Videoconferencing Guide

The Technology and Pedagogy of

Two-way communication over

Geographical distance

Version 3.0

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1. Introduction

People are often asked to go to meetings, attend and/or give lectures from a geographically distant site, away from their own institution and/or organisation. Distance, costs and the duration of the journey are frequently a source of discouragement to attend such meetings or even courses. Videoconferencing has emerged as a most successful solution. In use since the early 1950's[1], it has slowly evolved from its most rudimentary form, when the first system based on video and audio communication took place.

Videoconferencing is almost always associated with distance education. However its purposes have been found to be extensive and vary in nature. Videoconferencing is useful in general applications such as meetings, classroom practices and cross collaboration between partner institutions. It is also finding its use in more specific applications such as telemedicine, TeleEducation, remote laboratories, telecommuting and others.

A distinction should be made between *distance education* and *videoconferencing*.
Distance education takes place when the teaching and learning process occurs over a geographically marked distance. There are also various major issues of how distance education varies from the traditional classroom settings. These include modification and adaptation of existing teaching skills, as well as the application of various delivery systems. Such delivery systems include a combination of video, audio, print, and data[2] resources.
Distance teaching in itself might occur without the presence of any one of the technological resources. In fact distance learning can occur completely online via the web using course management software without offering any video services. However one must keep in mind that in a traditional classroom setting, one of the strongest influences on the students' own learning is the visual contact and the physical expressions exchanged between the learners and the teacher.
Videoconferencing offers a solution to a problem which most distance teachers and not only, encounter.

[1] A history of videoconferencing technology: http://myhome.hanafos.com/~soonjp/vchx.html [2004]
[2] These include various computer applications such a CMC (Computer Mediated Communication) and CAI (Computer Assisted Instruction).

Videoconferencing[3] is the simultaneous transmission of video and audio between two or more different locations. It is a technology that is most frequently used in addition to other resources and is not only used for teaching but it enhances communication between two or more people who are physically restricted from meeting face to face.

Using this scenario, the possibilities of putting this effective technology to use are innumerable and include communication with restricted access rooms such as laboratories, operation theatres in hospitals, and various other locations which can act as instructional settings not only for students studying at higher levels of education but also for employees at the work place[4]. In such a way videoconferencing is not only utilised to train and educate people, but to further promote cross cultural exchanges between students and tutors as well as stimulating collaborative learning.

[3] The Videoconferencing Cookbook.: http://www.videnet.gatech.edu/cookbook// [2004]

[4] Videoconferencing in the new millennium. http://www.uic.edu/depts/accc/newsletter/adn30/vc.html [2004]

2. Videoconferencing: the Technology

The technology of videoconferencing is based upon a combination of various determining factors which transfer video and audio across a network. The general keyword associated with videoconferencing is ***interactivity***[5]. This allows *real-time* visual and audio contact between two or more persons at different geographical locations. Simultaneously it also supports the use of various additional resources such as computer presentations and pre-edited video clips.

[5] Interactivity: A forgotten art? http://www.gsu.edu/~wwwitr/docs/interact/ [2004]

2.1. How does Videoconferencing work?

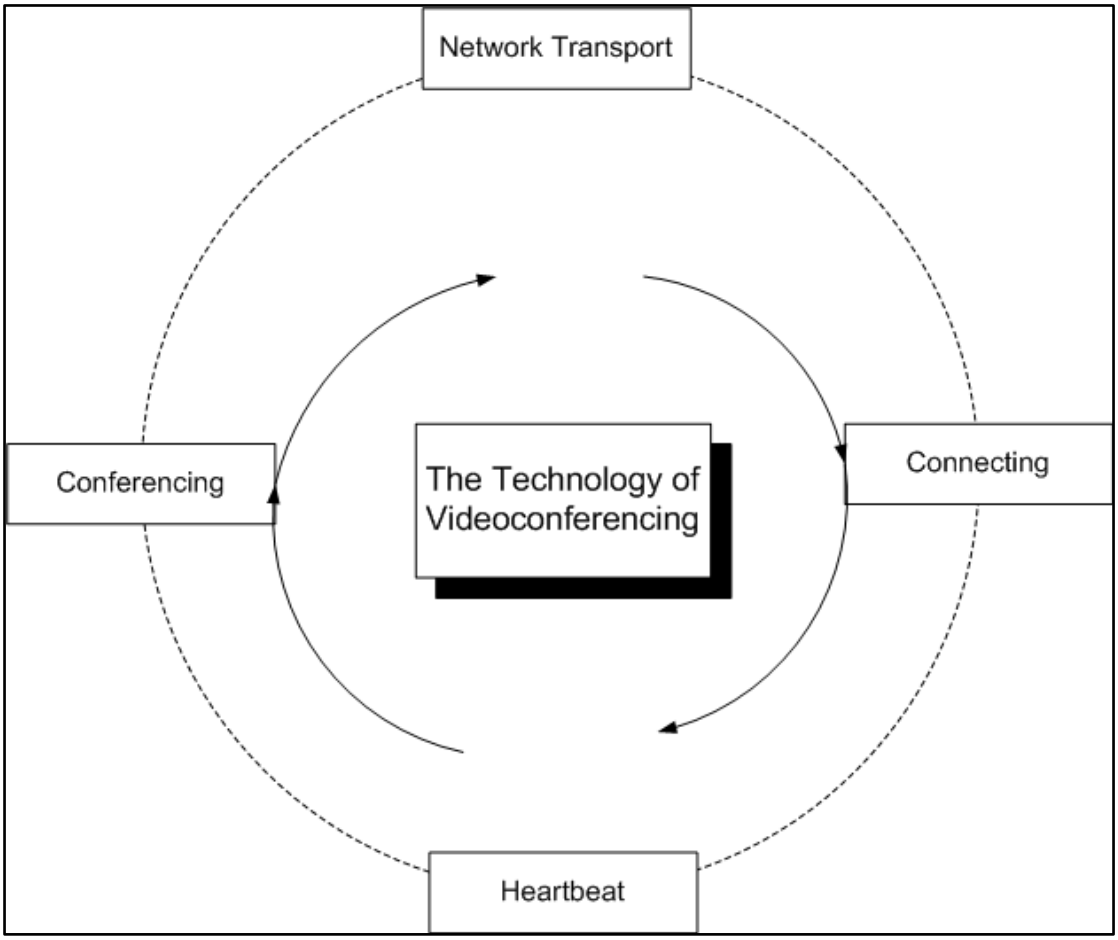


Figure 1 – Videoconferencing flow

The four major components of the system are:

- The Network Transport and service which refers to the actual network between the sites. At the University of Malta there is a choice of two types of links, IP[6] and ISDN[7].
- The Connecting Mechanism, if enabled, allows the connection between two or more sites together. Some mechanisms may also contain directory services which facilitate authorisation and authentication allowing control over who uses the videoconferencing services.
- The Heartbeat provides behind the scenes information of how the videoconferencing session is run. It also gives performance feedback on

[6] IP refers to Internet Protocol - The protocol defines how information gets sent between servers or systems across the Internet.

