

Media and Technology in Distance Education



**Staff Training and Research Institute of Distance Education
Indira Gandhi National Open University**

Maidan Garhi, New Delhi 110 068

www.ignou.ac.in



STRIDE HANDBOOK 7

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STRIDE HANDBOOK 7

(Note: In 1988, Handbook 7 entitled '*Electronic Media in Distance Education*' was developed by B.N. Koul, M.L. Koul and P.R. Ramanujam. The present Handbook 7 is a new handbook and is freshly written by Santosh Panda.)

Media and Technology in Distance Education

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FOREWORD

Starting from correspondence courses, a few decades ago, teaching and learning through non-conventional and non-traditional modes have undergone very dynamic and impressive changes for improved quality and sustainability of education. The emerging systems and trends are inherently flexible, widely accessible and endowed with immense capability to cater to the needs of large target group of learners. In view of such unique and distinctive features, these systems are identified as the open and distance learning (ODL) systems. It is now very well realized and understood that for effectiveness and success of the ODL systems, appropriately trained faculty, media professionals and distance educators are required to work together as a cohesive team. In the past decade, the ODL system has attracted considerable attention and acceptance of policy makers with the result that it is getting considerable support. In the absence of any other comparable system, the ODL system has positioned itself as the only viable system for training, retraining and education for lifelong learning. The system has been further propelled by dynamic and innovative developments in Information and Communication Technologies (ICTs) and their applications to the system of education. It is very satisfying to observe that, in recent years, the ODL system has very successfully absorbed the ICT capabilities for the betterment of the system, to make it more cost-effective and accessible so as to bring in equity in access to quality education.

The ODL system has thus witnessed tremendous growth. In the present state of development of the ODL system used for education, skill up-gradation and training of large human resource, the system is required to be handled professionally and efficiently. Keeping in view the above requirements of manpower development, the Staff Training and Research Institute of Distance Education (STRIDE) has brought out a series of Handbooks on different themes of ODL. These Handbooks should be useful for the teachers and other functionaries of the system. The Handbook addresses one of the most important issues of distance education, i.e. *Media and Technology* in the light of the experiences gained in these years of evolution of the ODL system in the country in general and at the National Open University in particular.



April 2006

H.P. Dikshit
Vice Chancellor

ABOUT THE HANDBOOK

This handbook is designed in a manner which combines good reading with reflective thinking and how-to-do media preparations, including selection of media for distance teaching. It covers a wide range of media and technologies, viz. audio and radio, audiovision, video and television, and teleconferencing, and also includes discussion on media selection. It excludes the latest media of computer. The discussion and examples centre round the situations as obtained in distance learning, though media and technology are largely used in classroom teaching and face-to-face training. The discussion of a variety of media and technology given in the first section, and those available at the Indira Gandhi National Open University given in the second section should be useful in appreciating the role different media play in distance teaching-learning.

The handbook is presented through six sections in a sequential order, though you can read any section independent of the other. The references given at the end should be useful for further study. The discussions in various sections should be related to and interpreted in your own conditions, and decisions are to be taken accordingly.

Santosh Panda

SECTION 1

TYPES OF MEDIA AND TECHNOLOGY

Introduction

The very development of distance learning was based on the use of media, including of course face-to-face interaction (and more so, the electronic media), for course design, development, delivery and evaluation – in other words, for teaching-learning at a distance. The traditional correspondence education used the print technology delivered through text media; and subsequently there have been tremendous media and technology developments within distance learning, the latest being web-based learning. Before describing and comparing various media and technologies, it is worth at this stage to clarify the distinctive meaning of ‘media’ and ‘technology’.

- *Media* refers to forms of communication and how knowledge is represented. For instance, the five media, viz. human contact, text, audio, video, and computing have their distinctive ways of organisation and presentation through varying formats or styles. These media carry messages, facilitate interactions, and therefore, self-learning. However, these media also need to be carried through appropriate technologies, and each medium can be carried by more than one technology.
- *Technology* refers to largely the hardware and also the mechanisms to carry the media message. For instance, print, audio and video cassettes, satellite, cable, broadcasting, video disc, video conferencing, computers are technologies that facilitate the transmission of media messages.

Media types and applications

Starting from audio technologies, Bates (2005) has listed 27 technological developments since the 1980s (given in the box on page 10 in descending order of development).

- Audio cassettes
- Video cassettes
- Audio-conferencing
- Computer-based learning
- Audio-graphics systems
- Cable TV
- Viewdata/tele-text
- Satellite TV
- Laser video-discs
- Video-conferencing
- Computer conferencing
- Compact discs
- Internet
- Electronic mail
- World Wide Web
- Digital video discs
- Search engines
- Fibre optics
- Mobile phones
- Learning objects
- Wireless networks
- Portals
- e-Portfolios
- Simulations
- Expert systems
- Virtual reality

The selected four media, corresponding technologies (one-way and two-way) and their distance learning applications are given in Table 1.1.

While the applications of media and technologies presented in Table 1.1 are self-explanatory, it needs further discussion on the strengths and weaknesses of different technologies used for distance teaching-learning. The summary presented by Bates (1995: 16) and given in Table 1.2 should be extremely useful to have a general understanding of what the different media and technologies can do for distance learning and what they can't.

The summary provided by Tony Bates should be useful to your understanding and you may like to see the strengths and weaknesses of those media when applied to your own context; and you may still find more benefit from any medium than noted in Table 1.2. Further, these media need to be seen from the point of view of different teaching functions that they

Table 1.1: Media, one/two-way technologies and DE applications

Media	Technologies	DE Applications	
		One-way	Two-way
Text & graphics	Print	Self-learning materials (course units and supplementary readings)	Correspondence tutoring Fax
Audio	Cassettes Radio Telephone	Audio cassette programmes Radio broadcasts –	Audio conferencing – Telephone tutoring
Video	Broadcasting Video cassettes Cable TV Satellite TV	TV broadcasting Video cassette programmes Cable TV broadcasting Satellite TV broadcasting	Interactive TV Video conferencing – –
Computing	Computers, telephone, satellite, fibre optics, ISDN, CD-ROM	Computer assisted learning/ instruction, computer-based training, DVDs, CD-ROM ,computer databases	Emails, interactive multimedia, computer conferencing, interactive databases

Source: Bates (1995, 2005)

contribute to. The table developed by Jack Koumi while serving at the BBC-OUPC, UK Open University and refined over the past years should be very useful to further refine our understanding of the usefulness and applicability of various media. The views of Koumi are presented in Table 1.3.

Teaching attributes

Descriptions of media attributes in relation to teaching-learning by scholars vary from each other, largely due to variations in the teaching and learning theories on which these are based. It will be facilitative to examine the generic media attributes and their contribution to various teaching functions. On the basis of long standing work on media production at the UK Open University and workshops presented in many parts of the world, Jack Koumi has described distinctive media features and teaching attributes as given in Table 1.3 and should provide a broader understanding of the contribution of various media to learning effectiveness.

Table 1.2: Strengths and weaknesses of various media and technologies for distance teaching-learning

Media	Access	Costs		Teaching		Interactivity		Organisation	Speed
		Students numbers							
		Large	Small	Presentation	Skills	Learning materials	Social		
<i>One-way media and technologies</i>									
Print	Good	Good	Average	Average	Average	Average	Poor	Poor	Poor
Radio	Good	Good	Poor	Poor	Poor	Poor	Poor	Average	Good
Audio cassette	Good	Good	Average	Average	Good	Good	Poor	Good	Average
Educational broadcast TV	Average	Poor	Poor	Good	Average	Poor	Poor	Poor	Poor
Pre-recorded ITV	Poor	Good	Poor	Average	Average	Average	Average	Average	Poor
Video cassettes	Good	Average	Poor	Good	Good	Good	Poor	Average	Poor
Computer-based learning	Average	Poor	Poor	Average	Average	Good	Poor	Poor	Poor
Multimedia	Poor	Poor	Poor	Good	Good	Good	Poor	Poor	Poor
<i>Two-way media and technologies</i>									
Audio conferencing	Good	Poor	Good	Poor	Average	Poor	Good	Good	Good
Live interactive TV	Poor	Poor	Poor	Poor	Poor	Poor	Average	Average	Good
Video conferencing	Poor	Poor	Average	Poor	Average	Average	Average	Average	Good
CMC	Average	Average	Good	Poor	Good	Average	Good	Good	Good

Source: Bates (1995)

Table 1.3: Comparative merits and distinctive teaching attributes of six different media

<p>1. Audiovisual (broadcast or cassette) over Print</p>	<p>2. Print over Audiovisual (broadcast or cassette)</p>
<p>1.1 unique ways to help learning, e.g. drama, animation, demonstration 1.2 provision of realistic experiences, e.g. sounds, places, events 1.3 the medium's realism has a strong impact on attitudes, appreciations, motivations 1.4 personalisation of teachers 1.5 breaks the tedium of print 1.6 literacy is not essential</p>	<p>2.1 random access at the student's own pace helps the study of</p> <ul style="list-style-type: none"> ● data in quantity, e.g. glossary, study guide ● fine details, e.g. equations, photos <p>2.2 student can browse and select more easily 2.3 print can carry more information 2.4 print is adequate to cover most of syllabus 2.5 easier teacher access/control 2.6 production skills are adequately resourced 2.7 reception is not affected by power cuts 2.8 family doesn't dispute access</p>
<p>3. Broadcast over Cassette, Print</p>	<p>4. Cassette or print over Broadcast</p>
<p>3.1 cheaper for large audiences 3.2 study pacing (obliged by broadcast schedule) 3.3 sense of importance 3.4 sense of community 3.5 sense of immediacy 3.6 non-stop is good for presenting an overview 3.7 recruitment of more students 3.8 public/academic exposure 3.9 national resource 3.10 appearance of top experts</p>	<p>4.1 student can study when alert and prepared 4.2 student can stop and reflect, annotate notes, hence the medium can carry greater detail 4.3 student chooses repeats 4.4 lessons can have variable length 4.5 lessons can be sub-divided into digestible segments, with interspersed activities 4.6 cassette is better for group discussion 4.7 frequency of lessons can be varied 4.8 can achieve closer integration with print 4.9 can carry socially sensitive material</p>
<p>5. TV/video over Radio/audio-cassette</p>	<p>6. Radio/audio-cassette over TV/video</p>
<p>5.1 more compelling, in general 5.2 more interesting/glamorous to produce 5.3 engages two senses: vision and hearing</p>	<p>6.1 student access to (cheaper) equipment 6.2 cheaper to produce and deliver 6.3 evoked images are better 6.4 translation is easier to implement 6.5 portability of equipment 6.6 one can listen while driving</p>
<p>7. Video over Audio cassette with notes/visuals</p>	<p>8. Audiocassette with notes/visuals over Video</p>
<p>7.1 the field of view is pre-determined 7.2 when moving pictures are needed 7.3 pictures and sound can be synchronised 7.4 video has picture-search facility</p>	<p>8.1 student choice of when to look where 8.2 cost effective when topic needs pictures but not moving pictures 8.3 adequate production skills easier to achieve</p> <p style="text-align: right;"><i>Contd....</i></p>

9. Audiocassette with notes/visuals over Print	10. Radio over all others
9.1 verbal commentary for diagrams is easier to use than margin notices for diagrams 9.2 students can revise more easily from the sparse notes (without replaying the audio) 9.3 (with or without notes) spoken words help pronunciation; pacing/intonation add meaning	10.1 the short lead time enables remedial tutorials, errata, news and information

Source: Koumi (2002)

You will notice that the comparisons presented in Table 1.3 have combined radio and television broadcasts on the one hand and audio and video cassettes on the other as broadcast vs. cassette. Further, these comparisons had been developed on the basis of six media characteristics, viz. symbol system (i.e. presentational attributes), access, controllability, student reactivity (which also included mental activities), interactivity, and adaptivity. Koumi (2002) extended media comparison to include matching of their attributes to different teaching functions and learning tasks as given in Table 1.4.

Table 1.4: Matching of media attributes to teaching functions & learning tasks

<p>Print</p> <ul style="list-style-type: none"> • when students need random access to study large quantities of data • in case of concentrated study at an individual pace for analysing fine details • where the student benefits from skimming and selecting • text and graphics can carry more information per megabyte than audio or video • print is adequate to cover most of the syllabus • print might substitute for video for reasons of cost or staff expertise
<p>Videocassette (with or without supplementary notes)</p> <p>tasks that need concentration but flexible access to dynamic visual material – the range of teaching functions is the same as that for TV, but video carries a <i>more detailed analysis</i> than TV, especially when supplemented with notes.</p>
<p>Audiovision</p> <ul style="list-style-type: none"> • informal guidance through a <i>step-by-step process</i> • talking students through practical procedures • in situations that benefit from <i>teacher looking over the student's shoulder</i> (e.g., remedial tutorial) • when the objects of study are visual source materials • when audio needs added visuals to avoid memory overload • for topics/audiences where attention might wander with audio alone (visuals anchor attention) <p style="text-align: right;"><i>Contd....</i></p>

- for detailed specification (in-text) of student activities
- substitute for video when static pictures are sufficient
- substitute for video when the diagrams are too detailed to be legible on video
- substitute for video for reasons of cost or staff expertise

Audio-cassette and Radio

- provides for experts' opinions
- provides for personal experiences of interviewees
- provides for human verbal interaction (real or dramatised)
- good in case of documentaries / recorded events
- good for informal study guidance
- aural experiences and models of good practice (e.g. music studies, foreign language)
- when multi-language versions are needed
- illiterate audiences can be catered for
- topical errata, remedial tutorials enabled by the speed of production (**radio** only)

The general presentation and discussion on various media and technologies used in distance teaching-learning given in this section will facilitate you to further appreciate the strengths and distance learning applications of audio-video, radio-television, and teleconferencing given in the subsequent sections, followed by a discussion on media selection in the last section. But before that, it will be useful to see the actual use of media by distance teaching institutions, in this case the Indira Gandhi National Open University given in the second section of this handbook. This can be compared with other institutions for wider understanding of media deployment and use in distance education.

