

Technical and pedagogical recommendations on videoconferencing in distance education

Hélio L. Costa Jr.^{1,2,4,6}, José L. P. Bueno^{2,3,7}, Ana L. V. Torkomian^{4,7}, and Édis M. Lapoli^{3,5,7}

¹ Faceca - Faculdade Cenecista de Varginha - Brazil (www.faceca.br)

² Unis-MG - Centro Universitário do Sul de Minas - Brazil (www.unis.edu.br)

³ Vias - Instituto Virtual de Estudo Avançados - Brazil (www.vias.org.br)

⁴ UFSCar - Universidade Federal de São Carlos - Brazil (www.ufscar.br)

⁵ EGC/UFSC - Universidade Federal de Santa Catarina - Brazil (www.egc.ufsc.br)

⁶ Professor, M.Sc.

⁷ Professor, Dr.

This article presents the videoconferencing resource and its applications in distance education, describing its main types, features, the hardware and telecommunication resources required and a set of technological and pedagogical recommendations to improve the performance while using this tool.

Keywords Videoconferencing; Distance Education

1. The development

"Videoconferencing is an audio and video based, interactive communication system. The transmission can be made through: radio waves, satellite, cables, telephone system or fiber optics "[1].

Through videoconferencing, pupils and teachers, separated by long distances, can communicate and see each other as if they were in the same room. This platform allows the application of pedagogical features that enrich the lesson, as marking electronic on congealed pictures, graphical in computer, access to the Internet and the use of a document camera for presentation of pictures and three-dimensional objects.

2. Videoconferencing features

2.1. Hardware and software

A videoconferencing system demanded, ten years ago, a special composite equipment with an appropriated furniture where there were a camera, a TV set and a computer system, or alternatively, a packaged single module, with these equipments integrated in one single device that could be connected to any TV. Currently, videoconferencing became a much more accessible tool, being able to be carried in personal, portable computers or even though in mobile telephones and PDAs – Personal Digital Assistants.

However, the videoconferencing which relates this article is that one made in proper environments for education. The one that happens in special rooms, prepared specifically for this.

The use of the videoconferencing based on mobile and portable devices must be object of study and prototype projects, for technical viability evaluation and effectiveness measures.

1 2.1.1 To the teacher

2 The room destined to the teacher, does not need to be large, except when one wants to place desks for
3 "local" pupils, thus creating an audience. Two obligator features are: good illumination and acoustic
4 isolation. The place for the professor is called podium or tribune and from there he controls all the proc-
5 ess. The videoconferencing rooms are projected not to depend on the interference of one technician or
6 cameraman. This is a list of basic items:

- 7 · a camera with electronic control of focus, zoom and movement;
8 · a document camera, so projects can be draft, to demonstrate objects, graphs and hand-made illustra-
9 tions;
10 · a monitor or TV of reasonable size to see well all the pupils. Almost all the modern equipment of
11 videoconferencing offer PIP feature (picture in picture – a picture inside the picture), that allows teacher
12 to see his proper picture in a bigger picture of the room;
13 · a good microphone. A lapel one, or a wireless, or in a tripod;
14 · a computer with multimedia features (sound, video card with high performance, CD and DVD drive;
15 · one VCR to present videos recorded in tapes (with the current technology, pictures that have much
16 action and movements, still do not offer good quality of visualization in videoconferencing);
17 · one VCR to register the lessons for later reference [2].
18

19 2.1.2 To the students

20 The classroom destined to the students must follow the same recommendations related to acoustics and
21 illumination and normally has space to hold up to thirty people. At the place where would be the teacher
22 in a regular classroom, the videoconferencing equipment is placed. The classroom must have features
23 similar to the teacher's room:

- 24 · a camera with electronic control of focus, zoom and movement;
25 · a document camera, where the pupils can draft projects, demonstrate objects, graphs and hand-made
26 illustrations when they present works and seminars;
27 · a oversize monitor or TV so that the pupil of the last row can read what is written in the screen. Also
28 the PIP feature allows the pupils see the picture of the room inside the picture of the teacher, or the pic-
29 ture of the teacher while it presents a sequence of slides;
30 · good quality wireless microphones and an environment microphone, that captures the general sound of
31 the room;
32 · a computer with multimedia features (sound, video cards with high performance);
33 · one VCR to present recorded videos in tapes;
34 · one VCR to register the lessons for later reference.
35

36 In both cases, it is necessary to have a command console or a control panel, to control the camera, the
37 sound, the connection. The control can be in a touch-screen (a screen sensible to the touch) or can still
38 have a touch-pad (plastic surface that is capable to recognize the touch of a special pen) or a key-pad
39 (kind of remote-control).
40

41 With these devices, the teacher takes control of the hardware and software and directs the picture and
42 the sound of the local room as the remote ones.