[7] ISDN – an abbreviation of integrated services digital network, an international standard to transfer video, voice and data over digital telephone lines.

the sender and receiver information. If one site disconnects, the heartbeat sends information to the receiver that no more data signals will be received.

- The Conferencing contains the audio and video signal which is compressed and sent to the receiving site/s.

2.2. Types of Videoconferencing systems

There are three kinds of videoconferencing setups.

2.2.1. Integrated Room Size

The teacher and students will be located in a technologically equipped room with multimedia resources. Multiple monitors are normally used to display video, and multiple microphones for the audio. This supports one to many interactive learning, normally controlled by the teacher or chairperson. Participation is normally unequal and distinct with formal communication. Students can attend both at the local and remote sites.

2.2.2. Desktop

This normally supports one-to-one videoconferencing, where participants who do not have access to videoconferencing equipment may communicate with each other using desktop videoconferencing software. This is an ideal tool for meetings and tutorial sessions.

2.2.3. Portable Units

The videoconference system is normally set in such a way so that it can be transported from one location to the next. Connection is also established through a network connecting the local (near-end), and the remote sites (far-end).

2.3. Videoconferencing Equipment

Any videoconferencing set up requires some basic equipment components:

a) Codec[8] – this can be implemented in hardware, software or a combination of both. The codec initially changes the analogue video signal to compressed digital form (encodes) and then decompresses and changes the digital signal back to analogue video when receiving transmitted information (decodes). A slow codec or low bandwidth results in an unstable picture.

[8] Codec – Coder/Decoder for compressing and decompressing data.

b) Monitor – In conference rooms a presentation screen is required. Other monitors are used to display the remote site/s, and the local site.

c) Camera/s – These can range from a simple desktop camera to other more high quality systems equipped with automatic pan and zoom. A minimum of two cameras, are required for adequate interactivity between tutors, students and peers, that is, one camera at the local end and one camera at the remote end.

d) Audio – Videoconference rooms are normally equipped with a set of microphones. These can either be found in in-built systems, or else as separate parts plugged in the system.

2.4. Connecting via videoconferencing

Once a connection is established data can be transmitted from one site to the other. Connection can occur in a number of ways:

- IP Video

IP Video is seen as a stable solution provided that connecting institutions are provided with enough bandwidth over their network. This platform uses the Internet protocol, hence in its most basic form; no special connection is required except for the existent network cabling.

- ISDN

This technology is widely used with high quality videoconferencing transmission. Video is transmitted through the existent phone line infrastructure providing guaranteed bandwidth for a point-to-point connection.

Both IP[9] and ISDN have got their advantages and disadvantages. Many connections nowadays, including that at the University of Malta, provide for multiple platforms therefore the migration from ISDN to IP is easier to achieve.

[9] Although the Computing Services Centre at the University of Malta supports both connections, it is suggested that users connect through over the internet network using IP addresses.

ISDN		IP	
Advantages	Adheres to standards	*Advantages*	No calling charges
	Works over regular phone lines		Multimedia integration, web and document sharing are built in.
	Works well for high quality videoconferencing		Growing in popularity and standards based.
Disadvantages	Multimedia integration, web and document sharing are difficult	*Disadvantages*	
	Increased line costs and call charges		
	Isn't available in rural areas and other geographical locations with a bad telecommunicating system.		Requires high bandwidth networks

Figure 2 – A table of advantages and disadvantages of different connection systems

Other connection systems may include a Multipoint Control Unit (MCU) which allows multiple sites to participate in a videoconference in real time. IT Services, at the University of Malta, host this MCU service as part of the videoconferencing service facility.

2.4.1. Point to Point vs. Multipoint[10]

A few years ago, videoconferences were mostly point-to-point, that is one two entities communicate with each other directly. A multipoint videoconference allows for more advanced levels of interactivity. It also enables a wider communication and pooling of resources for research and educational purposes.

Having a multipoint videoconference means that one site is able to communicate with more than one site. Numerous sites are visible and set in quadrants on the screen. In certain cases this set up can be modified so that the main lecturer appears on screen throughout the lesson irrespective of which site contributes to the lesson. For interactivity and discussion[11] purposes, the quadrants can then be re-activated. However more frequently the participating sites would need to 'mute' the volume from their end, so as to avoid additional confusing noise and disturbance. This helps having more focused attention during the lecturing period. When muted, the sites can afford their continuous presence on screen. The advantage of this is that the lecturer avoids becoming just a talking head on screen, as the audience visually participating on screen gives an indication of the flow of the lecture, in terms of motivation and attention.

Having a multipoint videoconferencing session may have its disadvantages as well. Sites should always be limited to no more than 4 at a time because carrying out adequate lectures with more interactivity and student involvement becomes too time-consuming. It is also difficult for the lecturer to develop a personal relationship with the attendees in each country. Having more countries increases the formality and decreases the active student participation in each session.

[10] The Multipoint facility offered by the University of Malta videoconferencing facilities will be available soon. Currently only point to point conferences are supported.

[11] For more details visit: http://www.wainhouse.com/files/papers/wr-navseadistedu.pdf [2004]

3. Videoconferencing at the University of Malta: where, what and how?

Videoconferencing at the University of Malta is now easy to access and to use!

The technology supports connections both on ISDN and IP systems enabling audio-visual links between two or more geographically remote sites.

The system is designed in such a way so as to facilitate lecturer meetings and partner collaborations, as well as overseas interviews, vivas and as an additional resource in distance education. Courses can be transmitted to remote areas, having students attend both on a local and remote scale. Classes not larger than 15 students are recommended both at the local and at the remote end. This is due to the physical size of the videoconferencing suite, as well due to the participation factor. The greater the number the participants the less chance they would have for increased interactivity throughout the courses.