SECTION 2

MEDIA AND TECHNOLOGY DEVELOPMENTS AND USE AT IGNOU

Introduction

The Indira Gandhi National Open University (IGNOU), established in 1985 by an Act of Indian Parliament, first offered two academic programmes in 1987; and since then the number of academic programmes has constantly increased to a total of 125 programmes comprising above 1000 courses in 2006. The number of students increased from 4381 to above a cumulative enrolment of 1.5 million during the period (including above 429 thousand in July 2005-January 2006 alone), served through a network of 48 regional centres, 1409 study centres (i.e. study centres, programme study centres, sub-centres, work centres, multi-media learning centres, tele-learning centres), and above 48000 counsellors. The university was entrusted with the dual responsibility of:

- i) offering educational, training, research and extension programmes at a distance with built-in openness and flexibility, and
- ii) coordinating, funding, accrediting and maintaining standards of the distance education system in the country.

Besides, the university acts as a national resource centre for distance education/technology-enabled education. It has an international presence in 34 countries overseas. Right from the first offer of academic programmes in 1987, IGNOU had made a conscious decision to use multi-media packages including print, and with a strong component of audio and video programmes. The study of media and technology developments and use at IGNOU shall give a fair idea about such developments in this country and the future possibilities of media use in distance education, especially in the developing countries.

Media and technology developments

The decision to use media, other than print, was intended to enhance the effectiveness of teaching-learning and for reaching a wider group of

learners in remote rural, tribal and isolated areas. The use of audio and video media (other than information technology and its resultant virtual campus initiative, and which was a later development in the University) has undergone considerable changes in terms of technological developments, extent of access and interactivity. You will find below discussions on the media developments at IGNOU. These have been further explained in the subsequent three sections devoted to audio and radio, video and television, and teleconferencing respectively.

Audio and video

Audio and video cassette-based programmes have been produced since 1987, by the erstwhile Communications Division, to largely play a supplementary role to the self-learning printed materials. The erstwhile Communication Division was upgraded to Electronic Media Production Centre (EMPC) in 1996 (established with grant/support received from JICA, Japan). The EMPC has state-of-the-art production and transmission facilities including two studios with multi-camera set-ups of 216 sq. meters and 196 sq. metres respectively. The number of audio programmes has cumulatively increased from 67 in 1987-88 to 8000 in 2006, and video programmes during the same period, from 85 to 2000; though during the last few years the programme production per annum has gone down, and the focus shifted to telecasts on *Gyan Darshan*.

As a general rule, an 8-credit course (1 credit = 30 student study hours) contains in the learning package 4 video and 6 audio programmes, though any academic programme, with due justification, may contain more audio and video programmes alongwith or in lieu of print materials, or even lesser than these numbers. The audio and video programmes were meant to supplement and support the text, enrich learning, and could be used in group learning situations with replay facilities available at study centres. The cassettes are also available on sale through designated agencies. Most of such programmes are lecture based and their low use (as indicated in a few feedback surveys conducted at EMPC) can be attributed to non-availability of facilities as per learners' choice, counsellors' apathy and their non-integration with the text. Subsequently, radio and television broadcasts were considered important to reach large masses of students, as also teleconferencing for increasing interactivity in learning.

Radio and television

Television broadcasting started in May 1991 through the national network of *Doordarshan* on every Monday, Wednesday and Friday from 6.30 a.m. to 7.00 a.m.; this was subsequently increased to five days a week. The AIR (All India Radio) stations of Mumbai and Hyderabad started radio

broadcasting in January 1992 (though AIR, Shillong which had started such a broadcast dropped out later). A television programme “open channel” was initiated to answer queries of the student viewers, and bring open university programmes closer to the public. The starting of the TDCC (training and development communication channel) for telecast on analogous transmission was a landmark in the history of distance educational media, and this initiative culminated in many subsequent developments described later in this section.

The EMPC, housed in the '*Sanchar Kendra*' on the campus, has a wide range of media production facilities including two video studios (described above), two audio studios, five single-step editing suites, four A/B roll editing suites, three audio editing suites, three pre-view rooms, post production facilities, tele cine, duplication, tape library, graphic workstation, scene store and workshop. Betacam-SP format is used for both production and post-production of programmes. Digital facilities with digital audiotape (DAT) are available in the audio studios to produce sound qualities comparable to compact disc and conform to the latest trends in high-end audio production and broadcasting. The EMPC provides facilities to schools of studies and other divisions of IGNOU, other open universities and distance education institutions, other higher education institutions, NGOs, government departments and industry for production, post-production, teleconferencing (as also audio-conferencing, which is dormant now), training and consultancy, research and academic programmes delivery.

Teleconferencing

IGNOU conducted the first 10-day teleconferencing experiment for distance education in October 1993 through extended C-Band (see Figure 2.1) and satellite uplink support provided by the Indian Space Research Organisation (ISRO) with the help of a TRACT (transportable remote area communication terminal — a mobile uplink facility), in which the potentiality of non-print media components came to fore front of programme design and delivery, and the issue of interactivity came to sharp focus. The teleconferencing experiment was based on the preceding two-way audio-conferencing system established at IGNOU in 1993, and which was supported by the Commonwealth of Learning (this though has been dormant now). The audio-conferencing system was improvised with one-way video and two-way audio teleconferencing system. The teleconferencing system connected the IGNOU headquarters, IGNOU regional centres and state open universities, and enabled all the participating nodes to communicate in a conferencing mode through the two-way audio links and communication through STD lines. The experiment involved 10 sites, i.e. regional centres of IGNOU, and the respective regional directors, assistant regional directors and academic counsellors with the objective of

gaining insights into the technical feasibility, organisation and managerial aspects, academic aspects and the cost of operationalising the system on a regular basis.



Figure 2.1: Extended C-Band satellite

During the experiment, the system permitted interactivity, though the operation was not smooth. There were administrative and technical problems; STD was not always available and the students sometimes did not get change to avail of this opportunity; and the design of the teleconferencing was in question. All kinds of academic programmes were fed into it, the prominent were the undergraduate degree programmes for which there was not much response from the receiving ends. Perhaps, as was realized subsequently, teleconferencing with 'selective' programmes would have been more successful.

The experiment of 1993 led to its regular use by IGNOU and other organizations for education, training and business meetings since 1995. For IGNOU, it is used for tele-teaching, tele-counselling, tele-training, tele-discussion and extended contact programmes. The studio at the headquarters contains three-camera set-up, scanner for graphics, facilities of special effects, video play back, computer interface, three dedicated phone lines in the control room, a fax machine for receiving participant's queries, and presentation facilities like white board and PC (with power point facility). The programmes (audio and video signals) passed through the TRACT which converted the signals to extended C-Band frequencies and uplinked to INSAT-2C, which in turn threw signals to the various receiving ends/nodes (substantially for IGNOU, and about 250 owned by other user organisations). Also, as a back-up, a second uplink facility was available at the Space Applications Centre of ISRO at Ahmedabad. The interactive

system was functional for nearly 20 days in a month for about eight hours (with 60-90 minutes a session). While almost all the academic programmes of IGNOU found slots in teleconferencing, the highest number of tele-counselling-sessions was conducted by the School of Management Studies for the MBA programme. Though many non-IGNOU organisations and agencies used the facility, IGNOU used it regularly for 246 hours in 1995, 483 hours in 1996 and 495 hours in 1997, the figures for non-IGNOU agencies during this period were 129 hours, 307 hours and 234 hours respectively. The figure in terms of hours of use has increased subsequently.

While the teleconferencing was stabilizing, a local cable TV experiment was conducted at Modasa, Gujarat state which proved very useful in utilising local facilities for ensuring interactivity. Even today, the local cable operator in the city telecasts IGNOU programmes to the households. Due to the failure of extended C-Band of INSAT-2C, teleconferencing was suspended for sometime. This was subsequently revived and made digital through INSAT-3B and later through INSAT-3C.

Interactive radio counselling

IGNOU got into IRC in May 1998 as an experimental programme for one year conducted at the Bhopal AIR. IRC intended to bridge the gap between the institution and the learners through instant response to their queries, as also provide interactive academic counselling on subject areas. The lecture presentation is made at concerned radio station as well as the audio studio of IGNOU; the students at their home or workplace can listen to the presentation, ask questions through a toll-free number in their phone; and both the presenter and the students from all over the country can listen to each other. In March 1999, IRC was extended to 8 other AIRs (Lucknow, Patna, Jaipur, Shimla, Rohtak, Jalandhar, Delhi and Jammu). Today, 184 radio stations across the country broadcast programmes for one hour every Sunday (4.00 to 5.00 p.m.); students from 80 cities can avail the toll-free telephone facility. The AIR slots time, the EMPC coordinates the activities, and the Regional Services Division (RSD) of IGNOU handles the interactive counselling. During the first and third Sundays of the month, AIR stations of Delhi (in Hindi) and Kolkata (in English) broadcast IRC programmes from the national hook up, which 186 radio stations relay either of them. On the fourth Sunday, the programmes are slotted for the state open universities and are broadcast from the AIR stations of Ahmedabad, Bhopal, Bangalore, Patna, Jaipur, Kolkata, Hyderabad and Mumbai. IRC was designed to focus on interactive counseling on subject areas, though the highest number of questions received from learners were found to be more managerial and logistical. However, as was evident in the last few years, the (toll free) radio phone-in counselling had reduced student queries generally

raised f2f at study centres and regional centres, and provided encouragement to students to progress on their courses.

Gyan Darshan

Gyan Darshan (literally meaning ‘knowledge vision’) represents the aspirations of the knowledge society to have a full dedicated educational channel in this country for educational and developmental programming. It was launched jointly by the Union Ministry of HRD, *Prashar Bharati* and IGNOU (the latter being the nodal agency for uplinking/transmission). Educational programmes for GD are contributed by IGNOU, UGC-CEC, NCERT-CIET, as also by National Open School, Department of Adult Education, and some governmental and non-educational organisations. The programmes are uplinked from the earth station at IGNOU and downlinked all over the country through INSAT-2B. Launched on January 26, 2000 as a 2-hour channel for daily transmission, the duration increased in 2000 to 9 hours in February, 18 hours in June, 19 hours in November, and 24 hours in January 2001. Though the trial transmission started with 3-8 metre antenna, it increased to 7.3 metre when it was fully commissioned. Since the channel is not terrestrial, it is available through various cable operators all over the country; and attempt is being made to have nodal transmission from Mumbai, Ludhiana and Bangalore. Toll-free facility of 1-600-1-12345 has been extended to 40 cities. It is also available to class X and XII students. Coaching institutions are also invited to join *Gyan Darshan* to receive television support in terms of telecast of produced programmes, telecast of live programmes, and their sponsorship of programmes. The signal for GD is available on INSAT-2B C-12 transponder, 4170 MHz downlink frequency, vertical polarisation 93.5 degrees east.

Though an essential educational media, the decision on establishing *Gyan Darshan* was handed down from the Ministry, rather than being born out of any academic need. IGNOU is at the mercy of the cable operators; though it is a satellite channel, cable operators have not been much favourable to it – it is not a viable business proposition for them. The operators are facilitated financially through ads, reimbursement and such other means so as to hold on to it for the larger benefit of the educational community. The cable transmission covers about 90% in Kerala, parts of Tamil Nadu, some pockets in the North East, Nashik, Ahmedabad, Delhi and Pune. The Asianet has been providing it free of cost in Kerala. It is claimed that the programmes go to 40 million cable homes in the country. The added benefit to cable operators is that other *Doordarshan* channels like DD-Marathi, DD-Gujarati, DD-Kanada and DD-Malayalam come free with *Gyan Darshan*. Efforts are being made to make GD available through terrestrial transmission; and the Government of India may make it compulsory for private DTH cable operators to provide GD. When *Doordarshan* shall have DTH operation, GD may form a part of that bouquet. While this may liberate

the channel from the clutches of the cable operators, the unit cost for shifting to DTH receivers will still be high for many to afford. Now six channels are available on the GD: separate dedicated channels for higher education (Vyas Channel launched on January 24, 2004), technical education (Ekalavya Channel), agricultural education (Kisan Channel launched on January 21, 2004), distance education, and language education (Bhasa Mandakini launched on September 5, 2003, and telecast on DD1 from 6.30-7.00 a.m., 7.15-7.45 a.m. and repeated 12.00-1.00 p.m). Further, the upcoming EduSat (i.e. a dedicated satellite for education) shall boost educational broadcasting in the country. The downlink facility offered at IGNOU covers many parts of the globe, and IGNOU's overseas partner institutions have been able to regularly view the GD programmes.

