that the arguments and observations are made from a scandinavian standpoint. This means that the penetration of computers, laptop and stationary, as well as mobile digital devices (such as phones, MP3-players, PDAs, etc.) are fairly widespread among university students.

It is also important to mention that IT is somewhat blackboxed in this paper. Students use of IT relates to how they take part on the web, how computers allow them to engage in communication in new ways, how calculations and production are allowed by different software, the actual hardware that this is brought into use when doing this, and even more. On a general level we define IT as technology used to create, store and share information, such as computers, databases and infrastructures, emphasizing the abilities for engaging in communicative activities. We will not go further into trying to frame what IT means here, simply because it is not necessary for this paper.

The focus in this paper is learning within the context of higher education, i.e. within universities and colleges. The observations made takes place within educational activities within the subjects of pedagogy, social science, design, and topics related to IT such as programming.

The motivation for the paper is the observation of a number of changes in what technology might be, and might be used for, and the effects and possible effects that this might have on higher education. In short these changes have meda different kinds of computers omnipresent and networked in many higher education settings, with or without the liking of educators. Students have, and are expected to have access to computers. In the university and in the home they are and are expected to be able to connect to the Internet. They are also expected to be able to use their computers in a competent way – at least relative to being a student. This is the main change. However this is also complemented with much of the computer evolution moving from being professionally driven to being driven by consumers' everyday use. As we see in hardware development, social networking applications, visualizations and simulations in the gaming market, etc.

In this paper we will present a view how research agendas for IT and learning have been and are formulated, after this we discuss the proposed change in IT involvement in the university students learning activities. This is followed by a number of anecdotal observations of how this change is received and adress by teachers and students. Finally we suggest some alternative directions for development of educational practices, as well as research on learning and IT.

A perspective on previous research on learning and IT

Research on IT and learning within higher education have been preoccupied with if and how IT might influence learning in a positive way. In Leidner and Jarvenpaa's (1995) influential paper they start out by motivating their research by the possible benefits of IT as part of education, and how schools have incorporated and involved IT in their educational activities. The paper emphasizes the importance of employing an idea of how learning takes place in pedagogical activities. In research taking the individual's perspective, the context for learning has largely been ignored, and the main efforts have been on finding cause-effect relationships between IT and "new" knowledge (Alavi & Leidner, 2001). Many studies over-emphasize how, and if, IT influence learning, rather than seeing IT as just one aspect of the context for learning.

In the 1960's the first computers with microprocessors were developed, opening up for ideas and experiments with personal computers, computers that had more possibilities for storing, sharing and accessing data, that were so cheap that we would be able to have one in our homes, at our offices, or even in the classrooms. In the 1970's, computers came to revolutionize how production as well as administration was conducted, efficiency and effectiveness being key words. This inspired developments in the educational world and the first attempts at automating teaching was made in the USA and Europe. This approach demanded a perspective on learning as something that could be automated, a view of learning as depending on predefined stimuli, i.e. learning as the result of proper teaching. The teaching machines described by, for example, Skinner (1968), were based on such a behaviorist understanding of learning. Specific knowledge was expected to be obtained by repeatedly exposing the learner to the certain correct stimulus. This instrumental idea of training (Computer Aided Instruction) is one of the main areas in the field of IT supported learning (for a brief overview see Koschmann, 1996). The idea that a computer could deliver personally adapted instruction to a student or a worker at the time, pace and place of their choice is naturally very appealing to the industry of education, and we still see numerous applications of these same ideas in CD-rom and online based courses. These applications are generally based on two steps: learners are presented with information in various ways, and then tested to see to what degree they are able to repeat the information in multiple-choice tests. This approach has been criticized for being based on an outdated understanding of learning, as well as for not using the computers to produce anything other than traditional textbook education, re-packaged with multimedia and some interactivity (Fischer & Scharff, 1998).

CSCL explores learning as part of collaborative activities involving computers. Here the focus is not as much on evaluating different collaborative activities or technologies, rather to understand how meaning is collectively created (e.g. Koschmann, 1996; Stahl, 2003; Lipponen, 2002). However the involved

technology is still defined as instructional. And in the vast majority of the papers presented at the CSCL conferences, papers are still focusing the involvement of technology in collaborative activities in school settings as a way to positively influence students learning.