3.1. Where can videoconferencing take place?

Two videoconferencing halls; VC Hall 101 and VC Hall 102, having capacity of 66 and 40 respectively and two other videoconferencing suites; TR 107 and TR 103, having capacity of 26 and 2 respecyively are located at the **IT Services Building,** University of Malta, (Campus Map - Location 45).

3.2. How does videoconferencing work?

The videoconference system at the University of Malta helps you:

1. reach a wider audience cutting on travelling time and costs
2. connect to any site which has videoconferencing equipment over IP. If equipment is not available, desktop conferencing may also be used at the remote site.
3. establish a connection from a specific location set up [e.g. a laboratory] on site within and outside the university premises
4. make use of small and portable equipment which is easy to handle
5. obtain high quality picture and sound
6. conduct your own videoconferencing session without the aid of operators or technicians
7. conduct interactive sessions with small groups of students at multiple sites, making lessons more effective and promoting cross cultural collaboration

This facility has been made available to you by IT Services at the University of Malta, at a minimal cost[12].

[12] Please refer to the IT Services website for more details: www.um.edu.mt/itservices

3.2.1. How does the booking system work?

A provisional booking form[13] can be filled in and submitted online to IT Services support staff. Important information to be considered includes the contact numbers, information related to the person in charge of the videoconference at the far end and the purpose of the videoconference itself.

3.2.2. How should a videoconferencing session be planned?

In order to be able to fill in the provisional booking form appropriately it is important to identify the necessary information which will help result in a successful videoconferencing session.

Preparation and *Planning* are the most important steps for a successful videoconferencing session.

1. Identify the site or sites which will be involved in the session.
2. Determine the needs of the videoconference session.
3. Get all the details of the remote site, including contact name/s, tel. number/s, relevant e-mail addresses, operator details and the connection numbers. Try to get an additional helpline in case of emergencies.
4. Establish a communication link with the sites via e-mail.
5. Confirm whether the far end site/s have videoconferencing equipment available.
6. A tentative date for the session is to be entered in the Provisional booking form. In the meantime, IT Services staff in charge of Videoconferencing sessions allocates a videoconferencing suite.
7. Verify the booking dates with the remote site.
8. If the videoconferencing session is being tried out for the first time with a particular remote site, a test session is booked prior the actual conference date.
9. Obtain as much information as you can about the remote audience. Knowing their interests and experience relative to the content which will be presented and discussed will give additional help when planning for the session. This will also help to carry out a more informal and personalised session.

[13] See appendix 1

3.2.3. How will the videoconferencing equipment be set up?

The room will generally be set up according to the individual conferencing needs. There are 3 typical setups which cater for videoconference needs.

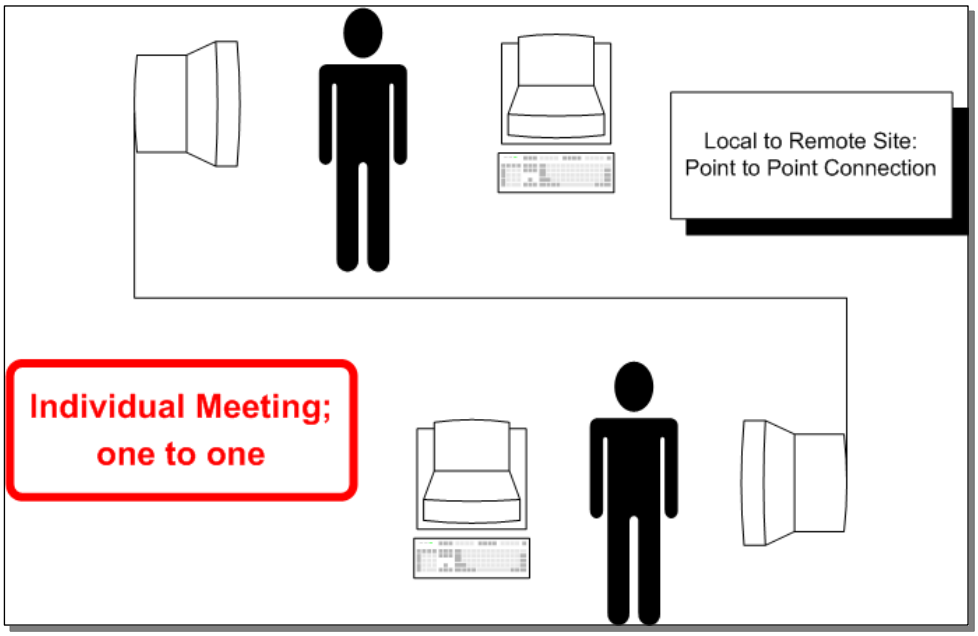
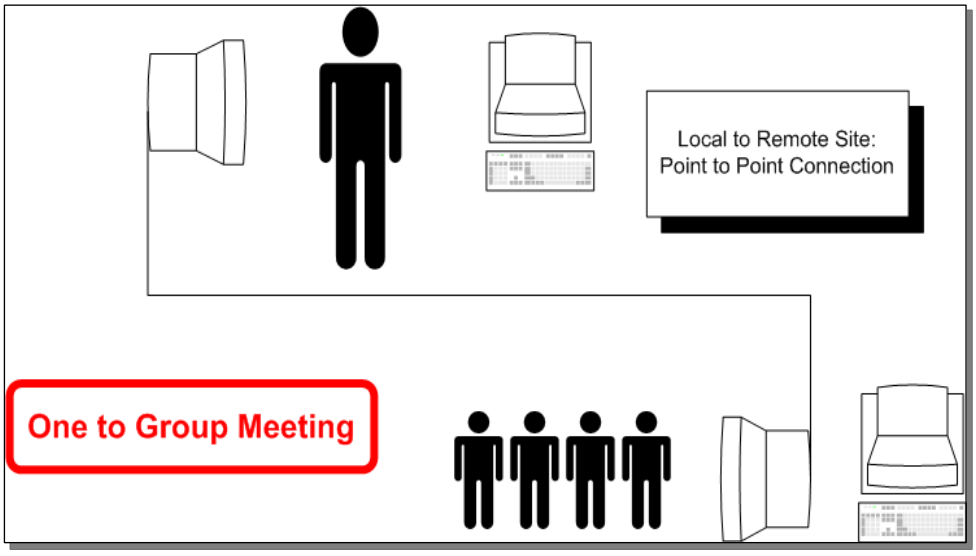


