

Use of IT in education: A current overview

Marco Schwanengel
Department of Information
Technology
Uppsala University
Uppsala Sweden
marco.schwanengel@miephos.de

Mattias Wiklund
Department of Information
Technology
Uppsala University
Uppsala Sweden
mattiaswiklund@gmail.com

Shyam Sundar Balasubramanian
Department of Information
Technology
Uppsala University
Uppsala Sweden
Shyamsundar.Balasubramanian.7625@
student.uu.se

Abstract

Teachers of Computer Science are working in a surrounding of technology, but how are the teachers themselves making use of the technology that exists to help their teaching at the university? As the technology is constantly evolving there are lot of new techniques and tools that are available in the market.

The main research question used to guide the work was, are the teachers making use of the modern technologies in their teaching practices for teaching computer science? If yes, in which way and what technologies do they use? If no, what are the reasons behind it?

Primary data was collected through interviews with professors and Ph.D. students at the department of Information technology at Uppsala University and secondary data was collected through research about teaching technology and tools.

The results showed that the teachers do not use many new and modern tools in their teaching. Four main areas of reasons for this were identified and analysed with the focus on three different aspects; personal, technological and educational aspects.

We can conclude that teachers have their reasons for avoiding new technology. Students need to expect a new technology or a new teaching method, otherwise it would not make any sense to use it any more. Maybe students should come up with new concepts and methods, which they find interesting as well.

1 Introduction

Teaching is a very important activity or process which has to be considered while transferring the knowledge from one person to another person. There are lots of teaching tools that can be of great help to the teachers in order to transfer the knowledge to the students. As the technology is constantly evolving there are lot of new techniques and tools that are available in the market. Anciently teachers started their teaching using black boards, then came the boards with sketches, teachers were using overhead projectors which made their job simple by not wasting time in writing on the boards. The PowerPoint which is quite very popular till now has been the major attraction and interests among the teachers. There are lot of new and advanced teaching tools that have emerged like the smart boards, screen cast tutorials, learning management system etc. This research is mainly focusing on

the teaching tools which are being used to teach computer science in today's universities. Teachers of Computer Science are working in a surrounding of technology, but how are the teachers themselves making use of the technology that exists to conduct their teaching at the university? Do they take advantage of the innovative tools that exist today? Are the teachers aware of those kinds of new methods that could be deployed? What are the difficulty and risk factors that might be involved in using them? What is the situation at Uppsala University? This research is going to deal and find out the reasons for these problems.

In order to find out the result, several professors and Ph.D. students were interviewed. The main reason of considering the professors was they had all the experience of teaching and using different tools for the teaching career. The idea of taking interview of the Ph.D. students was they were fresh and the present generation who are going to be the future professors. The research approach or the research methodology that has been used for the analysis is qualitative approach.

2 Research question and Motivation

The main research question penned down to guide the work was,

Are the teachers making use of the modern technologies in their teaching practices for teaching computer science?

If yes, in which way and what technologies do they use?

If no, what are the reasons behind it?

3 Software & Technology for Education

The education landscape radically changed in the last 10 years. The development is going so fast that a published software and technology of this year can be deprecated or not even exist any more in one or two years. Some technologies have proven their advantages in education utilisation. Others came up recently in the last years and have shown big potential to open new ways of teaching and improving education [1] [2]. We focused on technologies which are commonly used and others which have a great potential for the future. There are a lot of commercial, free, and open source products on the market. Open source products have the big advantage to be low cost-intensive [3]. We have chosen them by a technological perspective by the end of the year 2010.

3.1 PowerPoint

The availability of projectors in classrooms extremely increased in the last year. Most universities have equip their classrooms with projectors or they provide at least projectors for lectures and seminars. Therefore a lot of lectures are prepared as PowerPoint presentations today. PowerPoint gives the advantage to prepare lecture content in advance and take benefit of a already digitalised version of lecture content. The structure of slides as one screen shot and the simple use of predefined elements for text, images, animations, and a very similar user interface like a word processing tool made PowerPoint to the most common and popular presentation tool at the moment [4]. As every technology it has its disadvantages and advantages. You have to know, how to use it in the right way. Supporters and detractors of PowerPoint presentations still debate the benefits and influence in education and in the social society in general. The results of several investigations are highly mixed. There is no clear evidence in the collected data so far [5].

3.2 Discussion Forums

Forums are a very common technology for online discussions of every topic. They provide very good functions for structuring and organising content. Electronic discussion forums provide a time-of-convenience and place-of-convenience opportunity for student-student contact and student-instructor contact [6].