Gyan Vani

A shift form IRC is *Gyan Vani*, a Radio Cooperative devoted exclusively for education and development, which was created at the instance of aggressive initiative by the MHRD, Government of India. The Union I&B Ministry has now liberalised FM waves in the country, thereby private operators in 40 cities can operate the channel. One frequency for one educational radio channel in 40 cities shall be made available. The onus is on IGNOU to manage it. While GD is an educational television channel managed by IGNOU on behalf of *Doordarshan*, there is no interference by the All India Radio in the management of the educational radio channel of GV. This is a decentralised operation, with all 40 stations to having their own programming in respective regional language of the state. The organisational components, content programming, and implementation strategy have been worked out by IGNOU; by 2006, IGNOU had 17 FM stations operating in cities including that of Allahabad, Bangalore, Bhopal, Chennai, Coimbatore, Delhi, Kolkatta, Lucknow, Mumbai, and Vishakhapatnam.

The stations may be run through direct participation by NGOs, self-help groups, state controlled educational sectors, and other social and community development organisations. Though MHRD shall fully support this venture for five years, IGNOU has to sustain this on its own thereafter. In the next phase (i.e. after 5 years), it has been planned to allocate 70 more FM channels to IGNOU.

Educational satellite (EduSat)

As discussed earlier, the initial satellite based distance education, particularly teleconferencing, had been organized through a satellite transponder, and more particularly through extended C-Band. Before looking into the initiation and deployment of a fully dedicated satellite for education in India, the major teleconferencing initiatives for education and development are chronologically recorded in the following box.

Major teleconferencing initiatives at a glance

1979 – ISRO and the Post and Telegraph Department, Government of India jointly organized a national seminar in teleconferencing mode for professionals assembled at Ahmedabad, Delhi, Mumbai, Kolkata and Chennai during Satellite Telecommunication Experiment Project (STEP) using Franco-German satellite SYMPHONIE's transponder (Chaudhary, 1999).

1983 – Teleconferencing technology was tested exclusively for education with ISRO's course on satellite communications for engineering students using APPLE. Apart from testing the system efficacy, the experiment also investigated the impact of teleteaching in terms of knowledge gain which was found to be significant (Agarwal & Pande, 1992).

1983 – Indian National Satellite System (INSAT), India's first geostationary satellite, was launched. The indigenous satellite facilitated broadcast of University Grants Commission's enrichment programme for undergraduate level students (CWCR) and NCERT's programmes for children (ETV).

1991 – A three day training programme for trainers of adult education in Gujarat was conducted in collaboration with Gujarat Vidhyapeeth through INSAT-1B. Trainees from rural background viewed programmes through teleconferencing as an effective approach and used talk back facility with ease.

UGC conducted talk-back experiment for undergraduate students in Science, Arts, and Commerce for a six-day period in the same year involving eight receiving ends: Ahmedabad, Kolkata, Hyderabad, Imphal, Jodhpur, Madurai, Patiala and Roorkee. The question-answer sessions conducted after each programme were found to facilitate comprehension of the content. Many educational institutions showed enthusiasm to use the system (Agrawal and Pande, 1992).

1992 – Skill development training on maintenance engineering for the supervisory staff of the industries at eight locations, followed by Bhiwani Experiment for development functionaries, and Institution of Electronics and Telecommunication Engineers (IETE) experiment involving 11 locations were conducted. These experiments repeatedly endorsed the potential of teleconferencing as a "distance neutral" technology which could be used to great advantage in formal and non-formal education (Agrawal and Pande, 1992).

1993 – The ten-day long first IGNOU-ISRO teleconferencing experiment covered 525 participants. The transmission was carried out for five hours every day. It became a major landmark in the extensive and continuous use of teleconferencing for distance education and provided useful insights in organisational, managerial and technical aspects involved in the teleconferencing system. 10 regional centres were chosen as receiving ends. The success of the experiment prompted the university to include teleconferencing as a regular component of IGNOU's student support system (Chaudhary, 1999).

1995 – The Training and Development Communication Channel (TDCC) of ISRO became operational using the transponder of INSAT 2-C earmarked for the purpose to implement one-way video and two-way audio teleconferencing network on a regular basis for IGNOU and other user agencies for tele-teaching, tele-counselling, tele-training, academic seminars, and other related activities. The teaching-end facilities including studio and uplink were provided at IGNOU campus at New Delhi and at Space Application Centre (SAC) campus in ISRO, Ahmedabad. Gradually several users such as AIMA, NCERT, NIPCCD, State governments of Gujarat, Karnataka, Madhya Pradesh, Orissa and Rajasthan, NGO's like SEWA joined in to take advantage of this powerful technology on a regular basis. Later, four more teaching ends were established in Bhopal, Mysore, Gandhi Nagar and Cuttack (DECU, 2003).

2001 – Initiation of *Gyan Darshan 2* (GD-2) at IGNOU, a digital channel devoted to one-way-video and two-way audio teleconferencing enabled the University to serve its teleconferencing needs more effectively. GD-2 also extends teleconferencing service to other user agencies: NIEPA, ICAI, NCERT, RCI, National Trust, and other user agencies.

– Khan & Panda (2006)

A revolutionary change and progress in the satellite-based educational communication in the country occurred in September 2004 when a satellite fully dedicated to education and training was deployed. The satellite has footprints and coverage all over India and parts of South Asia (see Figures 2.2 and 2.3). One national and five regional beams in Ku-Band with digital transmission, along with the existing national beam through extended C-Band with analogous transmission are available. The communication channel provides for both two-way video and audio. There are provisions for both satellite interactive terminals (SITs) and receive only terminals (ROTs). There is also provision for digital resource repository, virtual classrooms, data transmission, and video-on-demand. While the technical support including the satellite itself has been provided by ISRO, each of the national educational networks like distance education (led by IGNOU), higher education (led by UGC), professional education (led by AICTE), school education (led by NCERT), education for all (led by SSA-MHRD) and many sub-networks is to be managed by the respective networks. Undoubtedly, distance learning (and IGNOU) is the largest user of this technology.

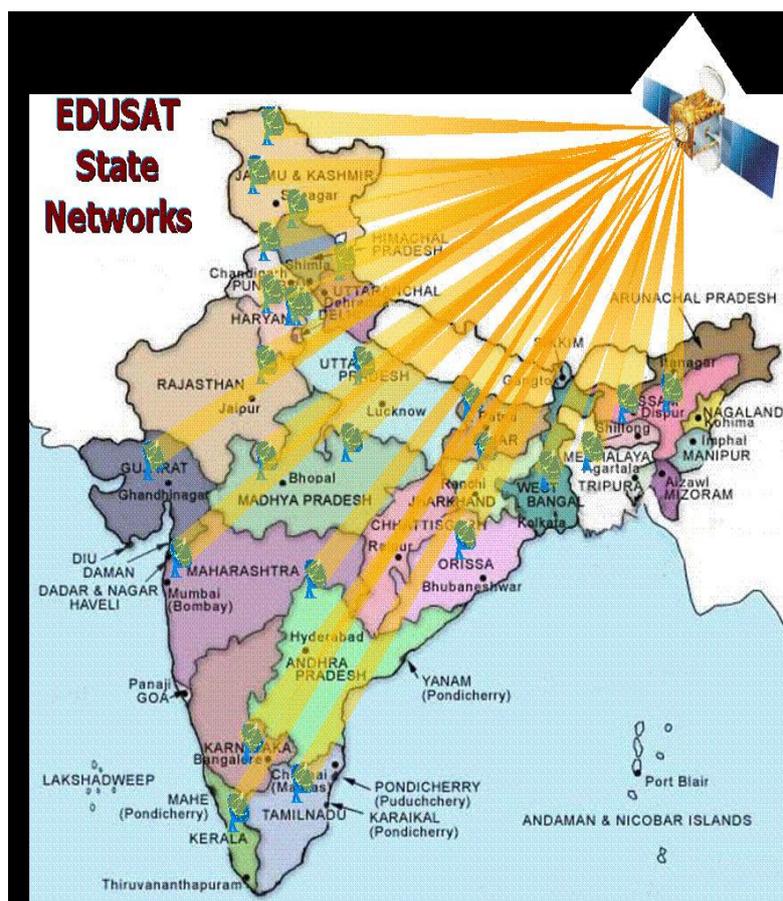


Figure 2.2: National coverage of EduSat

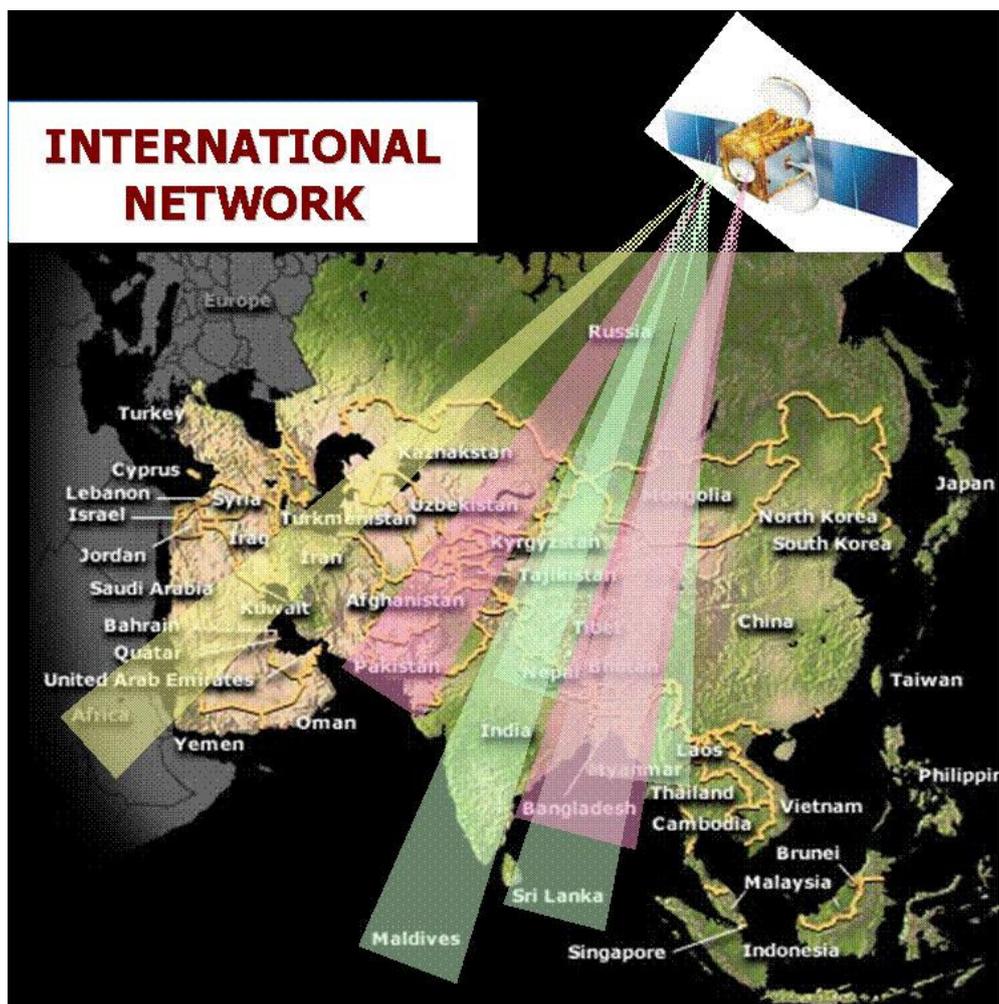


Figure 2.3: International coverage of EduSat

Ten teaching ends have been visualized to be located in different parts of the country. The teaching end at IGNOU has been operational since 2005 under the national beam with 131 SITs made operational for two-way video and audio multi-site interaction. By 2005, the other largest EduSat users have been APNET/Mana TV in Andhra Pradesh (with above 2000 terminals), the states of Madhya Pradesh (1350 terminals), Orissa (1434 terminals), Gujarat (550 terminals), Goa (20 terminals), Tamil Nadu (20 terminals), and KARNET in Karnataka (with over 200 terminals) (Bhatia and Dikshit, 2005). For IGNOU, both the satellite communication and FM radio stations are being facilitated by ISRO to have satellite supported simultaneous broadcasting through more than one FM radio station (Dikshit, 2006). This wireless technology, if converged with the wired web technology, and if properly used, is going to revolutionalise distance education in India.

Media use

Some of the academic aspects of educational media development and use at IGNOU are given as follows:

- The University has a general provision of a fixed number of audio and video programmes for 4-credit and 8-credit courses. However, this is not always compulsory to follow — the programme/course coordinators may use less or more number of non-print media programmes than printed course materials, either as supplementary or as the main medium of communication.
- Decisions on and design for media are taken at the curriculum and course design stages, i.e. while proposing the programme to various statutory bodies for approval as also while detailing out various course units and operational aspects of implementation of the programme.
- Media, other than print, are used either as supplementary or complementary to the printed self learning materials (SLMs); and, *integration* of these media with the print has been minimal.
- The process of media development and production starts either simultaneously with the development of print, or after the publication of printed SLMs.
- Production of audio and video programmes is the joint responsibility of the academic (i.e. the faculty) and the producer, and therefore the producer forms a part of the course team. The process of production generally involves the following: the course/programme coordinator (i.e. the faculty) prepares the academic brief and the academic note; academics and specialists (from within or outside IGNOU) develop the academic script; in-house or outsourced producers convert that script into a production script, and produce the programme in consultation with the concerned school faculty. The programme is edited, pre-viewed and re-edited to produce master copies in CDs, which are further duplicated for distribution to study centres and the designated marketing agencies; and the master tapes are used for broadcast/telecast. Varieties of formats are followed while producing the media programmes.
- While the same audio and video programmes are used for radio broadcasts and television telecasts respectively, programmes recorded from live teleconferencing are also used for telecasts on DD or GD.