Figure 3 – Meetings can also be used for project collaborations, research purposes, and interviews

Figure 4 – Setup for one-to-many project discussions



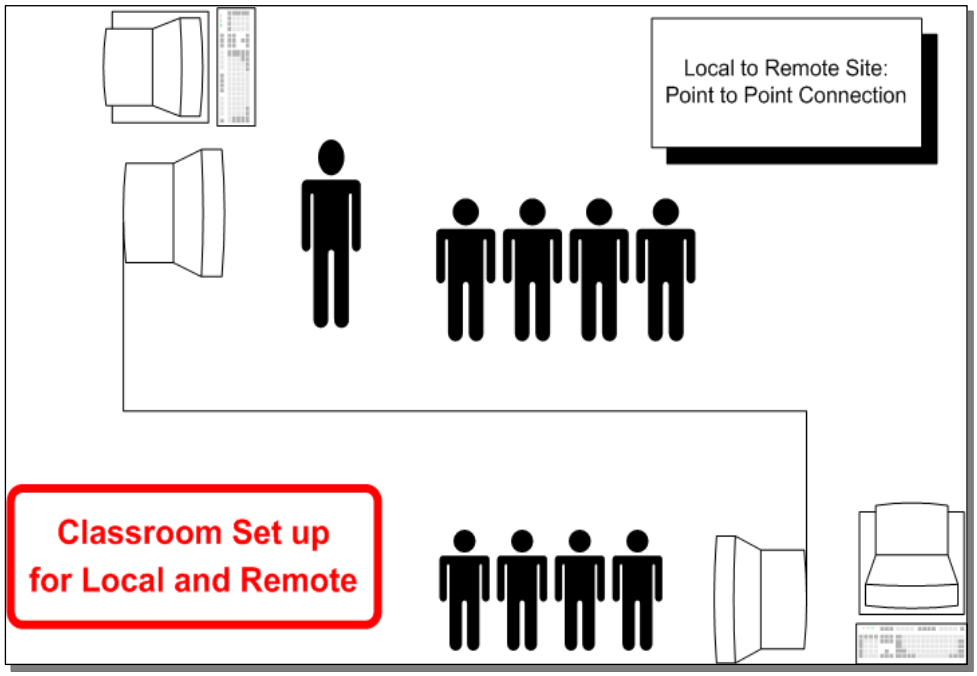


Figure 5 – Typical lecture setup

In case a different set up and location is required, fill in the additional comments box in the provisional online booking form.

The equipment found in the suite will be set up by an operator, prior to the session. However for your benefit, these photos show how the equipment is normally set.

4. Videoconferencing: Tips and Strategies

Videoconferencing is such a flexible and versatile system that it can be used for multiple purposes[14]. However there are certain strategies which need to be taken into consideration prior to each session and which will contribute to having a successful conference.

> Remember that: *failing to plan is planning to fail!*

4.1. Logistics

Before starting off on videoconferencing it is advisable to take into consideration some logistical details which have to be prepared well in advance, for example a week or a week and a half prior to the session.

1. Identify the purpose of the videoconference; determine ***aims***, ***objectives*** and ***attainment targets*** for each session.
2. If the session is scheduled as a lecture, prepare a lesson plan, determining the audio visual resources (as required for the lecture). Obtain any copyright clearance for use of printed/graphic materials if necessary.
3. Arrange a meeting with the facilitator, guest speaker or technical support at the remote site. The meeting does not need to take long. However it is important to establish the first contact.
4. Obtain relevant information about the audience; it is important to get to know about the participants in large discussion groups or tutorial sessions. This will help make the session more personalised and less formal establishing a better contact and improving interactivity.
5. Ensure that if a lecture is planned, the remote facilitator is present throughout. Establish defined roles and responsibilities prior to the session.
6. Book the videoconferencing suite; use the IT Services website to fill in the booking form and submit it online. In your form make sure that you write down the room set up needed for the session.
7. Send printed material in advance; whether it is a one to one meeting or a tutorial session or a lecture, ensure that any agendas or hand-outs are sent via e-mail or in case of study-units, make sure that the material is uploaded in the VLE. Printed material is an important appendage to any

[14] See Part 1: Introduction

videoconferencing session. Participants need to know in advance what contents the session will delve into. Experience has shown that attendees having reference material will disengage less easily throughout the videoconference.

8. Before the session, send an email to confirm that all printed material has arrived.
9. Take into consideration the time zone differences between local and remote sites and take in consideration daylight saving charges.

4.2. Planning the Lesson

It is important to plan for a lesson with interaction in mind. Each lesson should follow a typical matrix that suits videoconferencing purposes[15]. A videoconferencing lesson focuses more on collaborative learning rather than on the traditional didactic teaching process. Therefore each lesson has to be structured and designed in such a way so as to allow the learner to be more active involving more project building and problem solving as resources rather than the traditional lecture presentation.

Objectives[16] are typically structured according to hierarchical learning orders to facilitate the generation of ideas for more interactivity during the class session.

- ✓ A lesson plan matrix[17] should include the following components:
  a. Expected learner outcomes (lesson objectives)
  b. Methodology and activities
  c. Materials and audio-visual resources
  d. Time (duration of each planned activity)
  e. Notes (support hand-outs and additional notes to be supplied before or after the session)
- ✓ Allow 30%-50% of the total session for lecturing (around 20 – 30 minutes for 1 hour lectures). Use the rest of the time for interactivity, discussion and collaborative learning.
- ✓ Make an allowance (5-8 minutes) for adequate introductory elements such as a welcome address, site roll calls, establishing a friendly atmosphere with some typical ice breakers, defining the lesson objectives and setting the interaction expectations clearly.

[15] To view lesson plan templates and examples check these links: http://crlt.indiana.edu/dial/projects.html [2004]; http://www.learningspace.org/videoconf/projects/ [2004].

