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**AUDIO-VISUAL AIDS IN
HIGHER EDUCATION**

*Report of the Committee
appointed by the University Grants Commission*

UNIVERSITY GRANTS COMMISSION

NEW DELHI

1969

378-135
UN-PR

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16/9/72

FOREWORD

The University Grants Commission appointed some time ago a committee on audio-visual aids for higher education, including programmed learning. This is a subject of increasing importance and interest, and I have no doubt that the report of the committee would be of great value and utility to our universities and colleges. The Commission is most grateful to the members of the committee for the time, energy and attention which they so generously gave to the deliberations of the committee and the preparation of the report.

New Delhi
May, 1969.

D. S. Kothari
Chairman
University Grants Commission

REPORT OF THE COMMITTEE ON AUDIO-VISUAL AIDS IN HIGHER EDUCATION

1

APPOINTMENT OF THE COMMITTEE

The University Grants Commission appointed a committee consisting of the following members to consider how best radio, films, and other audio-visual aids including programmed learning could be used in the field of higher education in Indian universities and colleges:

1. Shri K. G. Saiyidian,*
Director,
Asian Institute of Educational
Planning and Administration.
2. Dr. V. K. Narayana Menon,*
Director-General,
All-India Radio.
3. Dr. P. K. Kelkar,
Director,
Indian Institute of Technology,
Kanpur.
4. Dr. V. S. Jha,
Formerly Member,
Education Commission.
5. Shri L. R. Nair,*
Director,
Indian Institute of Mass Communication.
6. Shri J. P. Naik,
Adviser,
Ministry of Education.
7. Shri S. L. Ahluwalia,
Head of the Department of
Audio-Visual Education,
NCERT, Delhi.

* Since retired.

8. Shri S. K. Chakrabarty,
Formerly Secretary,
University Film Council.
9. Dr. J. N. Kaul,
Development Officer,
University Grants Commission.

Miss S. Rehman of the Indian Institute of Mass Communication and Shri C. L. Kapur attended some of the meetings of the committee by special invitation.

2. The committee had the following terms of references :
 - (a) To report on the present position of the use of audio-visual aids in higher education in India.
 - (b) To assess the possibilities of their development with particular reference to institutions of higher education in India.
3. The committee held the following meetings in New Delhi :

1st meeting	:	3rd August, 1967
2nd meeting	:	3rd January, 1968
3rd meeting	:	6th September, 1968
4th meeting	:	20th September, 1968

4. In assessing the possibilities of development of audio-visual aids in institutions of higher education in India we had the advantage of several reports on the subject. Particular mention may be made of the Report of the Standards Committee of the UGC, the Education Commission (1964-66), Report of the Hale Committee on University Teaching Methods, the Report of the University Grants Committee on Audio-Visual Aids in Higher Scientific Education, Report of the Conference on the Use of Films in Higher Education and Research and some seminars conducted by the UNESCO, and the Indian Institute of Mass Communication. A brief summary of these reports is attached (annexures I to VII).

PRESENT POSITION OF AUDIO-VISUAL AIDS IN HIGHER EDUCATION IN INDIA

5. Until recently, little attention was paid to the use of audio-visual aids in our educational institutions partly because of lack of financial resources and partly owing to lack of proper appreciation of the role of audio-visual aids in teaching and learning. This does not mean that audio-visual aids have not been used in class-room teaching but that the impact of audio-visual aids has been very limited at all levels of education in India. By and large, the use of audio-visual aids has been confined to blackboards, maps, graphic material, pictorials etc. Educational films which are used to great advantage in educationally developed countries have not made any real impact on Indian universities, colleges and schools. Similarly, radio and television have not been fully exploited for educational purposes.

6. The earliest effort to encourage the use of audio-visual aids at all levels of education was made by the Ministry of Education with the establishment of a film library in 1947, as part of its post-war educational development plans. In 1948, the library formed a part of the Film Unit (later named as Audio-Visual Section) of the Ministry of Education, which was responsible for providing leadership in the use of audio-visual aids and was concerned with import as well as indigenous production of these materials. Its activities were guided by a National Board of Audio-Visual Education (abolished in 1964). In 1959, the library as well as the Audio-Visual Section became a part of the National Institute of Audio-Visual Education, then a subordinate office of the Ministry of Education. In 1961, the National Institute, in its turn, was merged with the National Council of Educational Research and Training, and in 1965 the National Institute of Audio-Visual Education was given the status of a Department of Audio-Visual Education within the Council.