- Audio and video cassettes are used at study centres by the students independently or at counselling sessions with the help of the counsellor. In some of the cases, audio, video and teleconferencing are compulsory course components for the students, and in some of the academic programmes tutoring/counseling is organized through teleconferencing only.
- It has been realized during the past few years that audio, radio broadcasts and interactive radio counseling are appreciated more than other media; and that, given a comprehensive basket of media (including the web), students will like to read self-learning materials through print and/or CD-ROM, and receive tutoring/counseling and other learner support online.
- Future use of media will include integration of satellite and web technologies in one platform – for instance, organization of two-way teleconferencing through the web – and communication (i.e. audio, video and data transmission) through the Internet and VSAT, with possibility of further local transmission through FM radio and WILL technology.

(For extended discussion, see Khan & Dikshit, 2006, pp. 181-194.)

SECTION 3

AUDIO, RADIO AND AUDIOVISION

As you have seen in Section One, audio and radio have certain advantages and meet certain teaching-learning functions which other media cannot match with. Audio and radio are accessible, the sets are portable, are relatively cheaper to produce, can personalize teaching, and can lead group discussion. Audio cassettes and recorded radio programmes can be used for interaction between the tutor and the learners. Additionally, audiovision is learner-controlled, can be effectively combined with print, and can lead learners step-by-step through even a complex process of learning.

Let us further discuss the three audio media, i.e. audio, radio and audiovision as follows.

Audio

Though radio is comparatively more effective in providing information and reaching the large mass of people, audio cassettes are important in providing motivation, learning resource materials, tutorial support and direct teaching. Students have full control over the use of audio learning materials as to when, where and how to listen to those materials. In so far as media integration is concerned, audio can be integrated with text (like audiovision), with text and video (like interactive multimedia), and with other learning activities like discussion, reading, writing, and hands-on experiments.

Institutional use

Many distance teaching institutions have been successfully using audio cassettes for effective student learning. A selective list of examples is given as follows.

Indira Gandhi National Open University, India

As you have seen in Section Two, there is an extensive use of audio cassettes for the programmes and courses offered by IGNOU starting from

the first offer of programmes in 1987. By convention, an 8-credit course (where 1 credit = 30 student study hours) is allotted 6 audio programmes, and the programme/course coordinator can ask for more programmes if the course demands so. The decision on media use and the number of programmes to be developed and produced is taken at the stage of course design, and the programmes can be produced either simultaneously with the printed course materials or after the course materials are printed. Invariably, the audio cassettes have been used as supplementary to the print. The cassettes are available at study centers for student use (either independently or in groups largely with the help of the academic counselor), as also at designated distributing houses/publishers at a price. It has been observed that programmes produced as audio cassettes are generally used as radio broadcasts for distance learning.

United Kingdom Open University, UK

Though from the beginning the UKOU used radio and television broadcasts (along with the master medium of print), a conscious decision was taken in the 1980s to switch over to the use of audio cassettes. With increasing number of courses offered (and thereby having less number of students per course) and the difficulty involved in securing transmission time from the BBC, audio cassette was considered more appropriate, viable and cost effective. Advanced level and specialized courses demanded such a media; also the OU academics recognised the potential of the contribution of audio cassettes to student learning, especially when they are combined with printed materials.

Allama Iqbal Open University, Pakistan

AIOU extensively used audio cassettes for delivery of basic education and training to the rural communities under the Functional Educational Project for Rural Areas in the early 1980s. The project, which was implemented in the state of Punjab, included use of audio cassette programmes in Urdu along with flip-chart illustrations at the village based study groups comprising 20 villagers each. Courses ranging from vegetable growing and animal husbandry to first aid were offered, and the success of the project led to its integration with the mainstream programmes of AIOU offered regularly along with other programmes.

Planning for audio

Like other media, audio programmes also require meticulous planning. The first stage of planning for audio programmes involves the decision whether to establish on audio studio or to outsource programme development and production. Each strategy has its own merits and demerits. Once this

decision is taken, the institutional planning exercise centers round further decision on the supplementary-complementary-integrated use of audio, number of programmes to be produced per course or programme, and whether to go for independent programmes or a series of audio programmes relating to a particular area of study. And, more importantly, how much money should be allocated to audio production, and allocation of the budget across different disciplines or schools of study or academic programmes. Advance information is required to be provided to the institutional planners and managers to make decisions and allocate budget and other infrastructural and human resources accordingly. Important information to be compiled at the initial stages include target groups, learning objectives, supplementary or complementary use of audio, delivery and use of audio programmes at study centers, and a plan of action as to how the programme implementation and the programme effectiveness shall be monitored and evaluated (i.e. by the programme coordinator, or the designated unit at the headquarters, or by the regional center/study center staff, and others).

Planning also involves the programme itself – its audience, objectives, content and structure, format, other support, and required resources. Let us discuss each of these as follows.

Audience

The characteristics of the target audience are important to both the academic (and the script writer) and the producer. This is important for the media researcher too. In a way, this is necessary for setting the level at which the design of the programme (i.e. content, presentation, format, etc) need to be pitched. This is what is called an ‘audience profile’ which includes the demographic characteristics (i.e. gender, age, employment status, rural-urban status, social status, etc.), their entry behaviour (i.e. qualification, academic record, knowledge on the particular area for audio, attitude, skills, etc.), audio study skills, access to audio and facilities available for listening to audio programmes, their expectation, level and style of language proficiency, and examples and activities liked by them. Sample survey and focused interviews are generally used to obtain these information.

Objectives

The academic or programme/course coordinator needs to specify the general aims and specific objectives of the programme, i.e. what the programme intends to achieve.

The general aims may include whether the programme shall provide information or application of the subject, shall motivate students, provide

direct teaching or additional learning resources or additional tutorial over and above the printed materials and the existing tutorial sessions. The specific objectives may include the specific learning objectives to be achieved, the skills to be developed (like critical thinking), the values to be imbibed, etc.

This specification shall facilitate decision on content to be included as also inclusion of activities in the programme, and their relationship with other activities as given in the course structure or the programme guide.

Content and Structure

The student audience profile and the aims and objectives shall facilitate the decision on what contents to include and how they will be organized. The main teaching points, their order of presentation, and the linkages to be established with the existing printed materials should be jotted down. Further, this decision shall also determine what format you would like to be used in specific programmes.

Format

Before deciding the format, it will be helpful if the *form* of audio material is determined. The form may include: natural presentation or scripted talks, discussions, field trip experiences, archived materials (i.e. already recorded audio), type of music including sound effects, etc. These need to be integrated with the format of the programme that you choose. You may like to choose any one or a combination of the following formats:

- ‘Documentaries’ in which reports of past and present events are given through discussion, archived materials, talks, etc.
- ‘Docu-Drama’ with commentaries in which the drama format is used to communicate, with occasional tutorial comments.
- ‘Features’ in which music and drama are included and the content is treated in a more creative way than documentaries.
- ‘Magazines’ dealing with a series of topics, linked to each other, and based on scripted talk or discussion or interview.

Other Support

Other support materials need to be decided and linked to the audio programme(s). For instance, decision needs to be taken on what to do before, during and after listening to the programme. Students may be asked

to read or listen or discuss something before the programme; may get into further reading or references or activities while listening to the programme; may undertake revision exercises or activities after the programme to reinforce or apply what they learnt in the programme. One way of doing this is to combine the audio with print as in the case of audiovision (which is discussed later in this section).

Required Resources

It is crucial on the part of the programme/course coordinator or the academic faculty to locate and specify the varieties of resources required for the development and production of the audio programme: the budget required, the producer and the production team, the human resources (i.e. script writer, presenter, etc.), the need for field trips for the programme, and others. A specification before hand shall reduce tension at later stages of programme production.

A typical planning document for audio includes the following (Table 3.1):

Table 3.1: Points for audio planning

Audience characteristics	Aims and objectives	Content and structure	Form and format	Other support	Required resources
Brief statement on the description of the target student audience on which structure and format can be based.	General aims on the intent of the programme and specific learning objectives of the programme.	List of teaching points to be covered, exercises and activities, and the way contents and presentation shall be ordered.	Statement on: the forms like natural presentation or scripted talk; and the formats like documentary, feature, drama, magazine, etc.	Activities to be undertaken before, during and after listening to the programme.	Specification of budget, production team, field trips, experts (script writer, presenter, etc.)

Further, the following decisions also need to be made:

- how the programme shall be delivered (i.e. through study centers, or directly to the students or be broadcast on FM/AIR/other radio stations,
- how this will be monitored, and
- how this will be evaluated (i.e. both formative and summative evaluation) along with programme evaluation for the entire certificate/diploma/degree programme.

The course coordinator will have to decide on people to be involved in the planning of the programme:

- an instructional designer who specializes on designing materials for adult learners,
- academic counselors who tutor students at study centers,
- a researcher who shall design the monitoring and evaluation of the programme,
- subject specialists who could guide on the validity of the content, and
- of course, the audio producer.

Scripting and production

Following the planning of the programme, the process of scripting and production starts. This presupposes that a decision has already been taken on whether the audio programme or series of programmes shall be used either as supplementary, or complementary or integrated (in which print is the master medium) or that it shall itself be used as the master medium.

The stage of scripting and production starts with the preparation of an academic brief/note, comprising the following:

- Tentative title of the programme.
- Characteristics of the target students.
- Aims and objectives of the programme.
- Brief content and structure of the programme (including the main teaching points).
- The form and format of the programme.
- The support materials and activities required to be used before, during and after the programme.
- Scheme of formative and summative evaluation, and delivery and monitoring mechanism.

The programme brief needs to be discussed with the concerned producer, and once finalized it will lead to development of the academic script. As hinted earlier, the scripting for different programmes shall differ. We describe below scripting of three types of programmes: i) talks/interviews/discussions, ii) documentaries/features/magazines, and iii) drama, which are produced more often than other types of programmes.

i) Talks/ Interviews/ Discussions

- Generally, audio programmes are based on direct *talks* which are scripted before producing the programme, and the scripts are read out to the microphone. Talks are important for providing information, advice and a variety of experiences to the students. Since there is involvement of very less drama or music, one has to simply write for the ear of the

listener. The programme may start with giving an idea about the objectives of the programme and the content and structure of the programme (usually called ‘concept map’); while presenting the programme, the main points need to be summarized from time to time; the students are also provided with signposts as to what has happened and what is going to happen. Links need to be established, and therefore it may involve repetition of summary of the content covered. Language should be informal and conversational – as if you are directly talking to your students.

While writing the script, the target audience, their entry behaviour, level of language, preference for examples and illustrations, etc. should be kept in mind. You have to ensure that each piece of the talk is communicating something which is essential for student learning. The presentation should be sequenced in a logical order, and may be in the form that as if one is presenting a tutorial to the students. A beginning, middle sections and an end to the talk will be highly appreciated. Some very common points (which are often given less attention) to be kept in mind include: clarity on the purpose of the talk, appropriateness of language and style, appropriate and adequate examples and illustrations, and conversational style of presentation. A well prepared talk needs to be read by a few and for quite a few times: by you, by another colleague, by a prospective student, and by the producer. A good presentation involves delivery at the rate of about 130-140 words per minute. The duration for each paragraph/teaching point and pauses between paragraphs/teaching points needs to be clearly mentioned on the script itself. And, of course, rehearsal always improves the presentation.

- *Interviews* are different from scripted talks in the sense that the former provide rich content and diversified points of view of different people or experts being interviewed, rather than the views of the script writer. Interviews may not require a full script (except that the main or focused questions need to be prepared and if required rehearsed with the interviewee) and that they can take place either within a studio or on locations. It is always effective if the interviewee and the interviewer speak naturally, and that the interviewer structures it while keeping the natural process intact. The points noted above for talks relating to aims and objectives, target audience, etc. are also applicable to interviews. The interviewee needs sufficient initial briefing (and needs to be authoritative and articulate), and the interviewer can make the interview natural if there is more than one interviewee. Briefing the interviewee may include: programme objectives, contents to be covered, the exact course materials to be used and read before the interview, length of the interview and the logistics aspects. As an interviewer, you can be more effective if the key words of the questions are kept in front, if proper eye

contact is maintained, and you listens to the interviewee attentively, and if the questions are asked keeping the target students' understanding in mind.

- *Discussions* are more diversified and enriched than talks and interviews, and can cater for the educational objectives of application, analysis and synthesis, and lead to critical reflection on the content. They represent different viewpoints or perspectives, thereby enrich students' understanding and learning. Good discussion requires indepth research on the topic for the moderator or the chairperson. He/she needs to be sufficiently briefed on the topics for discussion; and the points noted above for interview are applicable here too.

ii) *Documentaries/Features /Magazines*

- *Documentaries* are basically reports on the past or current issues and situations. A documentary may include interview, discussion, archives and talk, and is generally designed to include description, narration and analysis of situations. *Features* include music and dramatization, over and above the contents of documentaries. Except that the audio programmes lack visual movements (i.e. video), audio documentaries and features
 - describe the situations based on field trips;
 - observation of situations and their analysis and evaluation, and application of practical skills;
 - reports on facts, archived materials; and
 - analysis of current events.

The development of script for such programmes is similar to other types of programmes:

- defining target students;
- outlining aims and objectives;
- specifying content and structure, forms and formats; and
- support materials and resources.

Research assumes greater significance in these programmes, than others, aimed at establishing both intrinsic and extrinsic validity of the data/events/issues. The audio tutor, i.e. the presenter has an important role to play: to introduce the documentary materials to the students and relate to their work and other learning activities, link various materials and given interpretation, and present/ensure coherence of materials.

Generally, documentaries and features require considerable post-production editing.