[16] Writing learning objectives using Bloom's Taxonomy: http://www.ukcle.ac.uk/resources/reflection/figure3.html [2004]

[17] See appendix 2

- ✓ Define the learner objectives (not more than 3 or 4 for a 1 hour lesson)
- ✓ Present the content in a logical sequence (chunk the content and insert summary or discussion points between one chunk and the rest)
- ✓ Avoid leaving one image source or slide on for more than 5 minutes at a time. A variety of sources makes the class more exciting. However also take care not to overdo it otherwise students/participants might get confused.
- ✓ Allow for pauses; a pause at the end of each part/segment of the lesson allows time for reflection and gives an indication of the feedback/response from the audience.
- ✓ Make an allowance for question time. It is important to have a pre-prepared set of focused questions which elicit responses from the students. Sometimes asking "Does anybody have a question so far?", might not be enough. Students might feel embarrassed to speak or give feedback. Asking direct questions related to the lesson, helps stimulate more interactivity.
- ✓ Prepare the lesson opening and closing, starting the lesson with an activity helps get the students interested and increase their motivation for the ensuing parts.
- ✓ Invite guests; speakers enhance the participants' motivation. Other guests include faculty members or colleagues, who can follow this experience and appreciate the potentials of this system.
- ✓ Coordinate with other teaching partners at the remote end if necessary. If during the course the remote end facilitator can also take the role of a course instructor ensure that you plan the lessons jointly and that no class overlap occurs.
- ✓ Share lesson scripts and graphic visuals with the remote end facilitators so that they can keep pace with the lesson and give students specific instructions.
- ✓ Plan for the after-conference follow up. Prepare the necessary documentation for the students as backup to the session. Archive the lesson plan for reviewing later.
- ✓ Distribute (either hard copy or online) an evaluation form of the session for the participants to fill in. Go through the feedback and carry out a self-appraisal to identify strengths and weaknesses in the course.
- ✓ If a required update the relevant course related web-pages, including students' work and/or projects.

4.3. Videoconferencing Tips

What should be done for the videoconferencing session to be successful? Listed below are a number of tips which presenters can follow in order to achieve maximum effectiveness during each session. Most of these tips apply to any videoconference format and set-ups including meetings, lessons, tutorials.

The most important tip is that each participant in the session behaves naturally. *Be yourself!*

4.3.1. Communication Skills

- ✓ Find time for an informal chat prior to or after the session amongst all the participators. This helps establish a human contact and will aid more interactivity during later sessions.
- ✓ Use clothes adequately in front of the camera.

a) Natural or pastel coloured clothes work best.

b) Reds or other intense colours should be avoided. Stark white shirts might also cause some form of visual disturbance.

c) Do not wear striped or intricately patterned clothes.

d) If the lapel mic is used, the presenter should ensure that his/her hair is pulled back if it is lengthy. The hair brushing against the mic might cause audio disturbance.

- ✓ Show interest in all the participants. If small groups are online put some effort in trying to remember the students/partners' names. The facilitator can also help by sending a list of the attendees prior to the start of the session.
- ✓ Try to make the introductions of all the participants so that the students will feel that they're all part of the same class.
- ✓ Encourage remote to local site communication in the form of discussions and group sharing in particular project work.
- ✓

a) Verbal Skills

- ✓ Speak naturally in a strong clear voice.
- ✓ Take time to repeat important or catchy phrases. Sometimes it helps to provide an additional summary at the end of each chunk of content delivered.
- ✓ Speak slowly, placing direct emphasis on key words.
- ✓ Avoid reading out loud from a PowerPoint presentation unless a visually impaired participant is attending the session.

- ✓ Using one's own words and own experiences, to describe what is written on the presentation will heighten the students' interest in the lecture content.
- ✓ Use adequate intonation and voice projection to get the main points of the session across to the students/participants.
- ✓ Take time to pause. Pauses between one sentence and the next serve to stress the importance of what has just been said. Pauses after a 5 minute uninterrupted speech allow space for reflection, where students/colleagues can think back on what they have heard.
- ✓ Demonstrate enthusiasm towards the subject matter. Avoid speaking in monotones, people watching the screen will have difficulty in following.

b) Visual Skills

- ✓ Try to avoid moving around the room. It makes following the session from the remote end much more difficult.
- ✓ Decrease gesticulating movements and if hands are used to enhance body language try to keep them at the same distance apart at approximately the same height.
- ✓ Use your hands as indicators accompanying speech, for example to show how the size or the length of an object or to point at a particular item.
- ✓ Avoid distracting movements such as tapping a pencil or swivelling in the chair. Participants should also be made aware that too many movements and shuffling around distracts not only the presenter/course instructor but also diverts their peers' attention at the remote site.
- ✓ Try to keep all the participants within camera view. If this is not possible due to the room set-up, try to move the camera to capture the person/participant who contributes on the screen. Keep in mind that the camera has automated positions so prior to the session; pick places that will not be in view to avoid having participants sitting there.
- ✓ When pre-setting the camera positions, frame the video image on the camera properly, so that the presenter/main speaker will be the central inset in a clear cut frame.
- ✓ When giving a presentation or speaking to a remote audience, remember to look at the camera not at the display of the remote site on screen. Otherwise the remote audience will not feel that they are being addressed (it is like not looking somebody in the face while speaking to them).

- ✓ If illustrating a slide from a presentation remember to use the mouse pointer to point out objects. Don't point at the display with your finger or a laser pointer as the remote audience cannot see it.

5. Videoconferencing: the pedagogy

Videoconferencing poses new challenges to course designers, planners and instructors in such a way that they have to integrate this innovative technology into the teaching/learning process. However the tutor always prevails as the key medium in this instructional setting. The strategies employed in the educational process all form part of the term pedagogy[18].

The aim of videoconferencing is that of providing two-way communication; interactivity. Because the primary experience any one has of video is that of simply watching rather than talking with or to the person/s at remote sites, tutors have to place extra effort in their lesson plans to include this interactivity.

5.1. What is interactivity?

Interactivity is the contributing factor to active learning[19]. Active learning involves the students in all the forms of learning where students do more than just listening. Their involvement has to reach higher order thinking skills[20] such as *analysis*[21], *synthesis*[22] and *evaluation*[23] processes.

Research has frequently shown that students retain more motivation and enthusiasm for the class when actively involved. Therefore technology based interactivity, where the students are simply limited to sitting in on a videoconference, during a class is simply not enough to stimulate the learners' attention.

5.1.1. How can more interactivity be implemented during a class session?

Stimulating interactivity during class is the ability to help the students learn, apply what they have learnt and think about the way they handled each situation. Listed below are practical examples of how interactivity may be more included in each session.

1. Traditional lectures have to be modified if applied to videoconferencing classes. One can shorten the course content or increase the duration of

[18] Pedagogy refers to educational or instructional activities. http://www.hyperdictionary.com/dictionary/pedagogy [2004]

[19] Active learning places the responsibility of the individual learning on the students themselves. http://edweb.sdsu.edu/people/bdodge/Active/ActiveLearning.html [2004]

[20] Bloom's Taxonomy. http://www.coun.uvic.ca/learn/program/hndouts/bloom.html [2004]

[21] According to Bloom's hierarchical taxonomy of learning the analysis phase supports the break down of information material into components, examining them and point out general inferences.