7. During this period, the film library of the Audio-Visual Department has developed. It has added to its stock of materials and increased its membership. There are at present 6,129 films (though the titles may be fewer as the library holds multiple copies of some films) and 2,276 filmstrips. It also has 60 sets of slides. It has a membership of 2013, comprising schools, colleges and universities, professional institutions, social and welfare organizations and government offices all over the country. There are 638 institutions of higher education which have become members of the library. This includes 46 departments and colleges in 21 universities, 224 arts and science colleges, 138 teacher training institutions and 230 other professional institutions.

8. The 638 institutions of higher education which are members of the library borrowed 720 films in 1965-66, and 618 in 1966-67. No filmstrip

was issued during 1965-66, and 35 filmstrips were issued in 1966-67 to these institutions. This roughly works out to an average of one film per year per institution which does not reveal a satisfactory state of affairs.

9. This survey does not reveal the complete picture as there are other sources for films on loans. But it does show that the film has made little impact on institutions of higher education considering the fact that the central film library is the chief official source for the loan of films and filmstrips in the country. There are several reasons for this. Firstly, while the library of the Audio-Visual Institute in the initial stages was meant to create an interest in the use of films at all levels of education, the emphasis of its services was largely on the school programmes. Secondly, films suitable for use in higher education are in short supply, and special efforts have to be made to obtain them. Thirdly, for a variety of reasons, no special effort was made by the Central Film Library or the Department of Audio-Visual Education to involve institutions of higher learning in the use of audio-visual materials, although the library has a collection of over a thousand films, which could be used in institutions of higher education.

10. In 1960, the University Film Council was established by the Ministry of Education in consultation with the University Grants Commission, as an autonomous body registered under the Societies Registration Act for the purpose of creating and developing amongst university students a critical appreciation of the film as an aesthetic art and a medium of information and education. The University Film Council, unfortunately, wound up its activities in March, 1967. During its seven years the council succeeded in establishing film clubs in the following 33 universities :

Agra, Aligarh, Allahabad, Annamalai, Andhra, Banaras, Baroda, Bihar, Bombay, Delhi, Gorakhpur, Gujarat, Jadavpur, Jabalpur, Jamia Millia, Karnatak, Kuruksetra, Lucknow, Magadh, Marathwada, Nagpur, Osmania, Panjab, Patna, Poona, Ranchi, Roorkee, Sardar Patel, Saugar, S.N.D.T., Sri Venkateswara, Utkal and Varanasiya Sanskrit Vishvavidyalaya.

11. The University Film Council purchased some 55 films, rented and borrowed others from various sources and sent out suitable film programmes to the universities. The film programmes were accompanied by notes prepared by the council which suggested points for discussion and gave background information about the films.

12. The establishment of the Film Institute of India, Poona in 1960 by the Ministry of Information and Broadcasting is another landmark towards creating an appreciation of the film as an important medium of mass communication. In addition to its regular work of providing courses of study in all aspects of film production, the institute has resources for conducting refresher courses in the history of film and film appreciation for persons engaged in film society work, university officials handling film clubs and government officials dealing with films. Recently, the establishment of the Indian Institute of Mass Communication has further underlined the increasing awareness of the importance of film and other mass media in

communication and education. The institute has facilities for training in the specialised use of films.

13. All the states and union territories have set-up audio-visual departments. Information about their annual budgets and holdings is given in annexure VIII. Twentytwo universities provide for audio-visual education and some of them have active departments or units of audio-visual education. Training in audio-visual education is a compulsory requirement in 17 teachers' training colleges; similar facilities are available in 75 other training colleges either on optional basis or as a unit of the required training programme. The quality of the training, as is to be expected, varies from one institute to another.

14. We issued a questionnaire to universities and institutes of technology in order to have an estimate of the present use of audio-visual aids in institutions of higher education in the country. The results of this survey are given in a tabular form as an appendix to the report (annexure VIII). Unfortunately, the response to our questionnaire was not satisfactory. Only 21 universities and university level institutions and 17 colleges responded to the questionnaire. The available information indicates that universities have generally a good number of audio-visual aids. For instance, the Karnatak University has six epidiascopes, four film projectors, one slide projector, three tape-recorders and one still camera. The Punjab University has five still cameras, four epidiascopes, three tape-recorders, three film projectors, two cine cameras and one live camera. The responding institutions have indicated that the aids are frequently used and the response of students is generally enthusiastic. These institutions have the nucleus of an audio-visual unit which could be organized by pooling the resources of all the university departments, and, if necessary, by augmenting the number and variety of aids.