Furthermore you have a documented history of all things that were said during the entire discussion. That preserves thoughts and the whole developing process for further analysis. A monologue version of discussion forums are blogs [7]. The use of both are different, but both can be used as a discussion platform.

3.3 SMART Board interactive whiteboards

SMART Technologies is a company, that has developed a new electronic whiteboard system. These whiteboards serve as a projection surface for a projector. Furthermore they have a touch sensitive surface, that enables the user to control the mouse and manipulate items of the projected computer screen. It is possible to freely draw on the screen and save everything at the end. These electronic whiteboards combine the old usage of blackboards and the functionality of a computer [8].

Some universities are working with these SMART Boards since a couple of years and have investigated the effects in teaching, learning, and the resulting benefits of this technology. An investigation at the Lancaster University in 2004 says: "Among their findings, the team from Lancaster University's Department of Educational Research reports that interactive whiteboards are an important tool, along with Internet resources and presentation software, in facilitating improvements to the quality of student work." [9] [10]

A SMART Board is similar to a blackboard, but it has much more functions. To profit from the that additional functions teachers have to learn how to use it in the right

way. There is a big potential to increase the students involvement and creativity with new methods[11].

3.4 Learning Management Systems (LMS)

Learning Management Systems (LMS) are software packages, which include a lot of different software tools and technologies, and combine them to a centralised application. The big advantage of a LMS is the use of a common database for all data, although every user depending on his role and needs has different access and an individual view.

There are a lot of LMS available on the market. From commercial to open source products. A very good commercial software is the blackboard product family from Blackboard International [12]. They provide very advanced software packages suited for different education environments. The blackboard system integrates the latest mobile technologies and recent web and multimedia concepts.

Ping Pong [13] is a Swedish LMS that was mainly developed for universities and schools, but it is also used in some government departments or companies. Ping Pong tries to focus on the needs of the participants in learning. They provide tools especially for e-learning and web based courses. That makes Ping Pong very interesting for institutions, which provide a lot of online programmes or other online based content for education.

ILIAS [14] is one of the biggest open source LMS developed by universities and a couple of companies. ILIAS wants to provide the same functions as any other big LMS. The big advantage of the open source thought is, that everyone can adapted the system to their needs. Furthermore, they have a full modularised architecture, that makes it possible to develop own extensions. But it is still possible to get professional support, if needed.

3.5 Studentportalen

The Student Portal is the main LMS (Learning Management System) used by both students and employees at Uppsala University. It gives the students access to their study progress, course registration, course pages, web-mail, their own file area etc. The teachers can use it to administrate courses with the help of functions like file areas for submitting assignments, file areas for course material, progress where the students completed course components can be shown, messages where the teacher can notify different groups of students etc. [15].

In order to get access to all the available functions for the specific user type, the user has to login to the system and then the portal shows the information available.

3.6 Online Courses

Distance learning is one of the new enigmatic phrases in the education landscape of today. More and more universities and other education facilities provide online courses, web based programmes, and much more. The application of technology and learning is quite different compared to traditional methods. We need to gain new

experiences in developing and creating these new concepts of education. That includes new methods for teaching, but also new behaviour in learning and communication [16] [17].

Especially in Sweden distance courses become more and more popular. You are able to take interesting courses from the best Universities all over Sweden. The universities profit from the fact that they are not dependent from only local students. Almost a third of all Swedish students take at least one online course and the number is constantly increasing during the last years [18].

A lot of research is going on to investigate the benefits and issues of distance learning. Online lectures are one part of it. A lot of teachers, but also students feel unsatisfied that very different way of teaching and learning [19].

4 Methodology

4.1 Data collection

Primary data was collected through interviews with professors and Ph.D. students at the department of Information technology at Uppsala University which were held between the 22nd of November and the 1st of December in 2010. The reason for choosing to do qualitative interviews was to get as much details and elaborated answers as possible. A standard form was created with questions and room for notes. The questions were constructed with the use of the information that had been gained through the literature study. The interviews started out with questions about the interviewees' background in teaching to get a better idea of the person's experience. Then some shorter questions were asked about different teaching tools to see what the interviewee had and had not used. The interview carried on with broader questions to encourage discussion. There were also questions asked specifically about Studentportalen which is the main LMS (learning management system) and administrative tool used by the teachers at Uppsala University. The interviews lasted for approximately 15-20 minutes each. The secondary data was collected through research about teaching technology and tools.