[22] Synthesis refers to the building up of an original concept or idea from pre-existing knowledge

[23] The evaluation phase provides the learner with skills to criticise and judge materials or ideas supported by evidence built on the individual's personal values and opinions.

the module. Allowing for pauses during a class session helps students focus more and get a better understanding of the underlying concepts.

2. Inserting brief demonstrations where the students themselves are involved, helps to establish more contact in class. Remote end students should have the possibility of participating in the class session as much as local students.
3. The tutor can also plan for brief ungraded exercises whose aim is to stimulate discussion or analysis workshops.
4. Guided lectures[24] and feedback lectures[25] also help the students come to terms with the content which is being given to them. These sessions promote collaborative learning, where both local and remote end students are given the opportunity to share their individual experiences online.
5. Focused discussion during class sessions also helps to involve learners actively. The course instructor's role is to provide support reading materials (given prior to the lecture), and a structured plan of the direction the discussion should take.
6. Analysis of specific case studies (fictitious, open[26] or closed[27]) also contributes to various discussion periods, helping students enhance their problem solving skills working in a group.
7. Cooperative learning and peer teaching other ways of establishing interactivity during a class session.

5.2. Instructional Strategies

The use of videoconferencing in the distribution and construction of knowledge takes place within certain activities, such as in meetings, seminars and in a classroom setting. For interactive instruction to occur the participant/student has to be the main focus of each planned session. There are various ways of how to increase student interactivity by adopting the student-centred approach to the teaching process. This includes:

- ✓ Pre and post conferencing contact
- ✓ Distribution of the videoconferencing timeline[28]
- ✓ Establishing of rules, guidelines and videoconferencing etiquette

[24] Lecturer conducts a 30 minute uninterrupted lecture, without handing out notes. Students meet in groups and discuss in detail the main concepts highlighted by the instructor.
[25] The feedback lecture involves organising short tutorial sessions each separated by group study sessions.
[26] No ending is provided in this case study. Participants are expected to predict the solution.
[27] A solution has already been provided in this case study. Students will analyse the results produced and whether an alternative solution could have been provided.
[28] See appendix 3

- ✓ Assigning of roles and responsibilities in class

Instructional paradigms within a videoconference setup include: active, virtual, synchronous/asynchronous, supportive and dynamic learning. Each strategy involved focuses on these learning paradigms.

5.2.1. Participants' Motivation

Participants come to class with their own cultural and social backgrounds as well as previous learning experiences. Therefore the instructor takes on the role of a guide/director rather than the provider of knowledge. In order to keep participants focused, he/she must provide plan motivation factors strategically in the lesson. A guide to learner motivation is given by Keller[29] where he categorises motivation under 4 headings, attention, satisfaction, confidence and relevance.

5.2.1.1 .1 Holding the participants attention

a) Using variation throughout the lesson by a combination of resources and included activities.
b) Thought provoking inquiry periods helps students remain alert and attentive.
c) Hands on participation in the course material/s by all the participant students.
d) Light humour within a session serves to break some of the monotony and focus the students' attention once again on the instructor. Instructors have to be careful that the humour is neither culture, race nor gender based so as to avoid misinterpretation by any of the participants.
e) Conflicting issues may also serve to arouse interest and the students would be required to discuss and think about provocative issues.
f) The use of practical examples as case studies also serves to help students identify with real life instances and thus may be of additional value to the development of problem solving skills.

5.2.1.2 .2 Keeping the participants satisfied

Having the learners feel more satisfied with their results not only increases the positive atmosphere within the classroom setting but also propagates the general usefulness of having such a learning environment.

a) Instructors should provide positive criticism as a reward, (verbal feedback) without overdoing it.
b) Feedback should be consistent and fair.

[29] Keller, J. http://www.ittheory.com/keller1.htm [2004]

c) The practical application of a new skill to fit in a previously acquired knowledge framework helps the student feel that what he/she is learning fits a purpose.

5.2.1.3 .3 Enhancing the participants' confidence

More participants' confidence is gained when expectations and targets are clearly set. In this way the learner comprehends the expected outcomes and therefore can strive to achieve them.

a) Specific aims and objectives should be set at the start of each session.
b) Lessons are stepped in a hierarchical order of complexity. Increased difficulty levels should be gradual and consistent.
c) Set expectations should be realistic enough for the learners to achieve without excessive difficulty.
d) Participant control over their own achievements helps them feel that what they attain is strongly dependent on the effort they put in.
e) Opportunities for practice also increase the learners' confidence in their newly acquired knowledge base.

5.2.1.4 .4 Relevance of Learning

When a participant feels that the content material is relevant to day to day applications, the interest and motivation are heightened. One looks at relevance not only in connecting the present material to past experiences but also to present and future applications.

5.2.2 Activity Design

Each activity is designed suiting the pedagogic needs of each individual class. Activities can vary throughout the lesson to fit not only content but also the methodology of the lecturing philosophy adopted.

5.2.2.1 .1 Brainstorming Sessions

These can be organised as either group centred or class centred sessions where participants may be asked to come up with solutions to specific problems. A subsequent analysis can then be developed enhancing more collaboration between all the class members.

5.2.2.2 .2 Brainteasers

These help participants think creatively and observe different viewpoints. Cross-cultural exchange of ideas is thus promoted within the classrooms online.

5.2.2.3 .3 Question and Answer Activities

There are various techniques which can be used during question/answer activities to add more interactive element to each session.

a) Repeat questions asked from either location in a clear voice. This ensures that all students have understood all queries.
b) Pose a question in such a way that it is not close ended requiring monosyllabic answers (yes/no answers). Inquiry arousal, provocative questions are normally used to stimulate discussions.
c) Allow time for the audience to respond. It is not advisable to ask a question to which no one has the time to answer.
d) If one participant asks a question, it has been found to be good practice, to allow his/her peers/colleagues to answer. It is also important to repeat the answers (in a summary format) after the students themselves and offer some positive reinforcement.
e) Try to call on specific students when asking questions. This increases the alertness of the class when the members start looking tired.