SCOPE AND DEVELOPMENT OF AUDIO-VISUAL AIDS IN INDIA

(a) Films, filmstrips and slides

15. The lecture method on which teaching in universities and institutions of higher education largely rests at present is simple oral communication. While patterns of communication have changed considerably in many social situations with the advent of radio, the motion picture and television, the situation in educational institutions remains largely unchanged. In recent years, however, films, filmstrips and transparencies are being increasingly used in educationally advanced countries as visual materials which can be used in any teaching situation when it becomes necessary to demonstrate a point, a fact, an idea or a process.

16. The use of films and filmstrips does not constitute mechanization of teaching. These materials are aids to the teacher, valuable because they can bring to the classroom or lecture hall the entire world outside in a form which leaves a more lasting impression than, say, the conventional maps, photographs or charts. The fact that these are projected materials makes it possible for the visual image to be seen, and seen clearly, by large audiences. Hence their particular value in teaching large number of students. A good diagram sketched by a skilful teacher on a blackboard may or may not be visible to a very large group. But the same diagram can be used with much larger numbers if it is presented in the form of a slide. The slide can be used over and over again by the same teacher, as well as by other teachers who may not be good in drawing. Moreover, the best of thinking and skills, in lettering and presentation, would go into the preparation of a slide, thus making the slide image superior to that drawn off-hand on the blackboard.

17. The slide has the additional advantage, which it shares with the filmstrip, that it can reproduce visual images which cannot be drawn on the blackboard at all, howsoever skilful the teacher. The use of slide in the study of art, because of its ability to reproduce great works of art, should be specially noted. The UNESCO, as part of its programme to promote understanding of the world's cultural heritage, has brought out a series of art slides, of the highest technical quality, which is invaluable for students, teachers and lovers of art.

18. The standard $3\frac{1}{4}'' \times 4''$ slide, which has a projection surface nearly $5\frac{1}{2}$ times larger than that of the smaller $2'' \times 2''$ slide has the advantage of reproducing large maps, complicated charts and diagrams, tables and other material in which printing and fine detail are important. Research on

the possibility of the use of larger slide in certain special areas of higher education needs to be given a high priority.

19. The filmstrip, in many ways, shares the advantages of the slide. Both are "still" media in the sense that they cannot portray motion effectively. Nor for that matter are they intended to do so. Both are low-cost materials, available in black and white or colour, easy to store, and can be used at the desired pace because each picture can be left on the screen as long as desired. While the slide is an individual picture, the filmstrip is an organised presentation of many pictures or frames. The filmstrip may comprise as many as 20 to 50 frames, in a related sequence. Filmstrips are usually accompanied by self-contained teaching notes and as such a skillfully made and carefully planned filmstrip is extremely useful as it can provide in one packet well-organised text and illustrated teaching material. But it is possible that, by and large, the university teacher would prefer to be free to present the material in his own sequence (with such support as the visuals can supply) rather than base his lecture on the order and the content of frames presented in a filmstrip. Teaching with the slide is more in tune with the free and sophisticated methods called for in teaching in universities. The highest priority should be given to the production of slides on important areas of university teaching and to ensuring that the slide library becomes an important part of a book library in each institution of higher education.

20. The sound filmstrip would be useful in technical institutions in areas where skills and assembly of materials are needed to be taught. In a sound filmstrip, the positive transparency pictures are accompanied by a recorded talk or a set commentary read by the teacher or instructor.

21. The film opens up still greater possibilities in the realm of teaching. Of all media of reproduction so far devised, it has the closest approach to actuality. It has been pointed out that "no idea or phenomenon is too remote, inaccessible, or abstract for graphic and understandable explanation through this new medium of communication".

22. The film can be distinguished from other projected visual materials by the fact that it can portray motion. Where it is essential to show processes, as in the study of the natural and physical sciences, the film is irreplaceable. Not only can the film portray motion, but by exploiting the changing speeds of photographic cameras, it can portray very slow or very fast motion perception of which would otherwise be difficult or impossible for the human eye.

23. By the use of time-lapse photography, portrayal of processes, which take too long a time to happen for convenient observation (the growth of a plant, the movement of glaciers, the processes of erosion) can be speeded up, while by the use of slow motion photography, the depiction of processes which happen too rapidly for normal observation (the movement of vocal cords in speech, the flight of a bird) can be slowed down. By means of photomicrography, things which are too small to be seen (the process of cell division, the development of an embryo) can be made visible, while X-ray

and infra-red cinematography have special advantages of their own. By means of animation, the film can explain processes and actions which cannot be seen at all, but can be imagined and explained, for instance, the evolution of the world, the conversion of matter into energy, the process of jet propulsion, the functioning of the nervous system and the movement of sound. Pictorial analogy in animation is used to visualize things which are too abstract, too large, too hidden or too theoretical for effective comprehension by the average student.

