T. Hirashima et al. (Eds.) (2011). Proceedings of the 19th International Conference on Computers in Education. Chiang Mai, Thailand: Asia-Pacific Society for Computers in Education

Mapping Students Use of Technologies in Problem Based Learning Environments

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Abstract: This paper aims to understand how students use technology to enhance their learning in problem-based learning environments. The research methodology is based on both qualitative and quantitative studies. The results are based on students' interviews, a survey and students' reflections in course-related blog posts; they show that students have positive perceptions toward using technologies in problem-based learning environment.

Keywords: Net generation, Web application

Introduction

There are number of studies concerning the digital natives or the "Net generation" [1]. Some researchers claim that the Net generation- they have different brain structure, different learning practice, and different knowledge perception from the previous generation [2]. This is because of the impact of technologies in daily life since they were born. The digital natives or the Net generation, are argued to be a part of the creative and participatory culture where they produce, re-mix and develop advanced-learning capabilities through their informal use of technologies. Therefore, it has been claimed that we need to fundamentally rethink about the entire educational system to accommodate and cater to the needs of the digital natives or the Net generation [2]. Firstly, because of their advanced skills of using technologies, but also because they are bored with traditional education; they want learning environments which respond to their rich, varied and advanced use of technologies. However, it has become increasingly clear that the notion of a homogenous group of young people with particular traits and a general disinterest in education is somewhat misleading. While we can find differences between generations, there are equally pronounced differences within the generations assumed to be the Net generation. Likewise, empirical studies seem to suggest that their use of and creativity with technology is of a more mundane nature. Therefore, there is a need for more detailed knowledge on how students actually use technologies within a higher education context than these metaphors can provide us with. Students have come to study and within higher education we educate and train people to be ready for their future profession, whether to industry, public sector or academia [3]. Nowadays, students use many kinds of technologies in their daily life including for learning activities in both formal and informal learning contexts. As institutions or educators, we need to provide support for students to let them use what tools they are comfortable with. It is a challenge for student to use technologies for academic purposes. Therefore, in order to provide better facilitate and support, we need to understand how students use technologies to enhance their learning. To understand the particular setting in which the study took place we will briefly present some notes on the pedagogical model of Aalborg University (the Aalborg PBL model).

1. Review of Literature

1.1 Problem-based learning in Aalborg University

Aalborg University has employed a PBL model since its establishment in 1974. This has been become known as the Aalborg PBL-model and also referred to as problem oriented project pedagogy (POPP)[4]. In POPP, the students define real-life problems, plan and perform to achieve the projects' goal by themselves, but work closely with the project supervisor who acts as a facilitator. This is where POPP differs from traditional PBL[4] which students have to work in pre-defined problems or tasks and under control of teachers. Students in the POPP environment do not only learn about the domain content but they construct their learning from group by working collaboratively in their project time. However, they rather aim at the learning outcome, not to solve the project problems.

2. Methodology

We have engaged in different types of data collection (both qualitative and quantitative) to understand how students use technologies to support their learning. We launched an online survey on 30th May 2011 for the entire university, as to get an overview of students' use of technologies in different domains - across four faculties. We have analyzed or roughly categorized more than a hundred blog posts (narrative analysis) which were about how students use technologies in relation to courses and to support their problem oriented group work. The aim of this analysis was to gain an overview and a better understanding of the tools they use, and their attitude towards the various tool. The blog posts were written in Danish and were translated using *Google translator* (also cross-read by a native Danish speaker to avoid misinterpretations (one of the authors). We will discuss the results of the narratives in section 4. In addition we have followed a project group from April to May 2011 to get a deeper understanding of how they use technologies in different situations. We discuss their learning practices in section 5. In this way we have gathered data at three different levels of scale and for different analytic purposes – across faculties (survey - quantitative), within a semester (blog posts – analysis – semi-quantitative categorisation coupled with more analytic, interpretavist readings of the posting) and an ethnographical inspired observations and interviews with a small group of students (group work – qualitative deeper understanding of particular uses of technology)