5.2.2.4 .4 Focused Discussion

Pre-planned thought provoking structured questions are planned in such a way such that discussion amongst participants at the local and remote end is stimulated. Discussions can be generated by splitting the class into small groups and assigning differing material to introduce. Varying the questions asked such as exploratory, cause and effect, hypothetical, or diagnostic can help increase the value of the discussion.

5.2.2.5 .5 Project Based Activities

Activities which are project based are assigned prior to or after lecture sessions making enough allowance for adequate presentation of the products.

5.2.2.6.6Demonstration, Experiments and Investigations

These visual activities can be used as a strategy to change the pacing of the lesson and allow the students a short break from listening to the lecturer/course instructor. Seeing an action on the screen helps increase the interest and motivation in the lesson.

5.2.2.7 .7 Student Displays

Student displays both on the course web-site or on-camera are very important as they tend to increase the student satisfaction in the course and ultimately in the system. Positive feedback from the instructor is encouraged in this activity. Caution must be used when attempting this as problems might arise with incompatibility of systems or software and a possibility of virus transfer. It is best to try the displays during the test session done in advance.

5.2.2.8.8Case Study Analysis

Case studies enhance the relevance the student feels that the course material has to real life experiences. Such an activity helps with enhancing problem solving abilities in higher order learning.

5.3. Behaviour Management

Since videoconferencing is by itself a social activity, behaviour takes on a very important role in it. There are certain behaviours which might be acceptable for a traditional classroom setting but be unacceptable for the videoconferencing room. The behaviour guidelines are important for both lecturers and students to follow to enhance the educational experience for both ends.

5.3.1. Videoconferencing Etiquette

a) Be aware of the image which is being projected. If the videoconferencing room supports an additional monitor showing the local image, take a brief look periodically to see how the screen is appearing.
b) Ensure that the participants are aware that during interactive periods they should speak in a loud clear voice. Mics are to be used where necessary especially for large group setups.
c) Participants should also try to make as much eye contact with the camera as possible so that the students at the other end feel that they're communicating over the camera. Body language and facial expressions have a large impact on the educational experience.
d) Interruptions should be planned and made an allowance for.
e) It is important that once the room has been set up and the testing session has been carried out, no-one tampers with the equipment and the system setup.
f) No-one should talk out of turn. If such a rule is not observed a cacophony

of illogical noises will result instead of clear input. Participant should either

wait their turn or else signal discretely to the course instructor/facilitator/chair that they would like to contribute to the session.

g) Loud coloured clothing and noisy jewellery prove to be a great distraction on video. These should be avoided by both the presenter and the participants.

h) Data collaboration and sharing is very important during such sessions. Because of the physical distance separating the people involved and because of cultural differences, it could be difficult for the participants to follow up on the points discussed during a particular session. Sharing of information amongst peers helps overcome this problem.

i) Keeping a record of student interaction helps the session be lead in a fair way and ensures that all participants take part in class discussions and other activities.

5.4. Evaluation

The evaluation process determines the effectiveness of a videoconferencing session. Course instructors need an evaluation program to determine how successful the lesson was, by determining the quality of their teaching and learning.

There are a number of ways which course instructors/local site coordinators can utilise to carry out an appraisal of the system, both from a technical and from a pedagogical point of view.

Evaluation can be formative (continuous process used for course improvement throughout the delivery) or summative (overall assessment conducted upon completion of the course).

In the same manner both types of evaluation processes can also be carried out using two different techniques, by means of quantitative or qualitative methods.

5.4.1. Why Evaluate?

With the introduction of more technologically advanced resources during classes, there is the increased danger on losing focus on the most important aspect of teaching/learning. Planning curricular objectives and concentrating on students as the major stakeholders, leads to a continuum in the life cycle of a technology based course. It also paves the way for improvements which can be done not only at a personal level throughout the course but also at a curricular level to better suit the needs of the students.

5.4.2. What to Evaluate?

Three factors to consider during course design and planning are:

a) Effectiveness (*achieving the objectives*)
   - Have the student learning outcomes been achieved?
   - What skills have been attained within the course development?
   - What methodologies have been used for the course delivery?
   - Has the technology during delivery been made appropriate use of?
   - Were the instructors' presentations effective?

b) Relevance (*achieving the satisfaction*)
   - What were the student attitudes before/during/after the programme?
   - How is the learning environment in relation to the educational context?

- Did the familiarity of the student with technology impact on the learning environment?
- How relevant was the course content for the teaching/learning process?

c) Efficiency (*the administrative part of the learning process*)

- How is the course administration perceived?
- How was the course marketed?
- Was the course/programme successful from a logistic point of view?
- Was the technology reliable?
- Was the support given throughout appropriate?
- Did the availability of library resources impact on the education value of the course?

5.4.3. How to Evaluate?

There are various types of evaluation instruments designed to suit the different methodologies used. The most common ones include questionnaires, surveys, structured interviews and observation logs. Other feedback can be given by different layouts of pre and post tests like multiple choice and essay questions.

It is important that if a survey or questionnaire[30] is designed, a pilot one is done prior to handing out the questionnaire to the participants concerned.

The standard Likert 5 point scale[31] makes data collection easier, while keeping the questionnaires anonymous enables a freer response.

However one must ensure that questionnaires are not overused and time consuming as this will lead to a substantial decrease in the cooperative factor from the participants.

Another evaluation exercise which can also be particularly useful in the instructor's self appraisal is the observation log[32] where the instructor has the opportunity to list down the observations in relation to interactivity and technology manipulation.

[30] See appendix 2

[31] Questionnaires: procedures & facts http://ec.hku.hk/acadgrammar/report/repProc/sections/methods/question.htm [2004]

[32] See appendix 6

6. Conclusion

Videoconferencing is a system which is designed with huge potentials to education and the communication systems in general. However being innovative and dynamic it requires a degree of commitment from whoever makes use of it. It needs systematic design and preparation to be fully successful; otherwise it will be yet again another useful technological resource which represents nothing more than a piece of equipment.

Accurate planning is needed not only at the design level but also at a technical and pedagogic level.

Keeping the primary stakeholders targeted for each individual videoconferencing session helps establish clear aims and objectives which are the root of the success of such a system, in whichever way and set up it might be used.

Making the system as transparent as possible to the participants helps not only increase their confidence in the system, but also helps them to attain the level of skills and satisfaction which learners can only achieve through actively participating in their own learning process.

7. Troubleshooting and FAQs

I can see the remote end but I cannot hear them. What shall I do?