24. The filmed lecture is in many situations superior to a tape recording of the lecture, as it involves both sight and sound and, imaginatively made, it can be superior to the lecture itself. It is more than a simple recording of a lecture. It would be a carefully prepared and scripted presentation which would visually dramatize the substance of the lecture, incorporate visual aids specially prepared for it and use the personality of the speaker to good advantage. This kind of presentation is common in educational TV. It is also possible to use a film as a temporary substitute for a good lecture and it can help in overcoming the shortage of good teachers by filming lectures of distinguished teachers.

25. Film can also be used for recording scientific experiments and as such it has a special value in higher education from where research and new ideas emanate. Films of surgical operations were made as early as 1910 and their use for recording scientific experiments commenced from 1924. Such use of the film is important for disseminating information about new contributions made by scientists and scientific institutions and for making closer study of a skill or an operation from a vantage point.

26. Apart from the use of films in higher education for strictly instructional purposes, the film is also a powerful medium of communication, and can be used for many purposes which fall within the larger objectives of education. The dynamism of film is irresistible to young people. Its ability to guide attention and concentrate interest is well-known. Through a carefully planned programme of documentaries, educational and feature films, it is possible for universities do a great deal towards raising general knowledge and the cultural and scientific level of students, particularly during the undergraduate years. The film programme is one of the ways for providing common experiences to students many of whom enter the university from varied and sometimes ill-equipped backgrounds.

Observations and recommendations

27. In dealing with the role of films in higher education, we have to reckon with and recognize the pressure and the influence that cinema is exerting on society. The highly complex and powerful organisation of the cinema industry has become a part of the process of educating people, specially young people, who should therefore be trained in film appreciation, and intelligent and informed criticism of the films. The possibility the film as a means of mass communication, information and education have to be seriously studied. In other words, the universities should promote an appreciation of the film as an artistic medium and as a medium of mass communication and entertainment.

28. It is unfortunate as we have said that the University Film Council which had initiated a good programme of screening educational and entertainment films in the universities had to wind up its activities mainly because of irregular supply of funds and which did not permit it to develop a sufficiently strong administrative organisation to cater to the needs of institutions of higher education in the country. It could not carve out a place for itself in the university system. We understand that a committee appointed by the Commission had recommended that the University Film Council should be transferred to the IUB where it could have the benefit of being a part of the university system and that the Ministry of Education should provide adequate support to the IUB to continue and vitalize the activities of the Council. We endorse this suggestion and hope that the UGC will find it possible to take up this matter with the Government of India so that the University Film Council is revived at an early date.

29. The University Film Council, when revived, could make a comprehensive survey of the availability and use of films and filmstrips in higher education in India. This survey should elicit information on the physical and material resources and services and teaching materials actually available. In addition to the information on the situation in India, the survey should make a study of the use of films and filmstrips in higher education in other countries. It should also be a part of the survey to obtain information about the work done by international film and television organisations to promote the use of films and television in science and culture.

30. Beyond the beginning made by the NCERT, there is at present no production programme of instructional films or filmstrips in the country, though a fair proportion of the documentaries produced by the Films Division of the Government of India could be used in general education programme for university students. Serious attention will, therefore, have to be paid to the production of educational films directly related to course contents in various branches of knowledge. The revived University Film Council could play a useful role in making a beginning in this regard. The council could also take up research to determine the areas in which the production of films and slides may be taken on a priority basis. It, however, seems difficult in the near future to produce indigenous films on a large scale to meet the requirements of higher education in India. The university film council should be in a position to advise the universities in establishing and developing film libraries and in all technical matters concerning the procurement and screening of films.

(b) University broadcasts

31. AIR Stations have been broadcasting programme for the universities for over 20 years. Before 1947, these programmes were not broadcast on a fixed frequency and were part of the normal talks of a general nature designed to interest the university and college students. Since independence, the aims and objectives of the programmes have been recast so as to bring to the university students the results of advances in the various fields of knowledge and also to inculcate the habit of group discussions among them.