3. Survey result

On 30th May 2011, we had launched the survey by sending email invitations to more than 3,000 students randomly from 15,000 students in the university. After the deadline (10th June 2011) we had got 254 completed replies. We have got replies from all 4 faculties: Social Science 25.7%, Humanities 28.1%, Engineering and Science 41.6%, and Medicine 4.6%. Engineering and Science is the big faculty and Medicine is a new faculty. There were 80% of Danish students. However, most of the foreign students were from European countries. The survey was divided into 4 sections: Background (gender, nationality, faculty, number of years of PBL experienced), Mobile life style (owning mobile, Internet on mobile), Nature of collaboration (size of working group, places to work, places to use computer devices for working), and Tools (level of awareness to personal-acquired tools, and institution-provided tools) but we will not discuss about mobile life style in this paper. In the Nature of collaboration, we found that mostly students they form group with 5 members but that is because most of them are in the early year of study and group will be smaller when they go in the higher year. Students meet and work together at different places. Mostly

students prefer to work at a project or meeting room at the university but it was small number in faculty of Humanities because they cannot provide enough project rooms for students so the Humanities-students prefer to work together at one of their homes. After assigning task, they prefer to stay home to work alone. It reflects to our interview which found that most of students have the internet connection at home. They can stay connected when they work alone at home. In the last section about tools that they acquire and the university provides for them. We gave them a list of tools which can be classified into 2 categories: personal tools and academic tools. Personal tools are used for their personal life but they also can be adopted to be used for academic purposes, for example, Facebook, Skype, MSN messenger, Dropbox, Twitter, and etc. The second kind of tools is academic tools which are specially for collaboration or academic use, for example, Google docs, Wiggio, Diigo, Prezi, and etc. The survey result shows that students use varieties of personal tools for their academic task, for example, they use Facebook, Skype, Dropbox for their collaboration and communication. The email system has been used as a common communication tool within an organization. From the interview we found that the email system is used for communication between students and also with teachers or supervisors. We have asked the students from a survey question about the use of the institution-provided email system. The result is shown in figure 1. It is quite surprise that some students do not even know or they have stopped using it. They may have some way else to get information about the classes without using the email system.

Please select your state of use for the following AAU provided web applications. - AAU email	Percent
I don't know about it	3.5%
I know about it BUT I am not interested	7.7%
I know about it AND I plan to try it someday	2.7%
I tried it BUT I don't need it	6.2%
I tried it AND I might use it later	4.6%
I am using it BUT I shall stop soon	7.7%
I am using it AND I shall continue using it	66.2%
I stopped using it anymore	0.8%
I stopped using it but I may use it later	0.8%
Total	100.0%

Figure 1: States of using the institution (AAU) provided email system

Students who are in the Net generation, they use varieties of digital tools for their personal life. However, they do not use or know much about academic tools when they are new to academic as their professional life. The institution expects students to use collaboration tools to support their work. Even though, the tools have been proved and have potential to enhance their work, but students need to be facilitated in order to adopt the tools.

4. Students' narratives

We have collected narratives from the first semester students. We have got 133 student's replies with 51 males and 82 females. They were asked to write blog about using tools for their learning and project collaboration at the end of the semester. At the beginning of the semester they had been introduced to a number of tools for project collaboration by the institution, for example, Moodle and Mahara which are provided services by the university. Apart from this institution-provided tools, they were very briefly introduced to some web 2.0 tools e.g., Evernote, Skype, Etherpad, Google services (Google docs, Google wave, Google calendar), Doodle, and Wiggio. Students wrote in different stories under the theme of using tools for project collaboration. We have divided attitude of each tool from each postings into 8 categories as follows 1) Know it, 2)Tried it, 3) Like it, 4) Dislike it, 5) Indifferent, 6) Use but not specify attitude, 7)Use or know but still confuse, and 8) Use or know but not for this semester. From these states, we can identify the students' level of the using for tool. We (2 researchers and 1 Danish researcher) read the blogs individually and classify them into either one of the eight states for each tool, then we compared the result and adjusted into a single table. The following is the result of the narrative analysis.