- *Magazines* or magazine programmes form a part of a series; are broadcast daily/weekly or so; and are important means of providing information to the students. Such programmes can be course-specific, but usually compiled and broadcast from a central facility. The programme/course coordinators may like to provide additional information through such programmes; if these programme contents are intended to be used for a few years it is desirable to develop them in audio cassettes, or else it is advisable to have regular radio broadcasts for providing information and guidance.

iii) Audio Drama

Audio drama are used for situations where these are projected, or for very sensitive subjects like religion, family planning, etc., or where group interaction requires live recording. The past can be recreated and fiction can be enlivened in the current contexts. Audio drama programmes create more motivation and can significantly affect the attitude of distance learners; and these are vigorous and bold, and, therefore, need a strong theme to work on. The contexts in which these are enacted are behaviourally oriented and are therefore sensitive. Characterisation of actors needs to be very carefully drawn and there should a clear plot, a good story-line, with convincing involvement of characters in the drama.

For scripting and producing such programmes, one needs to specify the aims and objectives, the learning experiences to be provided and concomitant specification of the actual use of dramatic materials. The story-line needs to be further structured through various scenes which are to be presented as developmental, i.e. one building on the other. Audio drama can sometimes be scripted in which sounds and even silence can carry important meaning. One may use both studio as well as location recording, and needs to carefully design the sound effects. Audio drama has great potentiality of the imaginary, and therefore is called 'the theatre of the mind'.

Using audio

There is always a need for using the print alongwith audio or radio programmes. Printed notes that accompany audio programmes should note the following:

- programme title,
- objectives of the programme,
- content outline or brief,

- relation of the audio to the rest in the series (if any) and to the course,
- glossary of terms,
- pre/during/post programme activities,
- guidelines on the best use of the audio, and
- additional guidance on what to do in case of difficulty in understanding the programme.

Audio programmes can be used by learners either individually or in a group. In a group situation, learners get opportunity to discuss with the tutor and amongst themselves, followed by working on group-based activities like hands-on skill development, role play and simulation, applying knowledge to be assessed through assignments, and working on group projects. One has always to keep in mind that whether used in a cassette or a CD form, post-duplication high quality audio is extremely essential for sustaining student interest in audio programmes.

Evaluating audio

Rowntree (1994) has mentioned three types of evaluation for audio programmes: self-evaluation, critical commenting, and piloting. These are briefly discussed as follows. It is desirable that all the three types of evaluation are conducted and the results/feedback are collated for further improving the audio programme before its duplication, dissemination, and use.

Self-Evaluation

The programme/course coordinator is suggested to listen to the programme in a quiet moment, especially from the point of view of targeted distance learners. One may develop a checklist on the basis of the points noted earlier (i.e. aims and objectives, teaching points, etc.) and match whether the programme fulfils them.

Critical Commenting

Just like critical readers commenting the printed materials, audio programmes (along with accompanying programme notes) can be critically commented by colleagues and experts on the basis of a pre-developed checklist. These comments may include sound quality, individualized instruction, conversational language, clear structuring, workload, and clarity of instruction.

Piloting

Piloting or administration of the audio programme on current learners or graduates of the programme/course provides significant feedback to the faculty. There are two ways of doing piloting: i) face-to-face, and ii) field trial. In the first case, a few learners can be interviewed face-to-face to point out the weaknesses and difficulties (and also strengths) found in the programme. In case of field trials, 20-30 learners can be grouped where they listen to the programme and individually fill up a log sheet during the programme or a questionnaire after the programme. Even, one may administer a post-test on comprehension of the programme; and all the three can be analysed and discussed with the piloted learners on the need for further improvement.

Radio

Radio is the biggest mass media of all and covers the largest population in the world. Both radio and audio cassettes are one-way technologies, though the latter can be used in group learning situations and can be made interactive. Radio is used in two ways:

- One is that of radio broadcasting which is live.
- The other is that the broadcasts can be stored and used later like the way audio cassettes are used.

Radio programmes can be produced based on any of the following formats:

- *Lecture*: This consists of direct lecture by experts without using any accompanying reference materials.
- *Interview*: Interviews can be discussion based, by interviewing various experts in the field, and highlighting the important issues and teaching points, as also by cross referencing and cross examination.
- *Resource Material*: Recorded radio cassettes or audio cassettes can be used by an expert presenter as resource material while presenting a talk or discussing some aspects of the course; and these are telecast live. The presenter can also dramatise while using a recorded cassette.

The recorded cassettes can be used as resource material for situations which warrant a recorded voice, for instance music from different

musical instruments, noise, speech patterns, and the like; and these materials are used in a discussion mode with commentaries provided by the expert presenter.

- *Radio-Vision*: Before radio broadcasts take place, the learners are provided with guided study materials or handouts comprising complex diagrams or visuals; and the radio talk discusses those materials which students use while listening to the radio broadcasts.

Radio has been invariably used by most of the distance teaching institutions as the primary accompanying media alongside the print. The UK Open University used radio broadcasts right from the beginning, and the OU students had rated them very high. IGNOU has also used radio broadcasts since 1990; and its interactive radio counseling (IRC) which started in 1998 has been a great success. The experiment started at the Bhopal AIR station for one hour of interaction session twice a week; and was later on extended to all over the country. Now about 10 FM radio stations design and broadcast interactive radio counseling (by using toll-free phone numbers) in regional language by using regional programming and regional broadcasting.

Radio can be effectively utilized for distance learning programmes by taking care of the following:

- Student handouts or programme notes can be supplied before broadcasts take place, and which categorically underline the objectives of the programme, follow-up activities, assessment mechanisms, and how exactly learning is intended to happen.
- The programmes can concretize abstract concepts by giving very appropriate examples.
- The programmes can be made didactic by involving many discussants, and follow-up student activities to analyse, compile, compare, evaluate, test, etc.
- The programmes should explicitly state how and to what extent these are related to or integrated with course materials, additional readings, assignments, counselling, projects, and term-end examinations.

Audiovision

Audiovision as an important media, especially in the context of distance education, combines the advantages of print and audio, and converts the benefits for effective student learning more than what print and audio

combined together can do. As mentioned in Section One, audiovision has advantages

- over video as regards ease of production and cost effectiveness, and
- over print as regards teaching through different concepts by using diagrams and charts, and ease of revision by students through the frames within a short period of time.

Koumi (1993) has mentioned the following educational functions that can be significantly achieved through audiovision:

- Guidance can be provided step-by-step informally.
- Students can be taken through practical procedures with structured guidance through audio.
- Remedial tutorials are possible through this.
- Visual resource materials provide the major objects of study, and also reduce memory overload. Further, this is effective for students who find difficult to concentrate with audio alone.
- Student activities can be effectively carried out through the medium.
- When static pictures can achieve the learning objectives, there is considerable saving of money and time to have gone for video.

There can also be audio-guided learning with computer graphics (for details, see Koumi, 1995). Audiovision has been in use at the UK Open University since the 1970s and the Indira Gandhi National Open University had tried it out a few years back in the School of Sciences. The visuals formulate the core content, and are guided by the audio. A teacher can even teach or demonstrate technical and logical skills and guide students to acquire such skills through the medium. The visuals may comprise formula and equations, models, architectural plans, flow charts, etc.

The UKOU is one of the best examples of the use of audiovision as a media, which is even more effective (and cost effective) than video. The OU has used it for teaching of courses on art history, mathematics, economics, technology, computational mathematics, geology, biology, and mental handicap. For instance, in the art history course, the audio cassette takes the students through different text materials, and they write précis and comments in the margin of the printed materials (ADB, 1999). Audiovision, if properly designed, can be a lead media for distance learning.

SECTION 4

VIDEO AND TELEVISION

As was noted in the first section, both television and video are powerful media, and therefore have been substantially used in distance teaching-learning. Television is an open medium and involves one-way communication, while video can be individualised and can be made more interactive. Therefore, considerable instructional design goes into designing and producing video programmes than what is done for television. It is observed that there is a general tendency to produce a television programme and record it to be viewed as a video programme. While TV programmes can be recorded for future use and for repeated viewing, video programmes are specially designed and produced keeping in view various learning theories; and also these can be stopped and other related activities can be undertaken before coming back to continue the video. Given below is a brief description of educational television and video, followed by a discussion on some generic aspects for both the media: programme format, scripting and production.

Television

Contrary to the contention of the American scholar Richard Clark that media do not influence learning, and that "... Media are mere vehicles that deliver instruction but do not influence student achievement any more than the truck that delivers our groceries causes changes in our nutrition" (Clark, 1983), many have proved and therefore believe that media like television and video significantly contribute to achievement of certain learning objectives. The different forms of television like broadcasting, instructional television, interactive television, video conferencing, and tutored video instruction have been tried out in many countries, keeping in view what learning objectives one is looking for and what facilities are available to produce and use them.

Bates (1988) distinguished between *delivery* characteristics, *presentational* characteristics, and *control* characteristics of television. Relating Clark's

views to be confined to delivery characteristics only, he further elaborated the other two which are summarised as follows.

Presentational Characteristics

The presentational characteristics of the television differentiate it from other media. It can present and enrich experience through 3-D presentation, even better than direct observation. Through the process, the abstract principles are also concretely visualised as concrete examples. Television presentations also develop skills of analysis, application and evaluation. Viewers can relate the presentation to their circumstances through analysis of a new situation, application to practical contexts, evaluate evidences or arguments, and so on.

Control Characteristics

Since television is an ephemeral medium, quality viewing time is important. Students can though record the programmes in cassette form for repeated viewing. Video cassettes have advantage over the broadcast TV in that the former can be individually paced, integrated with other learning materials, and can facilitate analysis and reflection.

You may still find the following aspects of television that put it in a more advantageous position than other media.

- *Teaching resource:* Television provides a sort of direct experience of the field or the process or the event which other medium cannot provide with that ease.
- *Concretising the abstract:* Television concretises the abstract concepts, principles and generalisations through examples, illustrations, moving pictures, sound, audio-visual images. Pictures with words or vice versa communicate much more and with conviction and clarity than any one of these alone.
- Students can analyse the real life situations for themselves and replicate the same in other situations; in a way, they can ‘analyse’ and ‘synthesise’. Learning from television through live demos can be repeated and therefore can improve application in real situations.
- Television can reach a larger audience than what video cassettes can. Further, if properly designed, it can motivate more than other media.

- Television can still personalise teaching by creating a sense of belonging to the teacher and the teaching institution.
- It can increase efficiency of learning, especially when combined with reading the self-learning print materials. However, this is more possible in case of both video and audio.
- Regularly scheduled broadcasts provide pacing to student learning, and can guide students to be regular in their studies and complete tasks as stipulated.
- Television is one of the most influential media to *provide information* to distance learners.
- Also, the kind of academic credibility attached to good television programmes is unparalleled. For instance, the credibility of the UKOU's programmes has much to do with the credibility of the television programmes produced for it by the BBC.

Video

As noted above, video programmes are very powerful self-instructional materials in comparison to say radio and television. Such materials can be either ready-made to be bought from some agencies, or purpose-made, developed specifically for the achievement of specific learning objectives. The strengths of video programmes include the following:

- Can be designed in a manner that one can pace learning by stopping as and when required or as one feels like, and repeating the word-picture combinations again and again.
- Depicts actual processes and work situations in minute details.
- Does not require competent reading skills to view videos.
- Can animate motion or slow down the motion to closely observe the process.
- Can be geared towards specific learning groups with specific learning characteristics.

However, unlike television, video can reach only smaller population, and that one needs costlier instruments to view these programmes. It is also more expensive to produce than many other media. Different formats of video are available today, and though there are problems of compatibility of technology, it is getting easier day by day.

Programme formats

There is a wide range of formats for both video and television programmes. The choice of the format will depend on your teaching-learning objectives and a judicious consideration of interactive and participatory versus non-interactive approaches, the costs involved, availability of resource persons, and availability of facilities. Consider the following formats, and see which one alone or in combination best fits into your teaching-learning objectives.

- Documentary
- Interview
- Lecture presentation
- Group discussion
- Feature
- Drama
- Simulation and role play

Choice of a format will also depend on the focus of the programme, i.e.

- whether it is curriculum based or enrichment type;
- whether it is instruction-oriented or presents a general overview for awareness; and
- whether it addresses largely cognitive objective or it is largely motivational, and so on.

Let us consider the commonly used formats of: voice-over narration, lecture/demonstration, interview, panel discussion. These are briefly enumerated below in relation to their strengths and limitations.

Voice-over narration

This provides a good story line and description, and also general overview, coupled with a variety of sounds. One can read the narration from the script and visuals can be imposed on voice, and can be visible on the screen. However, such a format is impersonal and does not involve the learners much, and, therefore, makes them passive viewers. Hence, considerable pre-production planning is required to produce a good 'voice-over narration' programme.

Lecture/demonstration

Lecturing or presentation to the camera in a natural manner does not require much preparation for the experts, except that they need to learn how not to be camera conscious. However, lectures are more personal than narration, and can create a simulated classroom to provide a sense of belonging. In many instances it has been found that viewer interest depends largely on the presentation style of the teacher; and also that constant on-camera talk creates boredom.

Interview

Interview, if designed properly and handled carefully by the interviewer, can lead to critical thinking and reflection. It can be made interesting and therefore can involve the viewers in the programme. However, disjointed questions (without any linkage or cross-questioning) becomes boring and isolated pieces of information without a critical storyline.