Within the ALN community the task was defined as to (in 1997) support anytime/anywhere interaction with teachers and peers, adapting learning to individual pace and suitable time (Hiltz & Benbunan-Fich, 1997).

In these fields IT is often described as a possibility for learning, something that naturally also will result in research trying to shoot down such claims. This often results in a quite polarized debate on where one side accuse the other of saying that all pedagogical problems can be solved with information technology (which obviously have not been the case), and the other accusing the first of not taking a stance with relation to technology in education. We can also see how huge attempts (at least in economic terms) by research councils in the Nordic countries of bringing computers to school in useful ways, have rendered little effect, at least in comparison to how we now see the schools and universities being computerized.

The use of computers is also understood as something that has to be learned. Here the term “computer literacy” is one made relevant in various settings. Both in an educational policy sense, where competent use of computers can be understood as a matter of being able to participate in a digitized society, but also as a theoretical project, where new technologies drives new competencies in writing, reading, etc.

However, all the referenced research fields described above are formed and formulated in a time where the involvement of computers in university education still was a relevant discussion. In the 1980:s and 1990:s, teachers could still introduce the students to using computers. The involvement of computers was a matter of producing educational activities.

This naturally had, and still has, an effect on the main research questions, or even research interests concerning computers and learning. If universities are to invest in technology to support students learning, we better know if learning as actually supported and how much!

Old research themes in IT and learning

Fundamentally the research tradition on the involvement of IT in higher education is based on the idea that IT is brought into the educational situations by the teacher. In this setting the control of the IT involvement, as well as the carefully thought out introduction and use, is the responsibility of the teacher. In short IT is interesting as it is introduced in an educational setting. Universities need to support teachers in how to do this in a competent matter, but also how to provide technical support for doing this. The technology is owned by the institution and is

therefore also the responsibility of the university, we need support staff, computer labs, etc.

If *teachers* are to make the decision of how to involve IT, we need to know if, how, what and why to do this. We need to be able to make this decision with some scientific foundation. We need research on the effects that IT might have on learning. This basic view of the relation between IT and higher education led research to focus on a set of research themes.

(i) Should we involve IT?

In this theme focus evidence whether or not IT changes the pedagogical situation in a desired way. Research questions such as “Did students learn more if we involved computers in this particular way?” become central. Researchers try to develop causal relationships between technology and learning, giving statistical evidence whether or not computers are any good in educational settings. This theme, or perspective, provides fuel for a debate where one side preaches the excellent qualities of IT in relation to learning and one side more reserved and skeptical. Not only if we should involve it but also how becomes of great relevance. Hence we see research evaluating different methods for involving IT support in education.

(ii) How should the IT involved be designed?

If computers are involved we need not only to know how to involve them but also how they might be equipped, which ones might be the best, and what software might be the best. This drive comparative research trying to determine how IT should be designed to be the most supportive, as well as how the educational situations where IT is introduced should be designed. Often this theme is conducted in iterative projects where constant refinement is the goal. An interesting aspect is that the researchers within this theme generally have something invested in the introduced technology, i.e. they are testing a system that they themselves built. And the evaluations often take place in experimental settings, something that often is necessary to conduct a controlled evaluation of the potential benefits of a system.

(iii) How to teach students to use IT?

If the university as an educational institution is to introduce IT as a mandatory tool for engaging in certain activities it becomes important to make sure that the students either have the ability to engage in these activities competently, or are given sufficient training for doing this. Included here is the discussion of people becoming computer literate, calling for methods helping people becoming competent users, in particular in relation to educational activities. And in such a setup it naturally becomes interesting to discuss how different groups might benefit from using different methods when learning to use IT.

(iv) What is the relation between specific subjects and IT?

Within this theme we see how research on the involvement of IT in teaching in higher education have paid particular attention to some subject areas. Specific

uses of IT such as simulations, or visualizations, have been understood as interesting in relation to, for example, medical training, and IT-supported distance education have been paid interest within the context of language learning. As computers were not there all the time, in all the classrooms, we needed to know in what subjects they were suitable, to be able to know when and how to invest, and implement IT.

Here we must emphasize that these questions certainly have relevance today. However, the setup of questions as well as how they focus specific aspects of IT-involvement strongly point to the fact that IT in the learning situations is understood as something that the educators are to introduce, not something that is already there and that they, or we, have to relate to.

What changed?

