

Experience of professors with an electronic teaching environment for hybrid/remote teaching

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Abstract

This paper presents the user experience of professors with an electronic teaching environment for doing hybrid/remote teaching in several Human Factors Engineering courses at École Polytechnique de Montréal. We investigate some problems with the functionality and usability of the VIA software environment and we propose guidelines to solve them and improve the user acceptability. The main problems are concerned with the set-up time of the environment at the beginning of each course period (a minimum of 32 operations which may last between 5 and 8 minutes each time), the constraint of using only static material on slides presented to students, the difficulty to go back and forth between the course material and the Internet during the course, the poor interaction with remote students, and the limitations of the equipments (camera and microphone) that have to be installed in class for remote teaching.

1. Introduction

Over the last four years, we have been teaching several courses in Human Factors Engineering at École Polytechnique de Montréal, simultaneously in class and remotely through the collaborative software Via eLearning & eMeeting (VIA). In this hybrid/remote teaching, the professor is physically present in the classroom for teaching to students who come to the campus, who are available during the course period, and who prefer to attend a course in class. At the same time, s/he is present online, through Internet, for teaching to students who cannot come to the campus, who are not available during the course period, or who prefer (or are constrained) to attend a course at a distance. The remote students can see the professor in class, see the material s/he is presenting both on screen and in class, listen to his/her voice and other students' voices, and ask questions verbally or by writing. All the students have access to the course material and course recordings for the duration that is decided by the professor.

In this paper we report our experience with VIA software system. We analyze problems encountered with the functionality and usability of VIA and propose guidelines to solve them and improve the system user acceptance. Even though these problems are specific to VIA, in our opinion they are likely to exist in other similar systems so that the guidelines that flow from the problems should help system designers.

This article is structured as follows. First we define the objectives we pursue with hybrid/remote teaching, and present some characteristics of hybrid teaching. Then we describe the operations the professor has to perform with the VIA environment at the beginning of each course period. After, we present the problems encountered with VIA and the guidelines we propose to solve them. As conclusion, we take a stand on the future of hybrid/remote teaching in our courses.

2. Objectives of hybrid/remote teaching

We pursue three categories of objectives with hybrid/remote teaching, depending on the stakeholders that are considered: the students, the professors, and the university (Robert, 2010)

For the students:

- **Flexibility** both in space and in time so as to allow students to attend their courses at the place and time of their choice. This is essential for students who have part-time or full-time jobs during their studies. They often have difficulty to attend a course on a regular basis, i.e. at the same period of time each week during 15 weeks, because of important work deadlines, team meetings, visits to clients, business trips abroad, etc.
- **Accessibility** for students who live too far from the campus and do not have access to similar specialized courses in their region, and for students who may not be able to come to the campus because of family charges, sickness, physical handicaps, or other personal restricting conditions.
- An opportunity to learn how to use the technology that supports remote teaching.

For the professors:

- Have a larger audience and recruit students, especially from far regions and from abroad;
- Have more visibility in their professional community and their society;
- Acquire experience in remote teaching and with the technology that supports it.

For the university:

- Accomplish its educational mission more broadly;
- Be more competitive in front of other universities;
- Give more visibility to its professors, courses, and study programs;
- Recruit more students in far regions and abroad;
- Increase its revenues.

As with remote laboratories in engineering (Hariz & Mohtar 2010), there have been wide debates regarding the effectiveness of remote teaching in general and whether it can truly replace or complement teaching in class. With adequate resources and material, it can be very successful.

3. Hybrid teaching

An initiative of hybrid teaching depends mostly on the quality of the resources supporting the realization and the capture of lectures as well as the provision of the lectures captured. In fact, according to "The Campus Computing Project" (2010) the investment on technologies for the capture of lectures is considered as one of the three most important initiatives aimed at the development of instructional materials for 60.5% of U.S. universities. Two other major initiatives considered by American universities are electronic books (86.5%) and mobile applications (70%). Meanwhile, only 4,4% of the universities surveyed make use of lecture capture technology.

In a similar proportion, at École Polytechnique de Montréal, very few professors (15 out 220 - 1,82%) give their courses in a hybrid/remote mode. This may be due to several reasons: increase of the professor's workload, lack of motivation, lack of encouragement from university, skepticism towards the effectiveness of remote teaching, reluctance (for some professors) toward the potential negative use of recorded courses by the students and even the university, and the lack of functionality and usability of the VIA software environment. This last reason is major because, as it will be shown below, it affects the professors' workload and frustration, the quality of the course material, and the quality of learning for the students. So it deserves an investigation.

