Medical Student's Perception of The Deployment of Interactive Whiteboards for Problem Based Learning

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MEDICAL STUDENTS' PERCEPTION OF THE DEPLOYMENT OF INTERACTIVE WHITEBOARDS FOR PROBLEM BASED LEARNING

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Abstract

Background: Interactive whiteboards (IWB) were introduced in all the classrooms used for problem based learning (PBL) sessions within the University of Geneva faculty of medicine at the beginning of 2014. Students were surveyed at the end of the following semester to evaluate their perception and use of IWBs, and measure IWBs' impact on PBL process, students' motivation, and group functioning.

Method: Bachelor students of Years 2 and 3 answered a 61-item self-administered online survey exploring eight themes: IWB launching, IWB use, practice of the writing and drawing software, role of the secretary, PBL process, personal interaction with IWB, group functioning, and socio-demographic data.

Results: 236 students (71.7%) completed the survey. Globally students found IWBs as well as the text editor easy to use (mean 4.8± 0.9 standard deviation; easier for men, p=.007; and 4.9±0.9 on a 1 to 6 Likert scale). Other functionalities were occasionally or rarely used, as well as the integration of learning materials (articles, book chapter, and websites) in the notebook. When compared to the situation before the deployment of IWBs, students did not report higher motivation (3.2±1.4), more concentration (3.2±1.4), more creativity (3.7±1.6), better understanding (3.2±1.3), or better memorization of what was displayed in the board (3.3±1.4). They agreed that the use of multimedia learning resources was facilitated (4.9±1.1), the material produced by the group was richer in drawings, images, abstracts (4.3±1.4), but did not think the group was better organised (3.6±1.4) nor that the elements discussed were more precise (3.6±1.4). After the first phase of a PBL session, the electronic notes were used by the majority of the students to complete their own documentation. They were however not used more frequently than before (3.2±1.7), and only used sometimes as a starting point for the reporting phase of the PBL session (2.1±0.8).

Conclusions: The implementation of IWBs within the institution was rather positively welcomed by students. Whereas they deemed the material produced by the group was enriched when compared to the situation without IWBs, there was no evidence, neither at the individual, nor at the groups' level, of a significant change regarding the learning process and organisation.

Keywords: Interactive whiteboard, Problem based learning, Medical curriculum.

1 INTRODUCTION

The PBL has been the key instructional format in the second and third pre-clinical years of the medical curriculum at the university of Geneva since 1995 [1]. As Hamdy stated [2], PBL is a "fuzzy world", as there are as many applications of the PBL concept as there are medical schools. A typical PBL session in Geneva is organised in three phases. The phase one (the tutorial), is a two hour session where a group of eight to 12 students reads the problem, clarifies the terms of its statement, defines the list of the underlying phenomena, and discusses and organizes collaboratively the explanations, and finally define the learning objectives for the next phase. All is done under the guidance of a tutor (a faculty member with experience). To optimize the workflow, three students take in turn a special role: the moderator organizes the discussion, the secretary writes or sketches on a white board the group's understanding of the problem, and the scribe writes down the important points of the white board on a sheet of paper which is then photocopied or scanned and distributed to the other members of the group. This piece of paper is the roadmap for the second phase, where the students have one to two days to work alone on the problem. They afterwards meet one last time for a two hour session (the third phase) to try to explain the problem in the light of their newly self-acquired knowledge. Like during the first phase, the whiteboard is of most importance, because it is the place where the knowledge of the group about the problem is crystallized.

The opportunity of available funding allowed to renovate the teaching infrastructure at the faculty of medicine, and to install an interactive whiteboard (IWB) in all the rooms used for PBL by the end of

2013: IWB are large touch-sensitive boards controlled by a computer and connected to a beamer. The user interacts with the IWB with a pen or his or her index finger. Handwriting or drawing is done on a dedicated notebook software. Though the installation was more opportunistic than the result of clearly defined pedagogical strategy, the main goal was to facilitate the PBL process by:

- displaying the problem statement and all of its associated documents such as histological or anatomical images, data tables and charts, or web sites,
- saving the writings and drawings of the PBL session in a numerical format, thus:
- freeing the student who had the scribe role,
- making easier the transmission and re-use of the group's notes, and
- enhancing the participation of the group through the use of mobile devices interacting with the IWB.