32. From the academic year June-July, 1958, universities were grouped together into ten groups for the purpose of university broadcasts. The groups were formed on the basis of the linguistic homogeneity of the area and with a view to pooling special talents in the universities in the region. Consultative panels were also set up for each group of university broadcasts. They consist of eminent scholars, including principals of colleges who meet under the chairmanship of the station-director concerned. The panels previewed the programme scheduled for the next quarter or half year and made suggestions for improving and popularising them among university students.

33. The university broadcasts consist of talks by specialists in different subjects, student participation programmes, selected successful programmes already broadcast in the general programmes such as group discussions, magazine programmes, science reviews by eminent scientists, quiz programmes, general knowledge programmes and discussion of subjects not covered in the prescribed courses which keep the students in touch with modern knowledge and research.

34. In recent years the All-India Radio has taken steps towards the formation of listening-cum-discussion groups in colleges and universities. Students are invited to listen to the university broadcasts, discuss each broadcast and send their doubts and queries to the station for discussion in the next broadcast.

35. Spot recordings are also undertaken on a regular basis for broadcast in this programme. Talks by experts on specific subjects included in the university curriculum are recorded according to a pre-planned phased programme. Discussions, quiz-programmes and programmes in the nature of open-house involving student participation are also recorded in the university campuses.

36. It has, however, to be noted that while all other programmes of the AIR have their undoubted usefulness, the university broadcasts of the All-India Radio described above do not have a direct bearing on class-room teaching.

37. From the instructional point of view the most significant programme launched by the AIR is the "University of the Air". All-India Radio started its project "University of the Air" on the 7th of September, 1966, the idea behind the project being to supplement and reinforce the efforts of the Directorate of Correspondence Course, Delhi University. Under this project, the programme is broadcast three times a week by the Delhi and Madras stations of All-India Radio for the I year students of the correspondence course of Delhi University. The programme is correlated to the prescribed syllabus of B.A. (Pass) degree of Delhi University and university and college teachers are invited to broadcast on various subjects. Not only the students of the correspondence course but other students also benefit from these broadcasts. The programme covers four main subjects viz., English, economics, political science and commerce.

38. A mail survey was conducted during December, 1966/January, 1967 at Delhi and Madras to assess the utility of this programme. The replies received showed that 84% of the correspondence course students listened to these broadcasts regularly. Another 10% at Delhi and 12% at Madras did so once or twice a week. They all found the University of the Air useful.

Observations and recommendations

39. The keen interest shown by the AIR in broadcasting educational programmes for the university community in India is welcome. It is, however, clear that as yet there is no systematic attempt to reorient the programmes with the specific objective of supplementing and enriching classroom teaching, except for students of the correspondence course. The educational programmes of the AIR are not directly related to academic requirements of students in the universities and colleges. Nor is it always necessary. It would, however, add to the value of university broadcasts if they are organized in such a way that a complete series of talks by eminent teachers on some topic of interest to university students is planned and broadcast. Unless the talks are given in a sequence and on subjects which have direct relevance to the interests of university students, their usefulness will be limited. This, however, does not mean that adequate provision should not be made for talks on matters of general interest and general education.

40. It is obvious that the AIR has not been able to give sufficient time to instructional programmes, particularly in the field of higher education. University programmes are at present broadcast from 25 stations on a weekly/fortnightly basis for duration ranging from 15 to 30 minutes. The AIR could explore the possibility of increasing the duration of university programmes and bringing about greater coordination among the programmes of various stations in order to avoid unnecessary duplication of themes.

41. We would also suggest that in order to enhance the value of university broadcasts, tape-records of the lectures given by eminent scholars and outstanding teachers should be supplied to the universities or to the University Grants Commission for wider circulation. It would also be desirable if scripts of educational talks broadcast by the All-India Radio are printed or cyclostyled and circulated as is done in some other countries.

42. It would be useful if the AIR could, in consultation with the UGC, set up a small committee to review the working of its university programmes, to ascertain the requirements of the universities and to plan a comprehensive programme of broadcasts which would supplement and enrich teaching in the universities. This is all the more necessary in view of the fact that several universities have already started correspondence courses and many more may start the course in the near future.

(c) Television

43. The main advantage of television in contrast to other audio-visual aids like films and film-projectors is its built-in system of distribution

which enables students and teachers to watch the programmes telecast by the national or regional television centres without the aid of any technician. Since the programmes are 'live' or recorded actual replies of life they arouse much greater interest and create a deep and durable impression on the mind of the audience. Television can also be used as an instrument for magnification, observation and demonstration of detail. Another advantage which television shares with the films is that the programmes can be repeated, thus enabling students of varying abilities and aptitudes to learn at their own speed.