In this paper, we report our user experience with the functionality and usability of the VIA environment. It is important to notice that VIA is constantly evolving, and that the evaluation we carried out refers to the version available in May 2011. Our experience is based on the use of VIA for teaching one undergraduate and four graduate courses in Human Factors Engineering during four years. Each course consists of 15 periods of 3 hours each, and is principally a lecture with several interactions with the students. On average, there are 90-100 students per group in the undergraduate course, and 15-20 students per group in the graduate courses. For results on attitudes, beliefs, and attendance in a hybrid course, see Yudko et al. (2008).

4. The professor's activities for creating a teaching activity in VIA

To create a teaching activity on VIA, for each period of course the professor has to do the following operations:

1. Enter Moodle
One sees the list of documents to which s/he has access.
2. Select the course for which you want to create a teaching activity (click on course title)
3. Activate the edition mode (click on a button)
4. Open the menu "Add an activity"
5. Select VIA – Virtual teaching (in a combo box)
One sees the Window "Via – Virtual teaching" (see Figure 1)
6. Enter text (Title of the teaching activity)
7. Enter text to describe the activity
8. Enter 3 values to set the duration of the activity (or accept default values)
9. Enter 3 values for the session parameters (or accept default values)
10. Enter 1 value to Register the participants (or accept default value)
11. Enter 4 values for Common settings of the modules (or accept default values)
12. Click on "Register and come back to the course"
One sees the window "General view of the sections"
13. Click on "New teaching activity"
One sees the window with general information
14. Click on "Click here to access the activity"
One sees the window "Beware: This activity could be registered. ..."
15. Click on "I accept to access this activity and be registered" Or "I refuse to access to this activity"
One sees the window of the VIA system
16. Click on "Manage the documents"
One sees the window to choose an option
17. Click on "Import from my computer" or "Import from my VIA documents"
The window shows the list of files on my computer
18. Select a file to transfer into the teaching activity on VIA
One waits for the loading time depending on the size of the file
19. Click on the selection box "Make public"
Repeat steps 17, 18, 19 if there are other files to transfer into VIA
20. Click on "Terminate"
21. Click on the icon of the camera
One sees the window "Configure the camera"
22. Select a camera in the menu
23. Click on "Activate"
24. Click on the icon of the microphone
25. Click on "I hear the music"
26. Click on "Activate"
27. Adjust the sound level
28. Open the PPT file for the course
29. Reduce the chat window
30. Set the parameters of the main window (3 clicks)

If one adopts the default values in steps 8, 9, 10, 11 and transfers 3 files to VIA (which is typical for a 3-hour course, and which means doing the steps 17, 18, 19 three time), there is a minimum of 32 operations to do; they last between 5 and 8 minutes, depending on the number and size of the files to transfer to VIA. Figure 1 shows an example of screen of VIA that can be seen by the professor and the remote students.

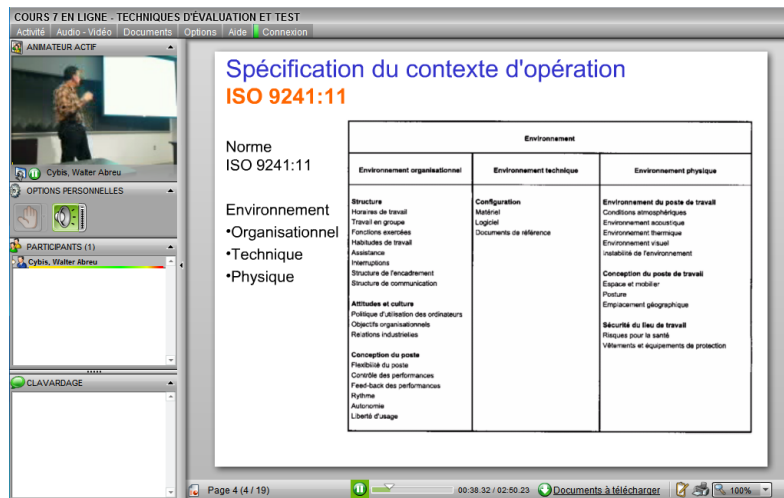


Figure 1: The VIA module for lecture visualization.

5. Problems and Guidelines

In this section we describe some problems with the VIA environment, we evaluate their impacts on the quality of teaching and on the professors' and students' activities, and we propose some guidelines to solve them.

Problem 1: With VIA, the course material shown in the PPT (PowerPoint) slides must be static, otherwise there are problems of use. This is a major weakness because there is strong tendency to present more and more dynamic material (e.g., animations, video) during courses. It is a constraint for the professor who builds the course material, and a limitation to the quality and modernity of a course. Since the presentation of dynamic material aims at improving the quality and interest of a course and at facilitating the learning activity for the students, its absence is likely to have a negative impact on students.

Guideline 1: Use a software environment that easily supports the presentation of dynamic material (e.g., animations, video) in course material.