More and more primary and secondary schools have been equipped with IWB [3] for the last 10-15 years. Most of the available literature about IWB deals with survey regarding the teacher and pupils perceptions of IWB, or reports how the introduction of IWB has changed their practices. In their literature review, Higgins et al. [4] classify reports which consider IWB as being either a tool to enhance teaching or a tool to support learning. IWB enhances teaching thanks to its versatility, the Internet access, the easy planning, saving, printing, and distributing of the lessons material. The IWB also promote interactivity, pupils' participation, and learning because pupils claim to have fun, to be more motivated and concentrated. Although IWB has the potential for a more participative way of teaching, most of the time its use is reserved to the teacher, and could even foster a teacher centred pedagogy [9 cited in 5].

So what about the use of IWB in PBL? It seemed important to investigate what does the situation look like when the students are the main users of IWB, whether IWB supports the student's knowledge building better than the traditional whiteboard, or whether it changes the PBL process. A survey was thus conducted among the students at the end of the first semester of exclusive IWB use in the rooms. The main findings of this survey are reported below]

2 METHOD

All 329 students of the second and third year of the medical bachelor (pre-clinical) curriculum were invited by email to complete 61-item self-administered online survey questionnaire, which was designed to explore eight dimensions: IWB launching, IWB use, practice of the writing and drawing software, role of the secretary, PBL process, personal interaction with IWB, group functioning, and socio-demographic data. Degrees of agreement were measure on a 1 to 6 likert scale (1: fully disagree, 6: fully agree), and frequencies of use on a 1 to 4 scale (1: never, 4: systematically). Deviation from the neutral value of the scale was tested with Student T tests, and deviation from the independence of two factors in a contingency table was tested with chi-square tests. All analyses were done with TIBCO Spotfire S+® 8.2 for Windows.

3 RESULTS

The response rate was 71.7%: 236 students completed the survey, among whom there were 54.5% of women, and 45.5% of men (representative of the cohorts of students; p=0.705).

3.1 IWB launching

The arrangement of the teaching rooms was deemed adequate for IWB (5.0±1.0; 95% Confidence Interval (IC) 4.9-5.1), and so was the time necessary to start the IWB (4.0±1.2; 95%CI 3.9-4.2).

3.2 IWB use

Students were satisfied about the facility of use (4.8±0.9; 95%CI 4.7-4.9; easier for men, p=.007), and the help available (4.8±0.9; 95%CI 4.7-5.0): 54% consulted the poster available in every room, and 19% the help online regarding the use of IWB.

3.3 Writing and drawing software

The use of the recommended software was almost systematic (3.8±0.6; 95%CI 3.7-3.8), and it was deemed easy to use (4.9±0.9; 95%CI 4.8-5.0). The Handwriting-to-Text feature was rarely used (1.7±0.7; 95%CI 1.6-1.8), while tools used for underlying (2.6±0.9; 95%CI 2.5-2.7) or designing lines or arrows (2.5±1.0; 95%CI 2.4-2.6) were more frequent.

3.4 Role of the secretary

Most of the students who had taken a role of secretary (82.3%) used the stylus (79.4%) rather than the keyboard (19.6%) to write on the TBI.

3.5 PBL process

The use of documents connected to the problem (pictures, tables, web site) was not so frequent (2.5±0.8; 95%CI 2.3-2.6), neither the consultation of sources of learning (2.1±0.9; 95%CI 2.0-2.2), nor the integration of these sources into the group's notes (2.3±0.9; 95%CI 2.2-2.5).