Independent of the influence of research on how IT might relate to learning, or learning to IT, or IT in education, being a student (as well as a teacher) in higher education is a practice heavily based on the use of computers in various ways. It turns out we (as teachers and researchers) did not have to make the choice of involving computers in students learning activities. Neither did we have much to say of how computers might be involved.

From a broad perspective the main change is that IT became a personal tool the students. Even though we hesitate to say that every student should have their own computer we certainly experience this as teachers, as well as expect this from the students. As teachers we expect students to deliver papers written on computers, expecting them to be able to use spell-check, count words, etc. We expect them to use university libraries digital resources. We demand that they read e-mails, to get information about schedules online, upload their assignments online. This borders on the democratic aspects of the university being available to anyone, even those that cannot afford a computer, an important and problematic issue. However, we argue that the problems of enrolling students from the society as a whole are only very marginally connected to the price of computers, rather to other socioeconomic aspects taking part in higher education. During the past ten years the capacity of a standard of the shelf laptop has certainly increased. Today there is quite limited difference between a desktop machine and a laptop. In that same time, the weight and price have dropped significantly. It is difficult to get reliable and global data on computer sales, but 2005 is argued to be the year when laptops started to sell more than desktop computers (e.g. Singer, 2005).

Very concretely we can see the effect of the IT as personal tool in the use and support of computer labs at our universities. This was a big issue in the beginning of the 1990's, when labs were equipped with state of the art technology. This was followed by a wave of subsidizations of computers for students. In some cases laptops were provided by the different departments, students could borrow or

lease computers, students were given large discounts on their computer purchases, all in a project of helping students acquiring computers. Recently the computer labs are increasingly empty, filled only with outdated computers. And students are not as interested in purchasing school sanctioned computers, often because they already have their IT support setup when they enroll.

If we add to the availability of IT the possibility to access online content in virtually all environments where we might engage with IT, the IT setup of the student is fundamentally different today compared to ten years ago. Broadband connections at home, WiFi in most university campuses, and cheap flat rate connections to mobile Internet connections, affect how IT is brought into play in new settings. The mobile phone is a main tool for communicating. The number of mobile service subscriptions in Sweden is at the moment more than one per person. Three years ago we talked collectively about 10 million minutes a year on mobile phones (Öst, Larsson & Davidsson, 2005). IT makes possible new ways of coordinating ourselves, collaborating, communicating.

One concrete example of how new uses of IT might affect the educational activities is given below:

During one lecture in a course on software design, a teacher were discussing a number of different design-researchers, the projects that they had been involved in, and how they might have had an impact on the topic of design. One of the students raises his hand and says that he just discovered a video on You tube (a site for sharing video content, www.youtube.com) where the particular researcher presents the project that the teacher just described. The student asks if we could watch that video instead. The teacher browses for the video-clip on his laptop, and the whole class watches and discuss the video.

Here the laptops become a tool, not only to the individual student, but also to the whole group, including the teacher. The computer and the Internet become resources for collaboratively constructing the collective learning experience. Recently, we have observed and experienced several similar examples where teachers for instance ask students to look something up on the Web, to message a student and ask where she is, or using a student laptop when the teachers does not work.

The role of the computer has turned from mainly dealing with calculations, repetitive tasks and remembering, to enabling mediated communication among people. With applications supporting, not only text but also video and audio communication the ways in which students can engage in synchronous communication certainly has increased. Different medias for communicating are then employed different ways depending on the needs, as well as the context of use. Students in class may send instant messages to each other, in some cases record and transmit sound, and take and distribute pictures. But besides these applications for direct communication students also engage in more social

networking activities online. Community applications such as Face book, is a good example of how online representation of self and identity shaping is an important aspect of what students do online. What students do in their everyday lives increasingly is taking place online.

To summarize mobile and networked IT have become one of the main resources for students to engage in whatever they might do, such as school work, communicating with friends, flirting and dating, entertainment, etc. And all these activities are accessible in ways that we never could foresee just five years ago. In all settings, not only educational, computers are omnipresent and online. Without the involvement of educational institutions, or teachers, students have made IT one of their main tools for learning, as well as producing and sharing knowledge.

Educational reactions to this change

As the computer has become one of the main tools for engaging in university learning activities, institutions of higher education have to have some kind of idea of how to relate to this. In our experience the response from teachers and institutions to a large extent is a response of resistance to change. In the section below we will present a number of anecdotes from our own discussions with colleagues, and observations of the ongoing debate of technology in relation to learning that will illustrate some major dimensions of how such resistance can be articulated and framed.