44. The first major attempt in India to utilise television for instructional purposes was made in 1961 in collaboration with the Directorate of Education, Delhi and the Ford Foundation. The school television programme caters to middle and higher secondary school classes. The lessons are directly related to the school curriculum in physics, chemistry, English and general science. Lessons are of 20 minutes duration each and are broadcast in the morning session and repeated in the afternoon for the benefit of schools running on the shift system. Teacher training programmes are also televised for class-room teachers in science and English. In Delhi State, 308 schools are equipped with 535 television sets, thus extending the benefit of television teaching to 1,32,000 science students and 96,000 students in English. Dr. Paul Neurath, Professor of Sociology and Statistics at the Queens College, City University of New York, was deputed by the Ford Foundation to conduct an evaluation of the school television project in Delhi. Extracts of his report are attached (annexure IX). He has observed that "TV is already proving itself an useful aid to teacher. The students see more and better experiments; some of the experiments shown on TV are which (Sic) even the best schools could not provide. . . . There is a slight overall superiority of the results of the students in TV schools over those of students in non-TV schools".

45. The other type of television viz., the closed circuit television, has restricted use and can be received only by restricted audiences. The closed circuit television is used mainly for teaching large size classes and for relieving teacher shortages which many developing and developed countries are facing. It is being increasingly used in universities in the educationally developed countries, particularly in the United States and United Kingdom. There are at present two centres in India, one at the Indian Institute of Technology, Kanpur, and the other at the Birla Institute of Technology and Science, Pilani. The present activities of the Kanpur IIT television consist of (a) evening programmes and (b) day-time telecast for the campus school. Evening programmes are produced, directed and telecast by the Students Television Club with which are associated more than 70 students on the campus. Producing, directing and telecasting these programmes is a very complex affair requiring coordinated team-effort for its success. Students involved in the programme learn how to manage a complex job and to work together as a team. The programme offered is a planned combination of educational and entertainment fare. The day-time programmes consist of telecasts of movies to the campus school. It is hoped that IIT Kanpur, and the Birla Institute of Technology and Science would develop their programmes further and make their experience available to other institutions.

46. The Government of India has recently agreed 'in principle' to recognise television as an integral part of its development programme. There are plans to put up television stations in a number of important urban centres. While the centre in Delhi is to be expanded, new stations are likely to come up in Bombay, Calcutta, Madras and Kanpur/Lucknow and Srinagar. It is also understood from newspaper reports that the Government has taken a decision to accept the offer of a Japanese firm for collaborating in this effort and that the Government has also decided to grant licences to private entrepreneurs for manufacturing television sets. The allocation is expected to be about Rs. 3.75 crores for the first three years and Rs. 25.75 crores for the entire 8-year programme.

47. It is understood that an internal and a global satellite are being launched over the Indian ocean in the near future and that every state will have relay stations which will provide additional audio channel thus facilitating simultaneous rendering into regional languages. The preparatory study of the pilot project prepared by the UNESCO expert mission in co-operation with the team of Indian experts appointed by the Government of India indicates that this system will play an important role in increasing expansion of educational facilities at all levels, lessening the isolation of the teacher and improving the quality of his education, unifying curriculum in science and mathematics in all the states and in promoting the teaching of all the regional languages of India. This study indicates that the satellite time could be usefully employed to reinforce and universalise correspondence courses for the teaching of arts and science courses at the college level. Radio-TV correspondence courses might become for many men and women the only or the most accessible way to receive good higher education. Another contribution of the satellite television facility at the level of higher education would be the post-university training of people in many professions who need to be kept informed and sometimes to be re-trained. We understand that the NCERT has been asked to plan and prepare programmes for teacher education which will be televised through this system. We are happy to note that the Government of India is taking active steps to implement this programme.

Observations and recommendations

48. The main handicap to the expansion of television in the country is the limited financial resources of the government, and of the people. We are, however, happy to note that the government is making a beginning and hope that educational TV will be given high priority in any scheme of expansion of TV facilities. The possibilities of developing educational TV are almost unlimited in India but a word of caution is necessary. Television should not merely duplicate or supplement class-room teaching, it should bring to the class-room in colleges and universities what would otherwise be inaccessible and expensive. The educational TV could also break new ground in methods of teaching, particularly in programmed learning. This will require imaginative and intensive preparatory work by technicians and subject matter specialists. It would be helpful if more seminars on television like the one arranged by the Institute of Mass Communication are arranged and experts in TV technology and university curricula

are brought together to plan TV programmes in order to use the projected satellite system as effectively as possible.