3.6 Personal interaction with IWB

Students felt they were comfortable the IWB (4.4±1.4; 95%CI 4.3-4.6) . After the first phase of a PBL session, the electronic notes were used by students to complete their own documentation, but not systematically (2.4±0.9; 95%CI 2.3-2.5), and not more frequently than before (3.2±1.7; 95%CI 3.0-3.4). Also, they only sometimes used as a starting point for the reporting phase of the PBL session (2.1±0.8). They felt slightly more creative than before (3.7±1.6; 95%CI 3.5-3.9), but did not think they were more motivated (3.2±1.4; 95%CI 3.1-3.4), more concentrated (3.2±1.4; 95%CI 3.0-3.4), could memorize more easily (3.3±1.4; 95%CI 3.1-3.5), or understand more easily (3.2±1.3; 95%CI 3.0-3.3).

3.7 Group functioning

The use of multimedia supports was clearly facilitated with the IWB (4.9±1.1; 95%CI 4.7-5.0), and the electronic notes taken by the group richer (4.3±1.4; 95%CI 4.1-4.5), but students did not think that the group was better organised (3.6±1.4; 95%CI 3.4-3.8), the pieces of information discussed more precise (3.6±1.4; 95%CI 3.4-3.8), while there was slight evidence of a better than before learning environment (3.7±1.4; 95%CI 3.6-3.9). In addition, the group only sometimes the electronic notes as a starting point for the reporting phase of the PBL session (2.1±0.8; 95%CI 1.9-2.2).

4 DISCUSSION

The rolling-out of IWBs was done in a very short time at the end of 2013, so that neither the students (more than 300), nor the tutors, were properly trained on the use the IWB. The users were only informed by email about this new tool and got access to an explanatory web site just before the beginning of the semester. In addition, each group of students received a 20 minutes demo by IT staff members at the first planned PBL session. Despite this minimal training, the survey shows that the students perceived the IWB as easy to use, which confirms the adequacy of the chosen material.

It seems that students did not went beyond a basic usage of IWB, and although the notes were sometimes enriched with external data (images, text, etc) the students mainly used the IWB as normal whiteboard. This did not come as a surprise, since the tutors were not well prepared, and the problems had not been adapted to take advantage of the added-value of IWB. Following the survey (fall 2014) workshops were organized for the tutors and the teachers responsible of the teaching units, to provide them with pieces of advice advices on how to take advantage of the range of tools offered by the IWB software, and how to enrich the problems. At the time of writing, an second survey is ongoing to evaluate the impact of these workshops.

Furthermore, since IWB offers all the capabilities of computers, researchers will have the opportunity to test and investigate the effect of computer-supported collaborative tools like mind-mapping or decision-making software on PBL.

The survey did not demonstrate any "psychological" benefits like fun, motivation, or gain of attention, which had generally been shown by other surveys: the context of higher education is likely to be different from the one of the primary schools.

In their recent literature review, Jun and Bridges [6], evaluated the effects of educational technologies, and how they could support PBL in higher education. Among the selected papers, the results of five articles on the impact of IWB were summarized. They showed that, provided that the problems are enriched with documents or iconography, IWB have a positive impact on PBL in that it supports the inquiry learning [11]. However, the access to the Internet to get immediate “answers” to the problem raised concerns about the potential detrimental effect in the dynamic of PBL: some of the time used for the knowledge elaboration processes in the first phase of PBL would be used for information searching that is normally done during the second self-learning phase [7].

On the other side, these authors found a positive effect of collaborative tools regarding the students decision making process, and regarding the way a teacher scaffolds the students in the context of a role-play based PBL, the "Deterioration Patient": IWBs had a positive effect in that the students came quicker to the good decisions for the clinical case management [10], and the teacher adapted his scaffolding strategy in order to challenge the participation of the students [8].

Since the recording of all events that happen on a IWB is quite easy, IWBs are a promising tool to collect raw materials for research on different aspects of PBL, such as the time flow of the knowledge building by the PBL group, or the impact of computer-based collaborative tools to support PBL.

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