4.2 Selection of interviewees

The people who were interviewed were five randomly selected professors and Ph.D. students from the department of Information technology at Uppsala University since the research was aiming at finding out the situation among teachers teaching computer science. The reason that both Ph.D. students and Professors were chosen was to get the different views that a Ph.D. student and a Professor might have. They were contacted through email where time and date for the interviews were decided. The interviews were recorded as a complement to notes being taken, and after each interview the recording was listened through and additional notes were being made. The age of the five respondents ranged from 27 to 54 and two of them were Ph.D. students and three were professors.

4.3 Research approach

The research has been conducted as a qualitative method to get as much details and elaborated answers as possible. With the help of this qualitative research we would be able to do a in depth examination of the problem. We could also build new theories and explore the areas of research more widely. One more main reason is that we wanted to examine the complex problem and find out the actual reality.

5 Results

The interview was conducted among 5 people out which 3 were professors and 2 were Ph.D. students. After finishing all the interviews we were able to see that all were aware of most of the modern teaching tools and methods that existed. Age was one of the factors when it comes to readiness of using these modern technologies. The reason that we got for not using the modern technologies were they are not very reliable, complex to learn. It also required for the teachers to change their teaching styles.

5.1 Experiences

All the teachers have a good knowledge and experience when it comes to the usage of power point, since they are using it for the past several years. When it comes to the new tools discussion forums and video recorded lectures were preferred to be used with some guidance using those technologies.

5.2 Technology

All of them are using PowerPoint for their presentations and a bit of black board. They felt that many tools are not very reliable and suitable for their subjects. Few methods like the discussion forums and video recorded lectures were among the interests among the teachers which they wanted to use. But they don't want those to be handled alone by themselves rather seeking some professional help who could assist them for its proper functioning.

5.3 Studentportalen

All of them were using the Studentportalen but mainly were using it updating the student progress and the results. A few felt that Studentportalen were lacking functions and another learning management system called ping pong was too complicated. Mainly course web pages were preferred by all for giving information about the course and other details that they want to give the students regarding their course.

6 Discussion

From the interviews we found that the teachers do not use many new and modern tools in their teaching. The reasons for not using more or newer tools seem to be numerous. From the results we have found four main areas of reasons.

6.1 Benefits. Does students perform better by using all this new stuff?

Not knowing the benefit of using the new method or tool seems to be a strong reason why the teachers stick to their old ways. Many times there needs to be some extra effort and time put in when starting to use something new, as an example learning how the tool works and get it to function well. If this is to be done there need to be a clear view of the benefits of the change. Is it maybe that the tool offers the students a more pedagogic way of learning, or is it the change in itself that makes the learning more interesting? A couple of the respondents seemed to think that their methods and tools works well and that they cannot see what the benefit would be.

6.2 Help from professionals with software/technology

Another reason stated in the interviews was the problem of not being confident in using the tool. This was explained with the example of the projectors who would not always function correctly when connected to different laptops. This lead to a lot of time being wasted on trying to get it to work and also a feeling of not trusting the tool. One professor mentioned how he would want to use the clickers more in his classes, but since he did not exactly know how to use them he avoided it. It seems that if there were someone to provide this technical expertise and help the teacher, more tools would be used more often. One professor also said that while they do get information about methods and tools through classes, they rarely get to try them out. From one of the interviews the respondent said that not all teachers attend these classes when they are not compulsory.

6.3 Changing teaching and lecture concepts/structure

To introduce new methods and tools to your teaching may have a big impact on the structure and the concepts of your classes. This is something that will take a lot of effort in doing which may prevent the teachers from using them, and instead they use the same material they did the year before, and maybe the year before that.

6.4 Availability, Infrastructure

One big issue is of course the availability of the tools. While some may be easier to get access to, like web based tools or software programs, others are more expensive and few in numbers. Today most classrooms have a projector mounted in the ceiling, but newer tools like the clickers are fewer and so are the SMART boards.

6.5 Studentportalen

Studentportalen is the main LMS used at Uppsala University which made it interesting to investigate. It is a big part of the new technology that is used by the teachers and it is important that it works in a satisfying way. The results from the interviews point to the tool being insufficient in many ways. A majority of the interviewees thought that the regular web based course pages are preferable. There are still some functions in Studentportalen which makes it good to use like the students

course progress and if some study material needs to be available to the students of the course only. As a whole Studentportalen does not seem to fill all the needs. There is another LMS used at Uppsala University called Ping Pong with more functions, but which instead is thought to be rather complicated and have a bigger threshold according to the answers in the interviews. So they are both a bit at different ends and a tool which sits more in the middle would seem to be more efficient.