Possible solutions:

- The remote site has muted the microphone. Ask them to turn the mic on again.
- Check the volume controls at your system. Turn them up if necessary.
- Check the volume control on your monitor/TV screen. It might possibly have been turned down. This does not apply for Room 106.
- Check that the remote end has their mic plugged in correctly in their system.

The remote end's sound has excessive feedback. What shall I do?

Possible solutions:

- Ensure that the mic is not placed too close to the speakers. If it is shift the position of the speakers so that feedback is eliminated.

The connection has dropped in the middle of a call. What shall I do?

Possible solutions:

- Someone has hung up. Press redial to re-connect to the system or else choose the call button to dial up another connection.
- It might be that there was temporary electricity cut off. As soon as the power is re-established, restart the system and dial the connection once again.

The students are looking bored and tired. What shall I do?

Possible solutions:

- Change strategy; use an activity which involves high interactivity.
- Plan for ice breakers and include some light humour to stimulate more interest.
- Use breaks where needed.

The students do not get involved in discussions. What shall I do?

Possible solutions:

- Plan for group activities, the discussion could be first initiated in a group prior to the actual class discussion. This serves to reduce camera shyness and increase self confidence.
- Structure the discussion with questions that help direct the debate.
- Send printed material in advance so that the students/participants are able to prepare themselves prior to the session.

There is a lot of noise in the background during sessions. What shall I do?

Possible solutions:

- Ensure that a student guide with videoconferencing etiquette is distributed amongst local and remote participants.
- Emphasise on behaviour guidelines prior to the session. Take time to explain the need for class rules.

It is difficult to pan the camera from one speaker to another during question time. What shall I do?

Possible solutions:

- Emphasise to the participants the need to pause between one speaker and the other, allowing the operator manipulating the camera to focus.
- Leave the camera on a wide angle shot to get complete view of the classroom.

I am a 'walker' during lecturing. I do not like sitting still in one place. What can I do?

Possible solutions:

- Try to limit the distance you use to move around so as to try as much as possible to fit in the camera picture at all times.
- Leave the camera on a wide angle shot to make allowances for your movements. Continuous movement is not recommended during a videoconferencing session as it is most often seen as a distraction.

Remember to keep the technical contact numbers handy so that you can phone immediately if a serious problem occurs.

Always have a contingency plan for when something goes wrong.

8. Recommended Further Reading

A report on Videoconferencing in Higher Education
http://www.man.ac.uk/MVC/SIMA/video3/contents.html Online.
[Available 2004]
Archipelago – Multimedia Distance Learning & Education.
http://www.archipelago.com/resources Online. [Available 2004]
Distance Learning in Higher Education. http://www.chea.org/Commentary/
Online. [Available 2004]
Evaluation form for a teacher's guide to videoconferencing.
http://www.netc.org/digitalbridges/teachersguide/images/evalform.pdf Online.
[Available 2004]
Issues in Distance Education.
http://carbon.cudenver.edu/~lsherry/pubs/issues.html Online. [Available 2004]
Janet Videoconferencing Service. http://www.jvcs.video.ja.net Online.
[Available 2004]
Learning by videoconference in the workplace.
http://hem.fyristorg.com/evaek/writings/dyrk.pdf Online. [Available 2004]
Resources for moderators and facilitators of Online Discussion
http://www.emoderators.com/moderators.shtml Online. [Available 2004]
RSC Wales Videoconferencing Support.
http://www.rsc-wales.ac.uk/english/ilt/videoconferencing.shtml Online.
[Available 2004]
Tips on Discussion Leading.
http://ctl.stanford.edu/Handouts/web/discussion_leading.html Online.
[Available 2004]
T.H.E. Journal Online: Technology Horizons in Education.
http://lttf.ieee.org/ Online. [Available 2004]
Videoconferencing for teaching and learning: Case studies
http://www.icbl.hw.ac.uk/ltdi/vcstudies/index.html Online. [Available 2004]

Appendix 1

A lesson plan matrix

TIMING	METHODS AND ACTIVITIES	LEARNER OUTCOMES	MATERIALS	REMARKS / NOTES
How much time will each activity take?	*How will you deliver the lesson? Include learning activities*	*What concepts or skills will the students demonstrate after the lesson?*	*List the items/additional equipment required to carry out the lesson.*	*Additional lesson comments. Do you need to prepare handouts in advance?*

Appendix 2

Sample evaluation questionnaire

Instructor(s):	***Date of Videoconference***:
Title of Videoconference:	***Duration***:
Venue where the videoconference was held:	
Your role: (tick one) : participant ❒ student ❒ facilitator ❒	
Your Institution/organisation:	

Circle the number which best matches your opinions:

1-strongly disagree ……. 5-strongly agree

General comments	1	2	3	4	5
The expectations were outlined very clearly before the start of the session.					
The content of the videoconferencing session was delivered effectively.					
I had no problems in understanding what the participants and members were saying.					
The course/session was very well organised.					
The videoconference was very effective technically.					
The participating site/s had equal opportunities for discussion and interaction.					
The learning environment (classroom setting) was adequate.					
The presentations by the participating parties were very effective.					
Different teaching strategies/methodologies were used during class					
Adequate support was given before, during and after the session					

Additional feedback: (*To be used in addition to the first questionnaire for first time participants and as an end of course response*)

	Your Comments:
Did you ever take part in any videoconference sessions? (please give details opposite)	
Did you achieve what you were hoping for in this videoconference session? Why/Why not?	
What were the benefits of using this technology?	
What did you not like about this technology?	
What suggestions would you have for future improvements on the presentation of this course?	
How did this learning environment compare to the traditional classroom setting?	
Other comments	

Appendix 3

Sample instructor observation log

Instructor(s):		***Date of Videoconference***:			
Institution:			***Duration***:		
Title of Videoconference:					
Number of viewers		**Number of sites**:			
Circle the number which best matches your opinions: ***1-strongly disagree ……. 5-strongly agree***					
General comments	**1**	**2**	**3**	**4**	**5**
The content was delivered effectively.					
The curriculum content connected well with the videoconference delivery.					
Technically the videoconference was very effective (clear picture, audio, etc.).					
Using this technology proved very satisfactory.					
The support before, during and after the videoconference was very helpful.					
What improvements would have made the videoconference better?					
General comments:					

Interactions during the videoconference	*Instructional strategy/Comments*
Teacher to student (local and remote)	
Student to student (local)	
Student to student (remote)	