Panel discussion

Discussions among a group of panellists and moderated by a moderator go beyond the critical elements found in interviews, and can be more thought provoking. Further, unlike interviews, none of the panellists are hard pressed to respond, and therefore become natural while presenting and intervening. On the other hand, if not handled properly by the moderator, such discussions tend to be more heated and loose balance.

Script writing

Script is the backbone of an effective video or television programme and significantly determines the learning effectiveness of the programme. There are two groups of experts who keep differing notions about scripting and instructional design for video/television. One group considers rigorous instructional design reflected in a structured academic script as the key to effect student learning. The other group adheres that a rigorous design mars creativity and flexibility, and does not provide space for individual creativity and articulation, and therefore resists any structured scripting before the programme production. You are though free to make your own decision on how to go about it; however, it is contended that there are certain aspects of the programme which need to be decided and which do affect the way the programme is produced and the way learners will be affected by it.

The essential elements of an academic script are described below.

- *Media Context:* Whether the video programme is self contained, or part of a series, or part of a multi-media package.
- *Educational Objectives:* The cognitive, motivational, and psycho-motor objectives that the programme intends to achieve.
- *Programme Format and Style:* Whether the programme is an interview, documentary, camera presentation, laboratory experiment, etc.
- *Learner Context:* Whether the learners shall view the programme individually or in groups or at the presence of the teacher.
- *Learner Activity:* If there are pre- and post-telecast activities for television; and if it involves working on handouts and notes in case of video.
- *Programme Proposal:* The duration and structural outline of the programme, and why the medium of TV or video has been chosen.

Let us take an example of the brief to a script (also called ‘academic note’), and see how the points noted above have been addressed. We have selected and noted below two preliminary scripts on: ‘Senior Citizens’ which was developed by Sohanvir Chaudhary in a training programme at BBC-OUPC at the Open University, UK; and ‘Crisis Management’ which was part of a second level interdisciplinary course at the undergraduate level at the UK

Open University (the contribution of the authors and BBC-OUPC is gratefully acknowledged). The script deliberately kept the duration of the programme for six minutes; this may be increased in the script that you may like to develop. You may examine the following preliminary ‘briefs’ to two academic scripts (Figures 4.1 and 4.2) and see if you agree or disagree, and in what way you can improve them.

1. Name	:	Sohanvir Chaudhary
2. Programme Title	:	‘Senior Citizens’
3. Programme Format and Style	:	Documentary; interview with a social worker and three senior citizens
4. Target Audience	:	Social welfare functionaries (government and voluntary); general public
5. a) Educational Objectives: After students have viewed the programme, the following changes are expected in their thinking, abilities, etc.	b) Rational for Using TV: Why is the TV treatment better suited to achieve the stipulated objectives than other media.	
i) Affective: Creation of awareness and interest amongst social welfare functionaries, as also the general public.	i) The problems of elderly people can be depicted better through TV than other media. TV can affect the attitude of target audience. The viewers will see the elderly people expressing their problems and the way they are.	
ii) Motivational: Encouraging them to take care of the elderly people.	ii) Social welfare agencies will be encouraged to plan welfare schemes for the elderly. Interview with social workers and elderly people will motivate the target audience.	
iii) Cognitive: The target audience will be aware of: the problems of the elderly as people (loneliness, depression, economic conditions, transportation, etc.); the services rendered by the welfare agencies; and the activities required to make them cheerful.	iii) Problems faced by the elderly can be better depicted by showing them they are. Facilities provided by Age Care (a voluntary agency) and the activities elderly people undertake can be visualised and appreciated.	

Contd....

6. Media Context: A detailed discussion on the socio-psychological and physiological aspects of the problems of old age will go into the text. This is a self-contained programme by itself, but can be used in combination with group activities and other materials.
7. Learner Context: Learners shall view the programme in a group, followed by a discussion. The topics for discussion include: socio-psychological problems of the aged people; how can the government and the society help the elderly people in bringing them closer to the mainstream; how to make welfare schemes user friendly and effective.
8. Learner Activity: The learners would have read the course unit related to the topic before viewing the programme, followed by a group discussion on the issues, problems and possibilities of welfare of the senior citizens.
9. Programme Proposal:
- a) Intended duration : 6 minutes
 - b) Structural outline of the programme :
 - Socio-psychological problems of the elderly people in the age of industrialisation; and the problems of nuclear family and single family.
 - Facilities provided by the day care centres.
 - Social welfare schemes and activities to keep the old people engaged, happy and mentally fit.
- There shall be interviews with selected old people concerning their problems and their reactions about the day care centres. There shall also be interviews with social workers on the purpose of day care centres, the services rendered to the old people, and the future plans of expansion of such facilities in more creative fashion.

Figure 4.1: Example of a brief to television academic script

Course	:	Nuclear Weapons, Inquiry, Analysis, Debate
Programme	:	Crisis Management
Format	:	Interview, Archive and Commentary
<i>Educational Objectives</i>		<i>Rationale for Using TV: Why is the TV</i>
Students to:		
1. Be reminded of major events of the crises of Cuba 1962 and Middle East 1973.		Archive plus commentary provides a memorable account of events in brief; plus seeing interviews with participants in these events adds another dimension.

Contd....

2. Compare and contrast the nature of the two crises and the lessons learned from them.	Interviews provide students with the views of academics and participants directly expressed by them (especially Kissinger and Schlesinger as well-known figures). US and USSR views expressed by relevant commentators.
3. Consider the nature of superpower crises in general and in what ways they change over time.	Interviews provide range of views directly expressed and illustrated; archive accentuates sense of change over time.
4. Be introduced to the idea of Crisis Management Centres as a possible future development.	Idea ends the programme, and leads student into activity after viewing. So this links television programme with reading and written work.
Media Context	: Programme one of a series of eight for an Open University "U" course (Second Level).
Learner Activity	: Students view individually on transmission.
Learner Activity	: Before viewing, students have read in detail historical accounts of the crises of '62 and '73 as part of a chronological account of the Cold War since the building of the Berlin Wall.
	After viewing, students have to explore the nature of superpower confrontations with particular emphasis on the possibilities for crisis management on crisis avoidance in the future.

Figure 4.2: Example of a TV brief on 'Crisis Management'

The above examples of a preliminary brief to an academic script were the first drafts. Can you think of better ways of representing the above brief? Or, you may like to compare the above with the one you intend to develop, and jot down how to improve briefs to or actual scripts in their second draft.

The briefs of scripts presented above will lead to what is called a full academic script which will have the full content of a 20-25 minutes programme: dialogues, visuals, activities, and so on, and through these, the main teaching points. The script writer could be the teacher handling the

concerned course or a professional script writer. Experience tells us that the script is pedagogically more effective if the teacher him/herself writes the script, or at least vets the script when written by others. This, therefore, requires some training on how to write effective scripts. The following points suggested by Jack Koumi may be kept in mind while writing your script. The aspects of an effective script emphasised by him and described below include: usage, structure, and sympathetic picture-word composition. These aspects need to be considered and must find a place in the script.

Usage

The usage dimension includes: target audience, learning experiences, and educational objectives. These are briefly explained as follows.

Target Audience: culture, age, commitment, previous knowledge and experience, media facilities and access.

Complementary Learning Experiences: other media like class teacher, print, audio, etc.; pre-work and post-work; TV versus stop-and-start video.

Educational Objectives: affective (reassure, fascinate, inspire); motivational (stimulate, provoke, encourage); experiential (explore, visualise, demonstrate); cognitive (facts, concepts, strategies).

Structure

Structuring of each chapter of the story within the script:

- Make them want to know: hook (appetise, create suspense, surprise, excite)
- Tell them what you will do: signpost (introduce and set the scene; tell what is coming up; provide a chapter heading, tell what is the focus)
- Do it with sympathy: texture the story (non-sequential, pacing of structure, varying format); reinforce (repeat, re-exemplify, compare and contrast); sensitise (consistent style, music style, change of mood of topic)

- Tell them what you have done: consolidate (recapitulate, summarise salient features, generalise, chapter ending)
- Connect it: link (make the story hang together, link of contents, link of the story)

Sympathetic picture-word composition

- Individual shots and transitions: minimise density, reinforce through word-picture combination, enhance legibility
- Story line: reduce overload, communicate assumed knowledge, concretise, fascinate
- Mindful learning: words not duplicating pictures, pause for contemplation, pose questions, don't mesmerise, reveal geography, professional integrity

You have to keep the above points in mind while developing your script, and see if you can take care of all the points noted above. Once the academic script is prepared, it is converted to a production script by the producer. This leads to production of the programme.

Programme production

As noted above, the programme brief (like the one presented in the box above) is transformed into an 'academic script' by the teacher, and the academic script is transformed into a 'production script' by the producer. The flowchart presented below for the production process (Figure 4.3) is a representative one; you may modify it to suit your situations and requirements.

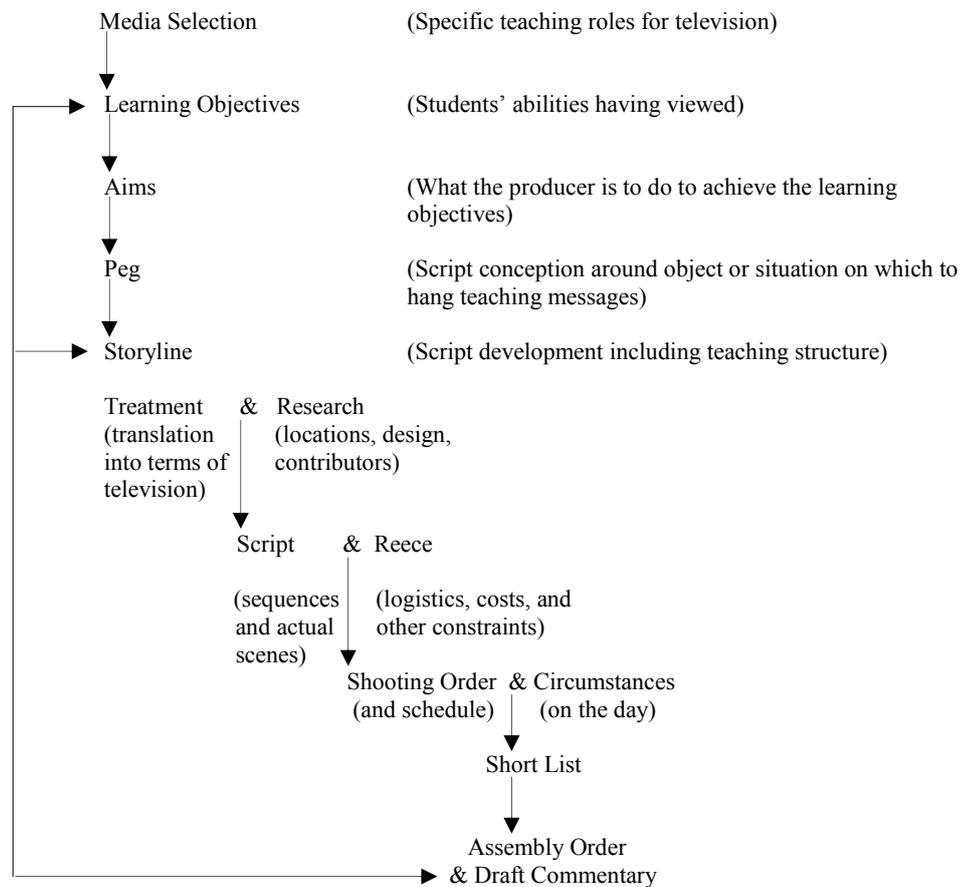


Figure 4.3: Flowchart of television/video production process

Formative evaluation

Formative evaluation or developmental testing of the video programmes before their large scale distribution and use increases the pedagogic effectiveness of the programmes. On the other hand, live or recorded television programmes can be evaluated as post-facto evaluation to further improve the future programmes in the series or any new programme production. The process starts from critiquing the draft scripts by experts, as also administration of scripts on some sampled target audience. It is essential that subject matter specialists, instructional designers, and television specialists read and provide comments on the academic script. Formative evaluation of the programme (before finalisation and duplication) suggests further the:

- accuracy of content
- difficulty level for comprehension
- achievement of instructional objectives
- access devices, and linkage of usage, structure and picture-word combination
- the technical aspects of sound, picture and production quality
- language of the television

The programmes can be evaluated with the help of rating scales which may cover aspects of:

- presentation, presenter, and his/her articulation
- clarity of visuals
- clarity of learning objectives
- integration of sound, picture and activities/processes
- meaningfulness of activities
- soundness of pacing and speed
- quality of sound and visuals
- motivational aspects

SECTION 5

TELECONFERENCING

The system of conferencing, especially audio and video conferencing, is widely used for distance teaching-learning in the developed countries. In some of the developing countries (for instance in IGNOU in India), teleconferencing is a regular part of the multi-media packages used for distance education delivery and interaction. Teleconferencing as such is a wide term and covers all kinds of conferencing, i.e. audio conferencing, video conferencing, or any combination of these types (Laurillard, 1993). It is a synchronous interaction at a distance, though in computer conferencing it can be asynchronous. Let's first describe the types of teleconferencing before taking up a discussion on organisation of teleconferencing for distance education.

Types of teleconferencing

Teleconferencing generally carries three forms of information, i.e. sound, vision and data; and these are transmitted through microwave radio links or satellite transmission, and telephone and cable networks. Therefore, the different types or forms of teleconferencing differ from each other.

Telephone tutoring

Students can connect with other students and also the tutor through telephone lines, and effective tutoring and self help group may take place. In Canada, this is a major form of distance education delivery and tutorial support. The students have control over the interaction and negotiate the topic and the process of discussion, including the time and pace it should take place. One may like to use fax for transmission of data while using telephone tutoring.

