IMPLEMENTATION AND EVALUATION OF VIDEOCONFERENCING IN A MULTI-CAMPUS ENGINEERING FACULTY

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Abstract
Despite the many advantages of a multi-campus faculty, physical access to the nearest campus can be very time consuming, as well for the students as the lecturers. Videoconferencing could be helpful in order to solve some of these transport problems. In some pilot projects we evaluated the use of videoconferencing.

Keywords: video-conferencing, weblectures, webinars, multi-campus

1 INTRODUCTION
In Flanders, six institutions joined their forces in order to start, from the first of October 2013, a new faculty of the KU Leuven: the faculty of Engineering Technology. One of the advantages of this multi-campus faculty is that the master students are offered a more diverse pallet of research-based modules in the master programme, which enables a better match of the master programme with the student’s interests and future ambitions. In addition, students come into contact with other researchers and gain hands-on experience with state-of-the-art research infrastructure that is not available at the home campus. In this way, the proposed multi-campus system is also a way of integrating research into engineering education [1]

However, despite the many advantages of our multi-campus faculty, physical access to the nearest campus can be very time consuming, as well for the students as the lecturers. One solution could be the use of videoconference. While there is some research on the use of videoconferencing for meetings and small group lectures, the papers on the use of videoconferencing for larger groups are rare [2]. Moreover, we get no clear answer from literature if students on the remote campus feel treated unfairly. It’s also not clear if the perceived advantages counterbalance the disadvantages. Much seems to be dependent on the specific local situation [3].

To answer the questions for the students of our engineering faculty, we started three pilot projects in which courses were taught using videoconferencing.

In the first part of the paper we will explain why we opted for videoconferencing instead of webcolleges (asynchronous videoconferencing) or webinars. In the second part we will discuss the survey of the pilot projects.

2 VIDEOCONFERENCE VERSUS WEBLECTURES AND WEBINARS
Considering the high cost of videoconferencing infrastructure, one can ask themselves if there are good alternatives for videoconferencing. We will therefore discuss the most obvious comparable technologies: webcolleges and webinars.

It's not that easy to estimate the cost of the conversion of a common lecture room to a videoconferencing or a webcollege room. The electronic equipment, the lightning of the room, the audio etc. are all important factors which determine the quality and the cost of the final product. At our campus, the conversion of an ordinary auditorium of 80 persons to a well equipped and state of the art videoconferencing room cost about 30 000 Euro.

A webcollege is an online video of (part of) a recorded lecture. Commercial available systems are available which can capture and distribute a whole lecture almost automatically. At our university, the cost of a self made automatic system is about 3000 Euro /year. The advantage of web lectures is that the student can view the lesson where and when he wants. But the student just sees a previous recorded lesson, he cannot interact.
An “online seminar” or “webinar” is a live broadcasting which students can attend online, on their own PC. The lecturer sits before his PC and gives his presentation. Students can hear and see the lecturer and his screen content. Using chat, poll and essay questions, the students and lecturer can interact. The participants can only see and hear the other participants after the intervention by the lecturer or a moderator. Webinars are relatively new. Cost is about the same as weblectures: 3000 euro/year.

Weblectures and webinars are considerably cheaper but miss the live and face to face interaction. Previous research on bachelor 1 students showed that only 10 to 20% of the students experience web lectures as a real replacement of the traditional lectures [3]. The missing interaction with lecturer and college students is probably the most important factor.

Since we wanted to use a technology for multi-campus teaching, with discussions and feedback during the lectures, we decided in our faculty to use videoconferencing.

3 STUDENTS PERCEPTIONS ON VIDEOCONFERENCE

3.1 Pilot projects

We carried out three videoconferencing pilot projects in the master program of our faculty of Engineering Technology. In table 1 some characteristics on these projects can be found. At the end of each pilot project the students on the remote site were questioned about their perceptions on videoconferencing. The questionnaire consisted of two open-ended and ten Likert scale questions.

In pilot project 1, in order to improve the personal contact with the two sites, the lecturer taught two times from one campus and once from the other campus. During videoconferencing, students on the remote site did not see the lecturer. Only the PowerPoint presentation was projected. Unfortunately the audio quality was not that good.