49. With a little more investment in equipment and staff the open circuit television at Delhi could be used more fully for educational purposes. It should be possible to televise lectures, demonstrations and operations by outstanding scholars and scientists. Appropriate samples of the work being done at the national laboratories, courses designed to keep teachers informed of the latest developments in their subjects, refresher courses and courses for correspondence students and of evening classes could be arranged when the time for telecast is increased in the near future, and television stations are set up in other metropolitan towns.

50. The use of closed circuit television on a large scale may, however, be ruled out in the present stage of our development in view of high cost (about \$ 2,90,000 per unit) involving foreign exchange. If funds and foreign exchange are available, we should concentrate on those areas of instruction in which we have acute shortage of qualified teachers and necessary equipment. Institutes where closed circuit television can be used with advantage provided they have adequate resources and technical know-how, are engineering and technical institutions, medical colleges and institutes and agricultural colleges and universities.

51. We hope that the satellite project will be implemented as scheduled; if for some reason, it is delayed or postponed indefinitely, it would be worth-while assisting one or two universities to set up CCT for instructional purposes. This will provide invaluable experience and experimental data for effective utilization of the facilities when the project is completed.

(d) Programmed learning

52. There is, in this country, a general lack of appreciation about the objectives of programmed learning and its role in the field of education. We, therefore, consider it necessary to discuss in detail what learning implies, and how it is facilitated by the introduction of new techniques, like programmed learning. A note on the psychological bases of programmed learning and its application in some selected foreign countries is attached (annexure X).

Programmed learning in India

53. During the past few years considerable interest has been shown by some Indian educators in the development of "Educational Technology" in general and programmed learning in particular. The Department of Psychological Foundation of the National Institute of Education, New Delhi and the State Institutes of Education in some states have conducted several courses in programmed learning for school teachers and teachers in training colleges. Week-end seminars of short duration on programmed learning have been organised by various organisations like the Pedagogical Institute, Lucknow, Literacy House, Lucknow and Baroda University. The local branches of the Indian Association of Programmed Learning at Madras,

Baroda, Delhi and Poona have organised seminars for the benefit of teachers in various spheres of education.

54. Recent studies in India in programmed learning include the following: (i) a programme for solving equations, (ii) students attitudes towards programmed learning, (iii) an experiment of programmed learning lesson in correspondence course, (iv) construction of a programmed unit for class X students, (v) adaptation of programmed learning material developed abroad, (vi) a comparative study of outcomes of teaching of algebra by conventional class-room methods and methods of programmed instructions, (vii) programmed learning vs. traditional approach in the teaching of Gujarati, (viii) a study of achievement in geography through programmed learning through television, and (ix) application of programmed learning techniques in training of family planning workers.

Observations and recommendations

55. Increasing the effectiveness of the teaching learning-process in our institutions of education is a major problem. The present explosion of knowledge has rendered the present teaching procedure inadequate. There is need for developing methods which will help assimilation of text materials and skills by the students at the optimum level in the shortest time possible. Research is, therefore, necessary regarding the functioning of the human brain in a teaching-learning situation, in development of instructional materials for students of different abilities and for different types of institutions and in identifying the situation, the concept and the conditions in which programmed learning can be most effective.

56. We indicate below some areas in which instructions can be developed through programmed learning with fruitful results:

(i) English as a library language

The Education Commission has stressed that adoption of regional languages as media of education should not involve elimination of teaching of English, which is an important library language and would continue to play a vital role in higher education. It has suggested that special units for teaching English should be established in the universities and colleges with the objective of imparting a good working knowledge of English to new entrants by the adoption of modern teaching techniques and in as short a time as possible. Since no single course in English would meet the needs of individual students, the Commission has, suggested that the English units in the universities should adjust their teaching programme to the needs of the different categories of students and ensure that all students are given essential command over English to enable them to use it efficiently as a library language. The technique of programmed learning is admirably suited to the requirements of teaching English as a library language. Since the emphasis will be on language and not on literature and the teaching programme will be adjusted to the individual needs of the students, the objectives of learning English for complete comprehension and simple

expression could be achieved with speed and facility through programmed learning.

(ii) *Learning of Indian languages*

With the gradual adoption of regional languages as media of education in the universities as proposed by the Education Commission, it will become increasingly difficult for students and teachers of one region to migrate to a university in another region. This will deprive the universities of all-India character and of the advantages which accrue from mobility of students and teachers. In such cases, the technique of programmed learning would be helpful in giving a working knowledge and in improving the language skills of the migrating students and teachers so that they may take advantage of the facilities which are available at other universities.