Audio-conferencing

Laurillard (1993) mentions that 'Audio-conferencing is group discussion by telephone'. There can be an audio-bridge with a single telephone number for all participants to use, and the moderator ensures everybody's participation

in the group conferencing. Moderating such conferencing as chairperson is a very difficult task, and social negotiation is a sensitive aspect to deal with.

Advantages

Audio-conferencing has the following advantages:

- It is very inexpensive for installation, operation and maintenance.
- Its access is far reaching since the existing telephone lines are used.
- In some countries its spread is high and so both the teachers and the students are familiar with this media.
- Interactivity and participation can be very high; and interaction of self help groups is best ensured with relatively low cost.
- If audio-conferencing is combined or integrated with print, video and computer, its pedagogic effectiveness increases.

Instructional Design

Though there is absence of visual input in audio-conferencing, its effectiveness can be maximized by proper instructional design. The following points may be kept in mind.

- Content can be presented through pre-recorded tapes for 10-15 minutes, followed by interaction and feedback. This cycle may be repeated again.
- Moderation by the moderator should facilitate students to see the organizational structure of the content, and link up with previous presentation and the corresponding text.
- Interaction needs to be encouraged, and moderation is essential to see through the main teaching points and the organization and structure of content.
- Printed materials in forms of illustrations, pictures, slides, handouts, etc. can be distributed prior to the event, and can be referred during audio-conferencing. They may provide organizational framework of the content and the main points for reference. There can be a separate manual for extra readings, exercises and activities, etc. to be used across a series of audio-conferencing sessions.

Organisation and Feedback

Conduct of such conferencing sessions should be a part of curriculum/course design, and therefore should indicate its supplementary, complementary or integrated use. The moderator/tutor should organize pre-conference and post-conference activities to link up with the regular conferencing sessions. He/she can enhance motivation and comprehension

by taking a student-centred approach by letting them set their own objectives and pace of communication and interaction. While information needs to be provided, application of the content needs to be emphasized. There should be content preview and overview, as also review of the main points during and at the end of the conferencing. Assignments that students need to do as part of course work can also be discussed before submission and even after students have received tutor comments. The moderator can increase student feedback by asking them to use telephone, mail and even email. There can be self assessment questions which students need to work out after each session. The moderator may use a checklist or matrix to analyse student interaction and provide for remedial support. Questions can be asked in-between the session to encourage participation and ensure interaction, as also check whether learning is taking place.

Audio-conferencing has also limitations in the sense that the participants must have access to it and should know how to make best use of it. One has to guard against the impersonal nature of interaction and participation. It has also pedagogic limitation: that psycho-motor activities need other instructional inputs.

Video-conferencing

Referred to as interactive television or two-way closed circuit television or even interactive cable television, video-conferencing uses the video-conferencing circuit in which camera is installed at both the ends of the link to carry the picture of the group to the other end through video link (i.e. cable, ISDN, radio microwave or satellite).

- In case teleconferencing is delivered through standard *telephone* lines, though the 64 kbps transmission rate reduces picture quality, the technology is more accessible to the largest number of population.
- Either telephone or fibre optics can be used for *ISDN* transmission of two-way voice, graphics and data.
- In case of *satellite* broadcasting, there is use of two-way audio and one-way video. The use of VSAT (very small aperture terminal) is generally receive only including data transmission; however VSAT mess system allows for two-way audio-video. Though transmission cost is low, the VSAT ground stations are costlier to establish.

There can be point-to-point connectivity linking two locations, or point-to-multipoint connectivity simultaneously connecting more than two sites through the use of multi-point control unit.

Video-conferencing (VC) can be:

- ‘small room VC’ for a small group of participants,
- ‘classroom VC’ in which high quality equipments are used for coverage of all the participants, and
- ‘desktop VC’ in which VC software and PC software are combined for effective one-to-one conferencing system.

The common form of videoconferencing in Australia for instance includes two-way audio-video transmission as compressed digital signals via ISDN through fibre optic cables (Schiller & Mitchell, 1993). Teleconferencing can also combine both telecommunication and computing systems and networks for greater interaction and reaching still wider groups of participants. In India, satellite-based teleconferencing is used for both analogous one-way video and two-way audio, and digital two-way audio-video conferencing using multi-sites.

Instruction can be designed more effectively if the instructor focuses on all the sites involved; provides activities to be carried out before, during and after the conferencing; and uses varied instructional strategies even in one session. These may include lecture, group discussion, question-answer, individual or small group projects, etc. Expectations and interactions need to be focused, distractions need to be reduced, and dialogue needs to be encouraged. The instructor/tutor and the students should know the technical aspects of operating the system since they have to, most of the times, handle the equipment themselves. The most important thing that needs to be given special attention by the instructor is the aspect of social negotiation in the involvement and participation during the conferencing.

Teleconferencing

Satellite-based teleconferencing, which accommodates full motion video, is being used to a considerable extent for instructional delivery and interaction in many institutions in the world. This requires expensive technological systems and a host of specialized people involved in its operation. Broadcast quality production facilities ensure clarity, speed and synchronization. It can be one-way video and two-way audio or even two-way audio and video. At IGNOU, the former system is in operation, and the analogous broadcasting is gradually being shifted to digital operation, with possibility of two-way audio and video. Digital technology increases volume of transmission, speed of transmission and quality of transmission. Use of fibre optics (instead of copper lines) further increases bandwidth and therefore the quality of operation.

An example of the teleconferencing configuration for the first experimental teleconferencing that took place (between Ahmedabad and Delhi) at IGNOU in 1993 is given in Figure 5.1.

The general configuration for the teleconferencing experiment comprised of the following:

- Satellite transponder: INSAT-2A (74°E) and INSAT-2C (93.5°E)
- Attenuator setting: 5dB (INSAT 2A/2C)

The configurations at Ahmedabad and Delhi were the following:

<i>Ahmedabad</i>	<i>Delhi</i>
1. Transmitting station : AES (14 M) campus	1. TRACT (6.1 m) at IGNOU
2. Transmit frequency: 6835 MHz (#15 of INSAT-2C)	2. 6835 MHz (#15 of INSAT-2C)
3. Transmit EIRP: 70 dBw	3. 70 dBw
4. Receive station: 2.5 M DRS at TV studio	4. DRS at IGNOU campus
5. Receive frequency: 4610 MHz (# 15 of INSAT-2C)	5. 4610 MHz (#15 of INSAT-2C)

The major objective of the teleconference was to have two-way interaction and discussion between the participants in Delhi and Ahmedabad. Figure 5.1 shows that the television programme from Ahmedabad was uplinked from AES using #15 of INSAT-2C and was received at Delhi through DRS terminal at IGNOU studio. Similarly, the television programme at Delhi was uplinked through Transportable Remote Area Communication Terminal (TRACT) by using #15 of INSAT-2A and was received at Ahmedabad through 2.5m DRS terminal. The two transponders were used in FM mode, and were experimental only. This configuration has undergone changes subsequently.

Planning for teleconferencing

Since it is live and on-the-spot, teleconferencing requires considerable preparation time, and if properly designed it can achieve many of the learning objectives including psycho-motor objectives, and those for critical reflection and problem solving. Use of visuals including computer animation, activities at the learning end and even body language increase participation and interaction. Instead of direct presentation, the instructional session can be divided into adoption of many instructional strategies. While preparation or planning for teleconferencing takes into account all the points noted for other media (like target audience, learning objectives, content and structure, learning resources, monitoring and evaluation, etc.) and that

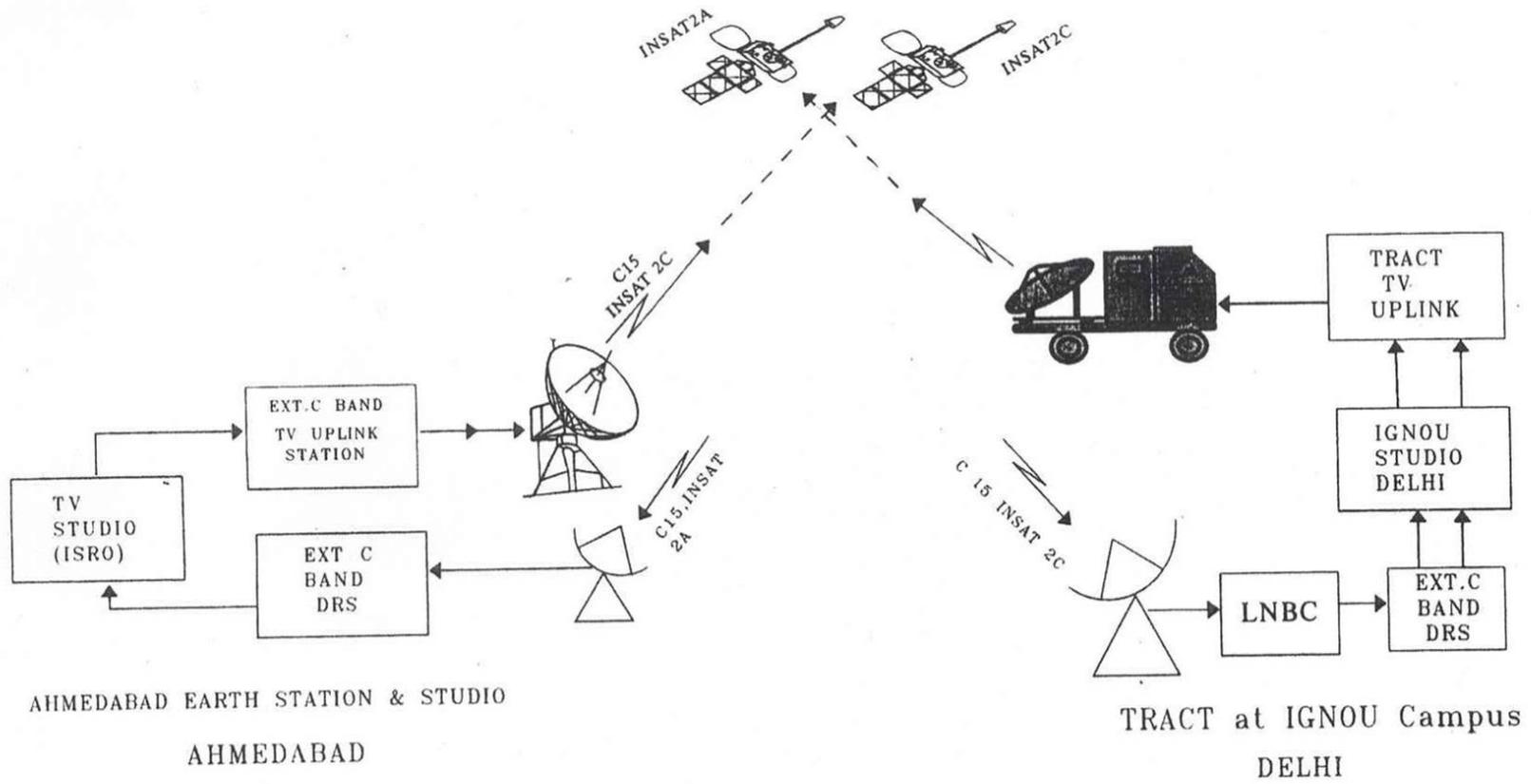


Figure 5.1: Network configuration for video conferencing

general instructional design is applicable for teleconferencing, it is important that the teleconferencing session is planned properly for maximising pedagogic effectiveness. In the North American universities, broadcast or relayed lectures are used to reach large masses of students. In these live lectures, students from home and other places can ask questions and interact with the teacher through largely audio telephone link (Bates, 1995). The lecture format, it is argued, leads to only surface processing or surface learning, i.e. recall and reproduction; and therefore attempt should be made to initiate deep processing or deep learning, i.e. questioning, analysis, critical reflection, etc.

Given below in the box is an example of how a one-hour teleconferencing session can be organized. You may work out many alternatives depending on your learning objectives, target audience, subject matter, learning activities to be undertaken, etc.

- 10 minutes: Preview
 - Welcome and introducing oneself and the topic; the learning objectives; the way the session shall be organized; activities to be undertaken at the learning ends; reference to any handout or learning materials; and even ascertaining where and how many learners are participating. This sub-session also includes discussing the advance organizer.

- 40 minutes: Presentation and Interaction
 - Brief presentation on new topic or material or teaching point.
 - Brief telecast of a live or pre-recorded interview.
 - Questions from participants and brief interaction.

- 10 minutes: Review
 - Summarising the important points brought out during discussion, and further clarifications.
 - Instructions for carrying out activities at the learning ends with the help of the local tutor/resource person.

The process of guided learning activities and the outcomes may be faxed to the teaching end on the same day to be further collated and responses prepared if the next presentation is on the next day, or be sent immediately after the practical session if the presentation is after the conduct of local learning activities on the same day.

The entire planning for teleconferencing can be divided into four aspects given as follows:

i) Humanising

- Welcome (through pre-conference letter and also at the time of teleconferencing).
- Master roster (records on the individual student and his/her participation).
- Addressing the participants and local resource persons by name.
- Use of own personality (one should not dramatise or act, rather be oneself). However, it needs considerable practice to present on camera, live.

ii) Participation

- Warm up (expression of enthusiasm, warmth and encouragement).
- Initial questioning (giving advance organizer and signposts for things to unfold).
- Questioning as the most important tool (expression of creativity in framing and asking questions; and summarization of important questions and possible answers/outcomes).
- Interactive format (adult education strategies/techniques: interview, case study, panel discussion, role play, case study followed by discussion, etc.).

iii) Presentation style

- Providing advance organizers/overview, and focusing on major teaching points/ideas.
- Presentation in short segments, use of variety of strategies, and presentation by multi-voices (i.e. more than one presenter, live or recorded).
- Repetition of important teaching points.
- Provision of print back up of what is presented.

iv) Feedback

- Always ask for feedback on materials, presentations, technical aspects, etc
- Feedback on questionnaire is extremely useful.
- One-the-spot monitoring and evaluation at local/regional level may be undertaken.
- Group feedback through group quiz, weekly questions and feedbacks.