1. So what – why change?

The first example could be taken from pretty much any educational practice. As new tools for educational practices become available, and as students appropriate these tools, teachers respond by providing motives for *not* changing, i.e. not recognizing that new technology might have an effect on their teaching practice. The possible impact of new technology is downplayed. One common motivation for not changing is that the discipline is so fundamental, and have “survived” technological fads before, that it will not be affected by the wide spread use of IT and Internet. It is sometimes even a matter of purity, i.e. the discipline would be clouded or even contaminated if related to IT.

One example taken from a meeting where the integration of IT in educational practice was discussed shows this in a particularly nice way. One of the participants talked about avoiding to being “lured into” promoting new IT as a tool for students. It was the content of the academic studies that was to be in focus, not the form, nor the tools involved. The discussion continued onto how it could be understood as a failure if students were to be dependent on the latest technology, rather than other educational tools, or activities. Such general skepticism towards IT is interesting, and it is obvious that IT has to prove itself in relation to what is being taught in different ways than other technologies. It would

not be a problem to argue that the students should have access to the latest literature or to the latest methods in teaching.

This attitude towards IT can partly be explained by the fact that changing the way you work is connected to a cost. Change demands questioning the way you conduct your work as a teacher, it also means investing time and effort into the process. To do something in a new way consumes the teachers' and university's resources, be it time or money.

2. IT leads to cheating and plagiarism!

The public debate on IT in relation to school has been paying much attention to the problems with cheating and plagiarism. Mobile phones allow easy access to recorded material, communication with others in writing, as well as web access – all three potential resources for cheating when students are taking written exams. The Internet is an important resource for students when writing papers. However, since text is so easily copied from the web, it is also a source for material to copy into reports. The idea that students are not writing for themselves is problematic to many teachers, and doing so without referencing the source (plagiarism) is often one of the reasons that students are subject to disciplinary actions at the universities. Related to this there are also a number of tools for discovering plagiarism, comparing the students' texts to various online resources (e.g. Genuine text).

In this line of argumentation IT is given part of the blame for students cheating. The fact that most students are more skilled users of the technology in comparison to their teachers also makes it easier for the students to cheat, and more difficult for the teachers to discover this. In a sense the rhetoric is symptomatic to the change in power in the educational setting. When students are skilled users, often much more so than their teachers, they naturally have more power of how IT might be part of their educational activities. Logically, there will be a struggle where educators strive to regain control over the tools students use to partake in their education. It is probably fair to assume that students always have cheated in various ways, and rather than uncritically stating that technology increase cheating - new technology might change the way we cheat.

3. Controlling the classroom.

The university classrooms are currently flooded by mobile IT, such as laptops, mobile phones and MP3-players. Students that bring laptops to school often have them open during classes. There are a number of different ways for dealing with this. One teacher told us that he does not like the students to use the computers during his lectures. The problem is that the students might not listen to him, and instead engage in some other activities. This is something that he sees as disrespectful behavior. His tactic for dealing with the problem is that when he discovers a student who is not paying attention he walks up to the student in

silence, waiting for the student to notice that he or she is the focus of the lecture. This naturally makes the student embarrassed and he or she often starts paying better attention.

Many teachers are feeling awkward by having to compete with online laptops during the lectures. Students might smile at things seen on their screens, or they might message each other during the lectures, or even play games. But they also have access to a number of online resources that could be involved in the lecture (as the next example illustrates).

The school is increasingly viewed upon as an environment where young peoples' use of mobile technology is understood as problematic. Phones are tools for cheating, bullying, taking inappropriate photos, and disturbing the peace of the classroom. Concerns such as these have led to radical suggestions such as giving teachers the right to confiscate students' cell phones in school.

4. Bad learning with computers.

Like in any other practice where new technology is introduced, education is challenged and changed by IT. Using IT as tool affects how we do what we do (Wertsch, 1993; 1998). In particular, IT will affect how we communicate and what we understand as competent ways of communicating (writing, talking, listening, etc.). New forms of writing arise, for example in the use of mobile phone text messages (Hård af Segerstad, 2002) the general informality and the use of smiley's (emoticons such as ':-)') annoys the conservative reader not familiar with sms-culture.