- *Moodle*. The institution provides Moodle service for communication, and sharing course materials between teachers and students. There were 127 students wrote about the use of Moodle and most of students like Moodle but anyway, there are some comments about difficulty to navigation and accessing to information as in the quotation '*Moodle is well structured, but it is messy in the way that documents and PowerPoints are not in one place. I think I spend more time on Moodle than it really is necessary because I often have problems and to find the various files.*'(a female student's blog).
- *Mahara*. The institution provides the Mahara service for students and teachers and expected it to be used as a social network and to support group work. There were 128 students wrote about the Mahara service. Most of students have *bad impression* on the Mahara service. They reflected it was too complicated and most of them have already used Facebook as a social network so they did not find any need for the Mahara services.
- *Dropbox*. The students were introduced to Dropbox to share files. It is quite successful. Most of students wrote about using Dropbox and almost of everyone like it especially user-friendly aspect. There was a person did not like it because his group wanted tool which allows editing documents simultaneously then they preferred to use Google docs.
- *Facebook*. There were 115 students who wrote about using Facebook and Almost everyone like it. There was a person did not like Facebook because he afraid of losing his privacy, but he prefers to use Skype which is not opened to unknown person.
- *Skype*. There were 51 wrote about using Skype for their project work. Most of students like it and others know it but do not use it.
- *Google services* (includes Google docs, Google wave, Google Calendar, and Google group). There were 94 replies about using Google services and most of students like Google and there are 2 students dislike Google because did not see any useful for the project.

From the narratives, we can see that institution-provided tools were highly adopted into practice. The pressure from teachers or institutions may be the reason of the adoption. However, if students did not find needs, they also reject to use. Personal tools which are familiar for students also were adopted into academic activities. They learn fast to use the tools for professional activities. Personal-acquired collaboration tools are also adopted into their project work collaboration; they may know about the tools from institution, friends, or other social. However, it takes sometimes for students to learn and make sure about tools before adoption to their practice.

5. Focus group observations and interviews

We had followed a group with 5 members. They were in the second semester of the first year. They had got project about work place communication. They decided to apply video analysis as the main methodology for the project. They made a video clip on interview a company-manager. They started their project from February and ended in May 2011. They maintained 3 strategies of working namely: the group assignments, sub-group assignments, and individual assignments. There were 2 from different city which takes 45 minutes by train to arrive the university so face-to-face meeting every time is expensive. The faculty cannot provide students enough project rooms. They met at university twice a week at a meeting room, canteen or some common area which can sit and work together. Many times they worked at home. They use tools for communication when they were at different locations. They defined a closed-group in Facebook to discuss and keep track of the project. They usually put assignments, schedule, feed back from the supervisor on the closed-group Facebook. Skype was used when they need conference. Dropbox was used all the time for file-sharing. To avoid concurrent editing, they had to maintain version of files on Dropbox.

They were very impressive on Dropbox and Facebook for project work support. They wanted to try new tools, for example, Zotero but they thought they did not have time to try. Even though, they know it will benefit their working. There was a member in the group who usually introduced new tool to the group. They need to make sure before adopting any new tools into their working. The group has a good impression on using technologies to support their group work. They can use different technologies in different situations and for different purposes. However, if they know a new tool; even though, they know it is useful for their work but they need time to learn before adopt the tool; sometimes they reject to use the tool. In order to let students adopt a tool for their academic activities, we need to provide facilitation. They can get help, if they are not sure about using the tool.

6. Conclusion and Discussion

The results of survey, the narratives analysis, and focus-group observation and interview show that these students, who are claimed as the Net generation; they have good attitude on using technologies. Technologies have become a part of their daily life. They are good in using technologies which they use for their personal life (e.g. social network, communication tools, and social-media sharing tools) and then they can also to some degree adopt these tools into their professional life (e.g. document editor, reference management tools, reflection tools, file sharing tools, conference tools, resource management and scheduling tools). The survey result shows that student work at different location, they need to stay connected by using technologies (e.g. social network, conference tools, and file sharing). The narrative analysis shows that even we provide tool for students but they may not adopt if they find any need (Mahara). On the other hand, if they find needs and it is easy to use, they will adopt it very soon (Dropbox). The observation says even though they aware about the useful of a tool for their professional but if it is complicated or they have no experienced, they also reject to use. Therefore, they still need guidance to adopt more advanced technologies into their professional. It is opened for students in Problem-based learning environment (Aalborg PBL model) to use any tool to support their learning. However, institution should provide facilitation for students who need on both institution-provided and personal-acquired tools. They should be introduced into varieties of tools with how to get facilitation then there is higher possibility that they will adopt the tools to their professional life.

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