In pilot project 2, the audio quality was okay and students on the remote site could see the lecturer. The lectures were also recorded.

Pilot project 3 was identical to pilot 2, except that all the lectures were taught using videoconferencing.

Table 1: characteristics of the pilot projects. (in case of pilot 1 the lecturer taught two times from one campus and once from the other campus)

<table>
<thead>
<tr>
<th>Pilot project</th>
<th>Number of lectures</th>
<th>Number of students on remote site</th>
<th>Number of students on local site</th>
<th>Number of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pilot project 1</td>
<td>Introduction to lab Chemistry</td>
<td>3</td>
<td>16</td>
<td>21</td>
</tr>
<tr>
<td>Pilot project 2</td>
<td>Production techniques</td>
<td>2</td>
<td>28</td>
<td>62</td>
</tr>
<tr>
<td>Pilot project 3</td>
<td>Production techniques</td>
<td>12</td>
<td>19</td>
<td>70</td>
</tr>
</tbody>
</table>

3.2 Results and discussion

We start with a discussion of the feedback after pilot 2. In figure 1 the most important quantitative data are shown.

Most of the students on the remote site believe that they learn as much during a videoconferencing lecture as they do during a traditional "live" lecture. Most of the students are willing to accept more
videoconferencing lectures if this increases the volume of available courses. They prefer videoconferencing above travelling to another campus.

Students disliked the reduced interactivity. Asking questions seemed not that simple. About half of the students agree that the students on the local site are favored.

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**Figure 1: perceptions of students after pilot project 2. Above each bar the percentage is displayed. 1: strongly disagree, 2: disagree, 3: neutral, 4: agree, 5: strongly agree**

Pilot project 3 was identical to pilot 2, except that now all the lectures (12) were taught using videoconferencing. Unfortunately the number of respondents was low. The results on the questionnaire were almost identical with pilot 2. It seems that the rather positive attitude towards video conferencing in the pilot project 2 was not due to the novelty effect. However, we need further research to verify this conclusion.

Finally, we discuss the results on our first videoconferencing lectures, pilot 1. Students were far less enthusiastic about the videoconferencing lectures than in case of the other pilot projects. Probably this is due to the poorer audio quality and the invisibility of the lecturer at the remote site.
The questionnaire also included two open ended questions:

- What you think are the advantages or disadvantages of a videoconferencing lecture in comparison with a 'live' lecture?
- What are the points of particular interest our faculty should keep in mind when further developing videoconferencing?

The most important conclusions from it are:

- Students really appreciate the recordings of the videoconferencing. As is the case with webcolleges [4], they probably used it to review the more difficult parts of the lecture. Recording facilities are a cheap extension of the videoconferencing equipment.

- Interaction between lecturer and students seems a shortcoming when using videoconferencing. Asking questions is less spontaneous because the microphone has to be passed. On the other hand, one student remarks that the asked question are more clear formulated than in a regular live lecture. Looking for methods or tools to enhance more interactivity is thus necessary. One possible solution could be the use of electronic voting system on both the remote and local site [5].

- The image of the lecturer is a must. If not, students miss the body language of the lecturer and is it more difficult for them to stay focused.

- In none of the pilots, the lecturer could use the backboard because it was not captured. Students experience this as an important disadvantage, because it is more difficult for the lecturer to respond to questions from the audience. Quality recording of a blackboard is difficult, unless you dispose of a cameraman. Good alternatives are document camera’s, electronic displays or drawing tablets. The picture quality of the electronic displays and drawing tablets is superior to that of the document camera. Moreover, one can make annotations in powerpoint presentations using the electronic displays and drawing tablets.

- The lecturer needs training in order to use the technology smoothly.

4 CONCLUSION

It is concluded that videoconferencing is an alternative for a limited part of the traditional lectures if some technical and pedagogical problems are solved. Students appreciate the possible larger amount of accessible specialized courses.

For future projects we will concentrate on the following points of interest: enhancing the interactivity, making it more comfortable for students to asks questions, integration of an electronic display or drawing tablet in the equipment, training of our lecturers.

REFERENCES