Furthermore, IT could also affect how we as communicators are supported in the process of writing and communicating. In the context of education such support is a sometimes questioned based on argument of diminished quality of the learning process. For example, spellchecking is sometimes blamed for students' not knowing how to spell (since the computer know, you don't need to know). Similarly, in computer programming courses students have access to a lot of support in compilers, editors and online resources giving corrective suggestions. Teachers occasionally describe such augmented support as counterproductive to learning – knowledge will not be as “deep” and “valuable” if it is acquired too easily.

This is an interesting, and slightly strange, discussion that brings to mind earlier educational debates on whether the abacus, the calculating stick, and later the calculator would threaten the arithmetic skills of students. Is it just as good to be able to calculate with the computer (you hopefully would get the same results), as it is to calculate with pen and paper? The common argument for resisting IT that provides support for student performance seems to be “if a task can be performed without a computer (adding a reasonable amount of extra effort) – then the computer is obsolete”.

5. Dangers of relying on web resources

On one hand, university students have (for practical reasons) limited access to resources, such as teachers, tutors and libraries during the school day, but on the other hand they have constant (and easy) access to online resources through the web. As a natural consequence, many students will employ the web in different ways to fulfill their obligations as student and to support themselves in their learning activities. Teachers, being less familiar with these online resources, tend to view them with suspicion and question their validity and quality. A particular such online resource, that is quickly becoming more and more central as a point of reference for students, is Wikipedia (an online dictionary depending on voluntary contributions from its users www.wikipedia.org). Many teachers engage in the ongoing discussion concerning the quality of Wikipedia, advocating that the lack of quality control is problematic. Still, in a recent comparison between Wikipedia and Encyclopædia Britannica (the online version) made by Nature in 2005 (Giles, 2005) there was no significant difference in accuracy between the two. This does not mean that all online resources are reliable, only that web resources are not necessarily unreliable just because they can be found online.

New themes of IT and learning

In this paper it has been argued that students to a growing extent bring and provide their own information technology infrastructure in the educational context. The students bring the technology to the various activities; the technology becomes omnipresent. This imposes radical changes in the institutions computing environment. The cost for the infrastructure is changed as conventional computer labs are replaced with students own laptop computers. The role of the teacher is changed as students at all times bring an access to content and channels for communication. The basic conditions for the students are changing as they have this omnipresent infrastructure.

So things have changed, and IT is involved in university teaching and learning in new and interesting ways. We now have the opportunity of formulating new research agendas related to the fact that laptops, mobile phones, Internet, etc. are used, everyday, in students' learning. We no longer have to decide if they should gather material on the web, we no longer have to make the choice if we want to communicate with them using e-mail. These are no longer relevant questions. Instead we can assume that students are skilled in using computers, surfing the web, chatting, searching, etc. We can also assume that they will engage in these activities outside of the university (in fact the major part of their use will take place in other settings).

This section suggests some alternative directions for research and development adapted to a world of omnipresent and networked IT. The term development is here used to point to the guidance, support and training that educators might need in this context. One fundamental difference between these suggested approaches to IT in the educational context is that IT cannot be understood as just a tool to involve in certain activities. Rather all our actions are, and have to, relate to IT as an omnipresent contextual factor. IT not only changes how teachers must relate and interact with students, but also how students and teachers relate to the university as a whole. In this setting IT is much more than a pedagogical tool, it is also fundamentally changing how we are to engage in teaching and learning in higher education.

The section suggests three main themes (i) virtualization of education, (ii) IT in the classroom, (iii) exploitation and integration of student technology.

(I) Virtualization of education

The first area concerns how educational resources are made available in new ways, and how this might affect learning activities, as well as the role of the university. The increased availability of computers in the homes, combined with good Internet connectivity opens up for good possibilities for virtually anyone to engage in online course activities. Our suggestion here is to look at the situation of participation for the students. This of course involves the technology, but as part of the whole participation, relation to other activities, personal aspects, interaction with others, etc.

The issue of going online also means that universities have to examine what local qualities that they might be able to offer the students. Why would I take a course on psychology online in Sweden, when I can apply to a similar (and much more prestigious course) in for example Oxford?