43 In the multipoint videoconferencing system it is possible to connect several places at the same time
44 with the coordination happening from the teacher's podium. From there, the teacher can control all the
45 rooms through two different modes. The first one, made through the voice. When somebody speaks in a
46 room, the system immediately places, in the screen, the picture of the speaker. This mode makes possible
47 a more open and interactive lesson. The second alternative is called "director". In this mode, only the
48 teacher determines the picture and the sound he wants to show for all the participants of the videoconfer-
49 ence. The teacher "calls" the rooms and places them "on air" so they can participate
50
51
52

2.2 Telecommunication features

Until now, the majority of telephone communications and also the videoconferencing made in Brazil, passes through regular low quality telephone strings and, therefore, low speed. New technologies are arising and the same installed telephone cables are allowing an enormous evolution in quality and speed in communication.

The fast expansion of the networks based on IP – Internet Protocol – comes to turn easy the popularization of videoconferencing, as for organizations, as for individuals. Currently, ADSL technology represents, for videoconferencing, a privileged media. It turns available transference bitrates over 1Mbps, at fixed cost. Without the necessity of counting telephone pulses or interurban tariffs [3].

Also, one can consider in the near future, the use of more recent technologies like GPRS, EVDO and WIMAX [4] for mobile videoconferencing.

3. The application of videoconferencing in education

With the use of the Videoconferencing, the great hashing happens in the form, not in the content of the information. The teacher will need to plan the use of the picture to become more efficient the lesson. The features are often varied and not always are dominated by the teacher who is initiating with this new technology. An initial training is necessary and also the teacher is stimulated to use the creativity in the planning of the lessons [2].

A very common error is, simply, to transpose the lessons given in regular classrooms to videoconferencing systems, therefore the pupils will be expecting more than a simple "filming" of a conventional lesson. At the time of planning lessons is necessary to think about the interface that will be separating the teacher and the pupils (the camera and the microphone).

With videoconferencing, the teacher can include its proper picture and voice live or he can also speaks while fixed pictures (photos, graphs, drawings), pictures in movement (in video or multimedia) and pictures of the pupils in the remote rooms (in the case of Multipoint) are shown [5].

All these video and audio sources compose a narrative that needs to be planned to be more efficient. This doesn't mean that the teacher has to become a TV scriptwriter, but yes, he can use his experience as a watcher to imagine more pleasant modes to pass the contents to the students. This means that the teacher needs to start to think not just about text, but also, and mainly, in pictures.

The planning of the lesson as a multimedia scripts is a basic task for the teacher who wants to work with videoconferencing. Think about the lesson with a start, a middle and an end can be useful at the time to produce didactic content. Mainly, because a big part of the work needs to be done with some antecedence and demand time for research and/or execution. A suggestion would be to divide the time of the lesson in modules of content with average of 10 minutes, reserving moments for questions and using, as much as it's possible, pictures to illustrate the concepts.

It is clear that, given the variety of contents and didactic methods, each teacher search his proper way to work in accordance with his experiences and needs. Seminars and practical exercises presented by pupils, for example, can be a way to turn more dynamic and to become more interactive the lesson.

In videoconference, the teacher needs to focus his attention in the students. The lessons can be enriched with some activities to students of several places. In small group activities, students presentations and an occasional interval to give variety to the lessons. As a rule, the teacher should change his methods of instruction at each 10-15 minutes.

Another useful recommendation is to bring lecturers invited for the classroom. Also it can be useful to have lecturers at remote places, participating in videoconference multipoint. This can stimulate the involvement of the long-distance pupils.

1
2
3 3.1 Pedagogical strategies

4 In the distance education classroom, some students may adopt the attitude of TV spectators, expecting
5 entertainment instead of education [6]. It is important to avoid this attitude, planning well and focusing
6 the presentation with emphasis in the interaction between teacher and student.

7 Making questions and observing the corporal language, the teachers can keep the interest and the
8 comprehension of the pupils. This type of attention will enable students feel more comfortable.

9 The interactive videoconferencing can be an efficient tool for the educator. As well as other technolo-
10 gies, its utility is related directly to the instructor comprehension of its benefits, limitations and strategies
11 of use.

12
13 3.2 Suggestions to improve the performance of the teacher

14
15 Perhaps in the beginning of the training for videoconferencing, the teacher tries a certain unreliability
16 about handling the equipment. But with the practice, the trend is that these tasks become so automated
17 that they allow the teacher to conjugate content and form, in a pleasant rhythm for all.

18 Moreover, the experiences with the interactivity through videoconference show that, after an initial
19 moment of discomfort, the TV screen "disappears" and the participants nor perceive they are communi-
20 cating through a technological interface.

21 Therefore, the teacher can keep calm and leave the lesson flows as natural as possible, choosing the
22 more adjusted way for his own style to teach. For this reason, he must consider the two basic factors of
23 the audiovisual language: the sound and the picture.

24
25 3.2.1 Sound

26
27 Although not recognized, the sound gives sense to the picture. Therefore, it deserves a special attention.
28 The quality of the equipment of audio caption is very important and economies in this choice do not have
29 to be made. There are microphones called "environmental" or „ambient“ ones. They are multidirectional
30 and can pick-up all the voices produced in the room at the same time. They are indicated for the pupils
31 classrooms.