7 Conclusion

The research has shown that the modern technology and tools for teaching are not used at a great extent at the department of Information Technology at Uppsala University. The reasons are several and can be explained through four different main categories:

- Benefits. Does students perform better by using all this new stuff?
- Help from professionals with software/technology
- Changing teaching and lecture concepts/structure
- Availability, Infrastructure

We found out that teachers have their reasons for avoiding new technology. Students need to accept a new technology or a new teaching method, otherwise it would not make any sense to use it any more. Maybe students should come up with new concepts and methods, which they find interesting as well.

There are a lot of reasons for pro and cons. We have to put focus on all four categories to establish a new technology. Students achieved a lot of experiences during their study years. Maybe teachers could create open teaching environments and give students the opportunity to create their own learning environment for their needs and situation with guidance of the teacher.

So the teachers would have to be convinced that they have something to gain from changing their old ways of teaching, but they also need better help from people with the knowledge of the tools in this procedure.

8 References

- [1] M. Devlin, C. Phillips, och L. Marshall, "Web 2.0, Technology Ownership and e-Learning in Computing Science.," *Proceedings of the International Conference on e-Learning*, 2009, ss. 93 - 100.
- [2] M.N. Ismail, N.A. Ngah, och I.N. Umar, "The Effects of Mind Mapping with Cooperative Learning on Programming Performance, Problem Solving Skill and Metacognitive Knowledge among Computer Science Students.," *Journal of Educational Computing Research*, vol. 42, 2010, ss. 35 - 61.
- [3] "50 Open Source Tools That Replace Popular Education Apps — Datamation.com.," http://itmanagement.earthweb.com/features/article.php/12297_3888901_1/50-Open-Source-Tools-That-

- Replace-Popular-Education-Apps.htm, 2010-12-06
- [4] "Microsoft PowerPoint - Wikipedia, the free encyclopedia.", https://secure.wikimedia.org/wikipedia/en/wiki/Microsoft_PowerPoint, 2010-12-07
- [5] "CiteULike: Information retention from PowerPoint™ and traditional lectures.", <http://www.citeulike.org/user/yoel/article/3987866>, 2010-12-06
- [6] R. Akers, "Web Discussion Forums in Teaching and Learning.", http://technologysource.org/article/web_discussion_forums_in_teaching_and_learning/, 2010-12-04
- [7] N. Saeed och Y. Yang, "Incorporating blogs, social bookmarks, and podcasts into unit teaching," *Tenth Australasian Computing Education Conference (ACE 2008)*, Simon och M. Hamilton, Reds., Wollongong, NSW, Australia: ACS, 2008, ss. 113-118.
- [8] "SMART Technologies.", <http://smarttech.com/>, 2010-12-01
- [9] "International research - SMART Technologies.", <http://www.smarttech.com/us/Resources/Research+and+data/International+research>, 2010-12-01
- [10] "The Motivational Effect of ICT on Pupils – Lancaster University (2004).", http://downloads01.smarttech.com/media/research/international_research/uk/lancaster_report.pdf, 2010-12-01
- [11] "Technology and Teacher Preparation: Creating Learning Environments for Increasing Student Involvement and Creativity.", http://downloads01.smarttech.com/media/sitecore/en/pdf/research_library/higher_education/technology_and_teacher_preparation.pdf, 2010-12-01
- [12] "Blackboard International | EMEA.", <http://www.blackboard.com/>, 2010-12-04
- [13] "Ping Pong.", <http://www.pingpong.se/>, 2010-12-07
- [14] "ILIAS E-Learning.", <http://www.ilias.de/>, 2010-12-07
- [15] "Studentportalen - Funktioner - Uppsala universitet.", http://www.uu.se/system_support/studentportalen/om/funktioner/, 2010-12-05
- [16] M. Bower, "A Learning System Engineering Approach to Developing Online Courses," *Eighth Australasian Computing Education Conference (ACE2006)*, D. Tolhurst och S. Mann, Reds., Hobart, Australia: ACS, 2006, ss. 45-54.
- [17] A. Finegan, J. Tutty, och B. White, "Information Technology Online: A Knowledge Framework for Curriculum Externalisation," *Eighth Australasian Computing Education Conference (ACE2006)*, D. Tolhurst och S. Mann, Reds., Hobart, Australia: ACS, 2006, ss. 63-70.
- [18] "Fakta om distans – Startside.", <https://www.studera.nu/studera/1826.html>, 2010-

12-07

- [19] J. Luca, "Using Blended Learning to Enhance Teaching and Learning," *Eighth Australasian Computing Education Conference (ACE2006)*, D. Tolhurst och S. Mann, Reds., Hobart, Australia: ACS, 2006, ss. 3-4.

This document is published under the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License



<http://creativecommons.org/licenses/by-nc-sa/3.0/>