We also have to investigate the monopoly of systemized learning of the universities. When online resources are easily, cheaply and accurately available, then why go to all the cost of taking a university course? Just for the credits? We currently experience this when professionals engage in educational course: they are generally more interested in taking part in the educational activities than taking the course exams. They want to learn, but they do not feel that they benefit much from doing the work of taking tests. This is naturally problematic since the quality of university education often is dependent on the number of students that pass the exams. Interestingly many of the full time students are approaching the issue from the opposite perspective – they are less interested in partaking in the educational activities, and much more dependent on getting a passing grade.

Mobile networked IT also opens up for potential participation in various place and throughout the day, how can we adapt to this, as well as utilize this in our planning of the education?

We should pay more attention to learning situations where IT is a part – and less to comparisons of different teaching platforms.

(II) IT in the classroom

In lack of a better word we often describe the activities taking place in at the university, with teachers, as classroom situations. However, one of the first topics for research in this area is to see how IT redefines the idea and practice played out of the traditional classroom. We see how the widespread use of presentation software changes how we act as teachers (Lanir, Kellog & Findlater, 2008; Greiffenhagen, 2008). We also have indications of the potential benefits of using IT to enhance experiences and question the traditional roles in the teaching (Nulden, 1999), as well as simulations that makes experiences available to students in new ways (Rystedt, 2002). It is not possible to anticipate all ways that we may involve technology in the classrooms, this is one of the tasks of innovative future research. This must be done explorative and creative, and with minimal demands on comparative evidence of benefit. It is not likely that the new classroom actually can be compared to the “old” one. This is as problematic as any comparison or artificial division between IT and non-IT situations. In the words of McDonald:

We are constantly being asked to compare distance education to traditional education. But by striving to make distance education “as **good** as” **face-to-face** education what are we overlooking or sacrificing? (McDonald, 2002).

We should help teachers to experiment with new technology – to see how technology might make the collective learning experience different, and what this mean to them, and to the students. We do not say that this should be done in a careless manner, just that we previously have overemphasized short-term comparative perspectives, and forgotten long-term innovative use. To be able to drive this development responsibly (not in the hands of developers, IT companies, etc.) we need a new and more allowing take.

Examples here might be lecturing over distance, using movies and other more interactive medias, using the Internet as a resource, involving students in the production of the education in new ways.

(III) Exploitation and integration of student technology

This area focus how students have brought more IT to their learning than we as educators could ever expect. What we can introduce to them now will only constiute a minory of their use of technology in relation to their learning. To many students their computers are today the main resource for both consumption and production connected to their education. But we also see how other less obvious technologic plays a part in their work of being students. Mobile phones are important for coordinating activities with fellow students and for receiving information from the school. They listen to books and lectures on their MP3-players, they subscribe to podcasts from famous universities in the world. We can

take two approaches to this, one described above is skepticism, need to control, and defensive. We suggest that this battle with technology is one that we will inevitably lose.

Instead we need to look at how students technology can be understood as a resource also to the teachers and to the university. How can we benefit from the fact that most students have access to computers, mobile phones, etc? Here we need innovation and experimentation.

But we must also look into what this new setting might put the teacher. If these are to be tools involved on the initiative of the teacher we need to train teachers, and support them. We must also focus our research on learning and IT as something that takes place all the time, not only in educational, teacher supervised situations. We need to know more about how students (or people) use IT to act and become competent, as well as how they become competent in using IT.

Concerning aspects of cheating we must reevaluate our forms for assessing students. If it is easy to accomplish competent results using IT, this is from one perspective very positive, we can do much more! Our methods for assessing knowledge have not kept up with how we value competents outside of the university as well as how technology is involved in competent action.

If students are bringing their own IT to the university we do not need to provide much IT-support there. Instead we need to focus on technical integration of what they bring. It should be easy to use your personal tools for learning in the educational settings that we provide. What this means, we need to examine further. In a sense the students bring the world to the classroom, even more so with networked technology.

Concluding remarks

This paper suggests relevant themes for further exploration of the relation between IT and higher education. In brief the focus must change from understanding IT as an optional educational tool, to understanding it as an omnipresent technology, altering the practice of higher education. It affects how universities conduct their work, on a global market. It affects what teachers can do in the classroom, and how they must do it. IT must be redefined from a tool for learning in the setting of higher education, to an infrastructure into which higher education must integrate itself in successful ways. Computers are the main tool for students' everyday communication and knowledge production, and this changes what higher education is, what it is to be a teacher, and most fundamentally the practice of being a student.

Acknowledgments

We want to thank the persons from who we borrowed the examples given above.

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