32 A problem inherent to this type of microphone is, when some people are speaking at the same time,
33 the reception of the sound can be very confused, not being able to identify who is speaking what. An-
34 other problem is the increase of possibility of producing echo; or either, the teacher speaks and his voice
35 returns for him, therefore the dialogue is confused by the classroom surrounding microphone. For these
36 reasons, the use of this type of microphone in great audiences or very populous rooms is not indicated.
37 The ideal application is in meetings that involve few people (up to ten). Also, the use of this microphone
38 together with the traditional ones (wireless), alternating them, depending on the situation.

39 Another basic axiom of audiovisual language is that a good sound always improves the picture. In
40 other words, our visual perception is influenced for what is heard. It is right therefore that "we see better"
41 the pictures in the TV when it comes followed with a narrative in off, describing the scene. The teacher
42 must use to the extent this kind of narrative feature in the videoconference. For this reason, the teacher's
43 speech is one of the strongest points of the lesson. Special attention to diction and speech always in the
44 microphone direction are some necessary cares [7].

45
46 3.2.2 Picture

47
48 It is good to remember that the stopped picture has more clearness and quality in the transmission of
49 videoconference. The ratio for this is that the equipment keeps the picture transmitted in the memory and
50 only relays what is moved. Therefore, the picture in movement tends "to smudge" on the screen when it
51 is moved.
52

1 An extra care has to be taken by the teacher. It is preferable to choose some fixed places to speak
2 instead of keep walking or moving in front of camera. The podium purpose is to fix the teacher in one
3 single place, but this does not have to immobilize the teacher. Depending on the size of the room, the
4 teacher can establish which will be the places that he will be in the classroom and to program the camera
5 movements. Also he can use the „Look at me“ feature, where the camera search the teacher’s voice or
6 one pin placed in his clothes, or still his microphone [8].

7 In picture issues, teacher needs to have a special care with the appearance. Total black, total white,
8 with fine stripes clothes, bright colors or with great prints must be prevented. Moreover the teacher needs
9 to be well located in relation to the light, just like in television shows. After all, he is the presenter of an
10 educative program that the pupils are attending on a TV screen in the remote rooms.

11 Some cares must be taken before initiating the lesson. The teacher needs to check the smoothing of the
12 pictures of all the cameras that he have to his disposal. The videoconferencing allows him programming
13 all of them.

16 4. Conclusions

17
18 The interactive videoconference is currently the richest possible tool in the long-distance education. It is
19 a possibility that always must be considered when is needed that separated groups interact in a creative
20 process.

21 The majority of the difficulties founded today, for the accomplishment of the videoconference, is
22 directly connected to quality and cost. Both obstacles are near to be surpassed. The evolution of the tele-
23 communications happens in speed up rhythm and the remaining obstacles will rely on pedagogical is-
24 sues.

25 Many low budget education projects will be able to rely on benefits of this rich tool, in interactivity
26 terms. This probably will improve quality and increase the interest for courses offered at a distance.

27 The videoconference is already a common feature in personal computers of middle class teenagers,
28 who use it for entertainment in services like ICQ and MSN Messenger. The people involved in the crea-
29 tion and application of long-distance education should promote experiences based on videoconference, to
30 evaluate its efficiency and validity in the process, therefore it lacks little time for the technological barriers
31 fall and the videoconferencing become a very attractive feature, as much to the pupils, as to the edu-
32 cationalists.

35 References

- 36
37 [1] Dulce M. Cruz, Construção de uma metodologia de criação, produção e avaliação no Ensino a Dis-
38 tância baseada em videoconferência, Projeto de Doutorado, UFSC, Florianópolis, SC, (1997).
39 [2] LED Laboratório de Ensino a Distância. Disponível em: <http://www.led.br>. (2000)
40 [3] J. C. Oliveira, Serviços de Teleconferência: Uma Visão Geral. PUC-Rio, Rio de Janeiro, RJ. (1995)
41 [4] J. Wilcox and D. Gibson, Video Communications: The Whole Picture, CMP Books, Gilroy, CA
42 (2005)
43 [5] Luiz F. G. Soares, L. Tucheran, M. A. Casanova, P. R. R. L. Nunes, Fundamentos de Sistemas
44 Multimídia, VIII Escola de Computação, Gramado, RS. (1992)
45 [6] J. Reed and M. Woodruff, Using compressed video for distance learning.
46 <http://www.kn.pacbell.com/wired/vidconf/Using.html>. (1999)
47 [7] Luiz F. G. Soares, S. de L. Martins, T. L. P. Bastos, Lan Based Real Time Audio-Graphics Confer-
48 encing Systems, General Overview, CCR066, Technical Report Rio Scientific Center - IBM Brasil.
49 (1988)
50 [8] M. Woodruff, J. Mosby, A brief description of videoconferencing. Videoconferencing in the class-
51 room and library. <http://www.kn.pacbell.com/wired/vidconf/description.html#what>. (1996)
52