Problem 2: With VIA, the back and forth movements between the course material on PPT and different Web sites that are visited during a course are not easy. The professor has to do cumbersome operations that are time consuming, increase his/her workload and finally discourage him/her to go often on Internet during the course. This is a source of frustration for the professors and it is to the detriment of the quality of a course and of the learning experience of the students.

Guideline 2: Use a software environment that easily supports Web surfing during courses and that permits rapid back and forth movements between the course material and the Web.

Problem 3: Due to a lack of integration between VIA and Moodle, the professor has to deposit the same course material both on Moodle (for students who attend the course in class) and on Via (for students who attend the course remotely). This activity is time consuming and increases the professor's workload, besides being perceived as repetitive and useless. And most of the time, it is done just before the course, at a critical time because the professor is busy with the final preparation of the course and would prefer to focus on what is more important.

Guideline 3: Use a software environment that does not increase (or minimize) the workload of the professors, either in time (through the number of operations to do) or in complexity.

Problem 4: With VIA, the interaction with the remote students is a bit awkward for different reasons. When a remote student asks a question by writing (N.B.: some students use the microphone of their computer and ask their questions verbally), the system makes a buzz, the professor has to go to the computer, click to enlarge the chat window (in the middle of the left

column of Figure 1), read the question, answer verbally, check if the student is writing comments or another question, wait for them, if any, answer again, and finally click to narrow down the chat window. This breaks the flow of the course and it is time consuming. If remote students were often asking questions during a course, the interaction with them would rapidly become cumbersome and difficult to manage by the professor. Another person would be necessary in the class to manage the questions and comments from remote students.

Guideline 4: Use a software environment that easily supports rapid and natural interactions with remote students.

Problem 5: With VIA, there is an important set-up time of the system at the beginning of each period of course. First, if fixed equipments are not available in the classroom, a mobile camera and microphone have to be installed at the beginning of each course and de-installed at the end; the position of the camera in front of the professor has to be adjusted so as to give the best view to remote students. Second, the professor has to perform several operations (see section 4 above). These operations are time consuming, done at a critical time (because it is the beginning of a course), and done *in live* in front of the students who can follow on the screen what the professor is doing, sometimes with errors... The professor has to memorize these operations since there are no guidelines on screen.

Guideline 5: Keep the set-up time of the equipment and the system as low as possible. If possible, use fixed rather mobile audio-video equipments for remote teaching in order not to have to install, de-install, and adjust them in class for each course period. Keep the number of operations for the set-up of the system as low as possible (if impossible to automate). Make sure that the operations to be done by the professor for setting the system are transparent, otherwise, provide a clear procedure.

Problem 6: With VIA, a camera must be placed in front of the class (usually on the first row of the students' desks) and oriented toward the professor to capture his/her face and gestures, the objects that s/he might be showing, and the blackboard. So remote students can see what is going on in the classroom. There are some problems with the use of this camera. First, it puts constraints on the size of the surface where the professor can walk in front of the class if s/he wants to remain visible to remote students. Second, the small size of the image shown on remote students' computer screens makes it difficult to clearly see the objects the professor is showing in class. For paper documents, a camera for documents would be much more appropriate. Third, the small size of the image makes it difficult for remote students to read on the blackboard. As a consequence, the professor should minimize or eliminate the use of a traditional blackboard in class. This is a constraint for the professor and to the detriment of the students in class.

Guideline 6: Use a high quality camera, especially if the professor shows objects in class and uses a traditional (or non interactive) blackboard. If paper documents are frequently showed in class, use a specific camera for documents. If other types of objects are frequently showed in class, use a specific camera to show these objects. If there is traditional (non interactive) blackboard in the classroom and if it is visible only through the camera placed in front of the professor, minimize its use because of the poor readability of the information presented on it for remote students.

Problem 7: With VIA, a microphone must be placed in front of the professor to record his/her voice and that of the students in the classroom. So the remote students can hear the professor's voice, and in principle, the questions/comments of the students present in class and the discussions between the professor and these students. Actually remote students have difficulty to hear the voice of the students who are sitting far from the microphone in class. Ideally, the professor should repeat the questions and comments for remote students but this is rarely done, or partially done; furthermore, it is almost impossible for the professor to repeat the discussions between the students.

Guideline 7: Use a high quality microphone in class. If the classroom is large, use several microphones to better capture the voices of the students.

The functionality and the usability of VIA should be improved to reduce the professor's workload, allow the creation of dynamic course material, and improve the quality of the interaction between the professors and remote students so as to create a positive user experience for the students.

6. Conclusion

Despite several irritants with the VIA environment, as professors we are globally satisfied with this hybrid/remote teaching experience so that we intend to pursue it in the future. Similarly, despite irritants, remote students assert they are globally satisfied with their learning experience. They encourage us to continue to offer them this service and wish it would be available for all their courses.

References

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