(Source: 'Designing of Interactive Teleconferencing', University of Wisconsin-Extension, Madison, WI 537706).

The anchor/facilitator

The anchor (or in an extended role as ‘facilitator’) should take care of planning of the conferencing session(s) much before the programme starts. This involves coordinating activities; checking with presenters, media persons and studio arrangements; prior circulation of the schedule/agenda, handouts etc.; checking proper arrangements for sitting, camera positions, equipments like fax machine, laptop/PC, pre-loading of powerpoints/video clips or setting for synchronous online connectivity with experts from a distance, and the like.

Connecting and keeping in touch with experts and facilitators of the other teaching ends (if it is team teaching) and the interactive terminals at the receiving ends as pre- and post-conferencing activities goes a long way in the success and continuity of the programmes.

The anchor guides the entire show — welcoming all, introducing the expert presenters, introducing the session, providing telephone numbers for interaction, intervening where necessary, encouraging question-answer interactive sessions, guiding activities at the teaching-end and the interactive terminals, obtaining feedback and conducting evaluation of the programme, and improving the subsequent sessions.

Pedagogic aspects

The pedagogic aspects in the design of teleconferencing are the most crucial ones. These include: decision on media mix and curricular chunk for teleconferencing at the stage of curriculum design; selection of content and development of learning objectives for each teaching point/teleconferencing session; instructional design for each session and the whole series; ensuring collaboration and interaction at actual teleconferencing sessions which use multiple strategies of presentation and interaction; obtaining appropriate feedback; and evaluation of the entire gamut of activities for further improvement.

The list of various critical factors (including pedagogic) relating to videoconferencing provided by Coventry (n.d.) should be very useful in designing and delivery teleconferencing. While the list is not exhaustive, it can be very useful to both the new faculty and the old hands:

Critical preparation: Prior preparation of all the aspects discussed in this handbook so far including teething problems of last-minute technology failure, and teacher and student preparedness should go a long way in ensuring success of the sessions.

Site logistics: Arrangements at all the sites including distribution of materials, prior orientation of all the people involved, and personal understanding and involvement are extremely essential as non-pedagogic factors of success.

Equipment: All the equipments need to be checked: cameras, monitors (two), VCRs, microphones, PCs/laptops, telephones, and others.

Timing: Time management, especially for various strategies used within teleconferencing sessions, is important. While on the one hand participant attention span is limited, on the other hand, each one in the team needs to stick to the stipulated time for the task. Not more than 60 minutes for a continuous session; not more than 6-10 minutes of talk/ presentation at a time; and at least some break (of monotony) after 30 minutes are recommended.

Signs of communication: The presenter must use both verbal and non-verbal communication: voice at a constant pitch; expressions of interest, involvement and concern for the participants; eye contact; establishment of rapport, and so on. Use of interpersonal skills enhances confidence and effectiveness. One must remember that affective (attitudinal) and emotional issues are as important as cognitive ones.

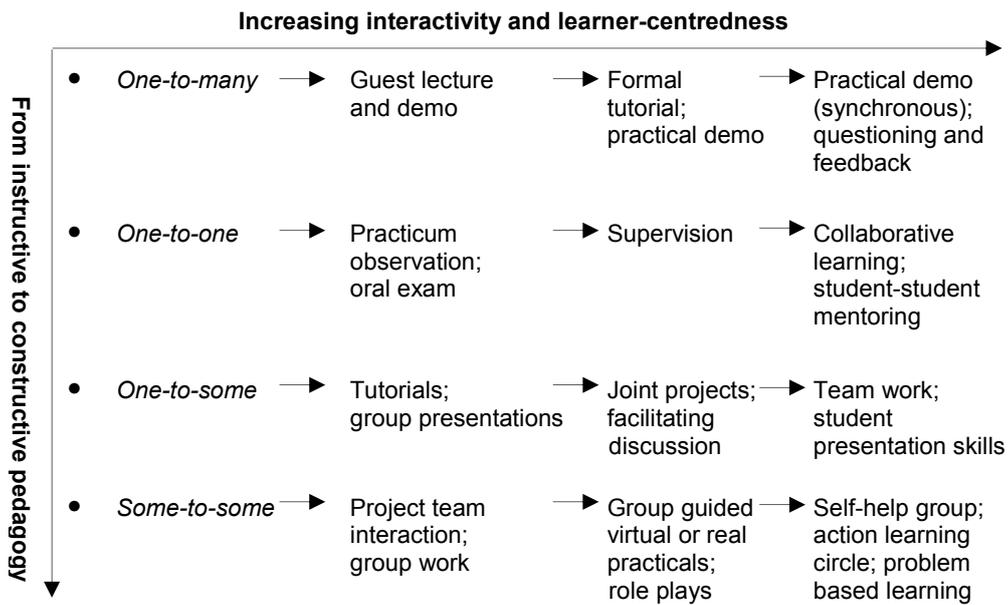
Reading materials: Precise, structured and focused guidelines and handouts must be supplied before hand. Such materials may include guidelines for assignments and projects, assessment criteria, hints for group discussion and reflection, etc.

Use of adjunct media: Alongside main teleconferencing presentations and discussions, you may use video clips, audio clips, powerpoints, graphs and charts, writing on white board, slides, and even models and charts. The use of these adjunct media breaks monotony, creates interest, encourages attention and reflection.

Teaching skills and styles: A good design of the combination of materials, media and teaching/presentation methods ensures effectiveness for both the sides. Classroom presentation strategies are equally applicable here: content presentation in small chunks with one teaching point at a time; a good sense of humour; student involvement by asking questions and cross questioning; conversational style, role plays, discussions, individual and group projects; and also student handling of teleconferencing itself.

Training: Orientation and training of all those involved in teleconferencing is extremely desirable — crew, teachers/presenters, students, anchor/moderator, coordinators at the receiving ends. The most important thing is most effective use of technology for achieving the learning/training objectives. Sometimes, teachers need to have more intensive and continuous training than the rest. The crucial aspects are: continuing reflection; making teleconferencing sessions more experiential; and ensuring interaction and dialogue.

Prior planning, based on reflection on past experiences, is required to ensure a learner-centred approach. With regard to broadband videoconferencing, Smyth's (2005) conceptual framework may be considered for ensuring greater interaction. The framework is based on increasing progress, greater interactivity and learner-centredness on the one hand, and from instructive pedagogy to constructive pedagogy on the other. The framework is represented as follows:



All the above teaching strategies and forms of interaction may be used in teleconferencing sessions. The important factor is giving more freedom to the learners, increasing learner autonomy, and fostering collaborative learning. Some of the other strategies like peer teaching, pre-structuring task-specific contents, providing cooperation scripts, and reciprocal teaching (Reiserer et al, 2001) could also be useful in designing and presenting teleconferencing sessions. Teachers' approach to teaching is influenced by their personal beliefs about the process of knowing and acquisition of knowledge. Continuous professional interaction, therefore, is essential in exchanging meaning and learning from each other.

SECTION 6

MEDIA SELECTION AND INTEGRATION

By now you must have developed a fair understanding about different media and technologies generally used for distance teaching-learning. We shall provide below additional variables for you to collate your understanding, and to be able to take the role of a course/programme manager or coordinator to decide on media selection and deployment.

Jack Koumi (1994, p.55) has provided a scheme of three-stage media selection (these have further been detailed out in his forthcoming 2006 book from RoutledgeFalmer):

- List comparative merits and distinctive teaching functions.
- Devise a procedure for media deployment based on your list.
- Fully exploit the potential of each medium.

He further stresses that ‘multiple media presentation can accommodate individual differences in learning style’ (p.55).

The criteria called ACTIONS, given by Tony Bates (Bates, 2005) should be of significant use to all of us. However, you need to contextualize these criteria before taking a firm decision on this. The criteria – ACTIONS – are described as follows:

A Access:

The most important variable is the easy access and reach of media and technology to the teachers and especially to the learners. Access may be possible at one’s home or workplace or at the least at an easily accessible study centre. Access could also mean that the learning materials and interaction presented through these specific technologies are accessible for easy comprehension of learners, and that they are well conversant with the language of the particular medium or technology used.

C Cost:

This refers to calculation of costs for on one hand the development of media materials and on the other hand their delivery. These two are separate costs, though in a situation like teleconferencing the development, delivery and interaction take place simultaneously. The unit cost, i.e. cost per learner in both independent and combined media situations is important, and sometimes dominates the decision-making on selection of a particular or combination of media.

T Teaching and Learning:

The media selected should categorically conform to the achievement of specific teaching-learning objectives. Sometimes a single medium and sometimes a combination of media is required to achieve the objectives stipulated for the course or course unit. Of course, this decision will depend on whether media are used as supplementary, independent, complementary or in an integrated fashion.

As teachers and academics, we have our respective belief about how learning takes place. This may be based on one or more of these strands: behaviouristic, cognitive, humanistic, and constructivist. Our belief considerably influences our choice of technology as also the way that technology (or combination of technologies) is designed. In all our decisions, considerations of interaction, needs of individual learning style, and individual capacity to reflect shall hold the key. Therefore, design is the issue here. Bates writes: 'Thus a well-designed lecture will teach better than a poorly design television programme, and vice versa' (2005, p. 58).

I Interactivity and User-friendliness:

The ability of media to facilitate interaction is very crucial, and also that the teachers and the learners must be at ease to use them for teaching and learning respectively.

O Organisational Issues:

The organization in which you are working has its own strengths and limitations with regard to media: e.g. availability, preparedness, requirements, constraints, and willingness and ability to shift towards the use of multiple media materials. These issues are important to address since they will determine the ease of production, sustainability of media use, and organisational support for quality production.

N Novelty:

This refers to the newness of the technology to the organization and its teachers and learners, or novel design and deployment of technologies for achieving certain objectives. While at the initial stage of organisational development the former would attract both the teachers and the learners, as the technology use gets older, new ways of technology design and use should be of interest.

S Speed:

Faculty attitude towards media and their ability to acquire new skills to design, develop and deliver through the selected media and technology are crucial. Their agreement and preparedness to develop fresh materials using these media or transform the existing materials into, say for instance web-based learning, or multiple media-based materials, are key to success of effective media deployment.

Further, the workload involved in developing these media materials should also be considered. Sparkes (1984) had long back noted the development time required for one hour of materials through different media, and this is represented in Table 6.1.

Table 6.1: Effective use of manpower

<i>Teaching method</i>	<i>Ratio of academic person-hour per student-hour of work generated</i>
Lecturing	2 – 10
Small group teaching	1 – 10
Teaching by telephone	2 – 10
Video-tape lecture (for TVI)	3 – 10*
Audio-vision	10 – 20*
Teaching text	50 – 100**
Broadcast TV	100 or more**
Computer-aided learning	200 or more**
Interactive video disc	300 or more**

* requires support staff

** requires several other support staff

You will find that to produce one hour of student work, whether attending a class lecture or viewing a video, and others, it takes: 2-10 hours of

preparation for a lecture, the same time is required if it involves teaching by telephone, and certainly more hours if one uses other media and technologies. For instance, for developing one hour of self-learning material, it requires 50-100 hours for a team to develop these materials; and materials in interactive video disc will need more than 300 hours of work. This discussion simply suggests that the workload of the teacher and teaching team increases if one adopts media other than lecturing. However, the indication of these hours is generic, and one could still take less time to develop these materials with agreed upon quality. Nonetheless, this consideration is important in developing a broader view of time required in developing these, and for taking decisions on moving to media-based distance education delivery.

Let us consider the other important aspect, i.e. the production cost of these media. Bates (1995) has given the cost of material development for one hour of material through different media, keeping the cost of lecture as one unit, and comparing it with other media (Table 6.2).

Table 6.2: Production costs (including overheads) for one hour of teaching material

<i>Medium</i>	<i>Production cost</i>
Face-to-face lecture	1 unit
Audio cassette/radio/teleconference	2 units
Televised lecture	2-5 units
Computer-mediated communication	2-5 units
Print	2-10 units
High-quality TV programme	20-50 units
Pre-programmed computer-based learning	20-50 units
Computer-controlled video disc (from scratch)	50-100 units

The data presented in Table 6.2 are generic, based on the experiences of the UK Open University; however, these are very much indicative of the amount of resources required to produce learning materials in print and electronic form. It may be noticed that while producing one hour of the same material in audio, television and CMC takes two to two and half times more cost than that required for producing/preparing and delivering one hour of lecture, production of the same material in self-learning print form needs two to ten times more cost; and computer-based learning and video discs certainly require more money than the rest. However, these data must be related to the number of expected or actual students that will benefit from such materials, once produced, over a period of time till their revision. If

there are large number of students, the unit cost of production will come down, though the distribution/delivery cost per student shall remain constant.

Based on these considerations, you may like to relate these variables to the data presented on the pedagogic effectiveness and other aspects of these media given in Table 1.2 in the first section. In the overall analysis, the pedagogic considerations generally dominate the decision-making, and this then is related to other organizational and learner concerns.

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