(iii) *Teaching of foreign languages*

Most of Indian universities are teaching one or more foreign languages with a view to developing skills of comprehension and communication. The introduction of programmed learning would facilitate the teaching of these languages.

(iv) *Programmed material in science and mathematics courses*

Rapid changes in curriculum in science and mathematics have to be brought about if we are to keep pace with advances in scientific knowledge; this poses a new problem for the college teacher who has to confront students from schools with varying standards of achievement. Considering the increasing quantum of knowledge and the varying abilities of students, the gaps to be filled in are enormous. Time and speed are of the essence of good teaching in such a situation. Programmed learning will be of help to the science and mathematics teachers in devising lessons which will suit the ability and speed of every student.

(v) *Professional and medical education*

It is being increasingly realised that students in professional courses particularly in engineering, medicine and law, have to learn a large variety of courses which were once considered to be outside their purview. For instance, students of medicine have to offer courses in medical jurisprudence, psycho-pathology and sociology which have a direct relationship with medicine. Similarly the study of psychology, sociology and history is inevitable for proper grounding in law. To cope with the requirement of professional courses, one has either to increase the duration of courses and to increase the staff or to adopt new techniques of teaching like programmed learning. It would be worthwhile trying this experiment of programmed instruction in some selected professional colleges in India, especially in fields which are cognate to the main discipline.

(vi) *Programmed learning for gifted and retarded students*

One of the chief characteristics of the technique of programmed learning is its adaptability to the varying abilities and aptitudes of students. The

talented and the mentally retarded students could learn under programmed learning at their own speed, without the progress of the class being affected by the pace of the those learners who are either above or below the norm.

(vii) *Programmed learning in correspondence courses*

The number of students joining the first year of the correspondence course at Delhi University has steadily increased from 1,112 in 1963 to 3,300 in 1966. The Central Institute of Education, Delhi and the four regional colleges of education have also been conducting B.Ed. course through correspondence lessons. The Punjabi and Rajasthan Universities have instituted correspondence courses at the PUC and the undergraduate levels from the academic session 1968-69 with the support of the University Grants Commission. This raises the question of maintaining reasonably high standards of education, so far as possible especially in view of the fact that the students joining the correspondence courses are not likely to have much opportunity of direct contact with the mind of the teacher. Though the examination results of the correspondence course students of the Delhi University have been very encouraging, there is considerable scope for increasing the effectiveness of teaching by correspondence. One of the ways to improve correspondence education would be to improve the lessons sent to the students. If such lessons are prepared in accordance with the principles of programmed learning, the effectiveness of learning could be considerably improved. Teaching by correspondence lends itself admirably to the technique of programmed learning for there is a one to one relationship between the student and the teacher in such courses. An experiment conducted recently on B.Ed. students showed that correspondence students learning with programmed lessons did better than students who learnt only by the conventional methods of correspondence courses.

(viii) *Programmed learning and television in India*

The television centre of the All-India Radio at Delhi has been telecasting lessons in physics and chemistry for the students of higher secondary classes in Delhi. It is interesting to note that a recent study conducted to determine whether the application of response control leading to active student participation and of immediate confirmation (the two basic principles of programmed learning) to televised instruction in Delhi would yield better results in terms of student learning, has demonstrated that it is possible to have televised lessons based on programmed learning and the effectiveness of these lessons is invariably more than that of non-programmed lessons. Programming of lessons on the television has now immense possibilities for higher education particularly because of the satellite communication facilities which will be soon available. We would like to stress that adequate preparations should be made and CCT should be installed in one or two universities for experimenting with programmed learning and other modern techniques so that the facilities made available by the satellite communication system are used to maximum advantage.

57. We stress the need for proper training in the techniques of programmed learning. It is only when the programmes are prepared with

imagination and understanding that absorption at the receiving end is quicker and deeper. The essence of programmed learning is the presentation of material in such a way that it aids self instruction. It would be useful to have active collaboration between the subjects experts and the psychologist in the preparation of programmes, since the psychologist can bring to bear upon the subject-matter an understanding of the cognitive process of learning. The use of aids, like, charts, diagrams, tape-recorders etc., would add to the effectiveness of programmed learning.

58. We are also of the view that the centres selected for development of programmed learning should be concerned primarily with the training of personnel and production of materials. Research activities would follow and may have to be developed in a specialized institution. To begin with, a few university centres might be selected for development of programmed learning and those interested in the development of instructional material in the university sent for training abroad if necessary. These and other programmes of audio-visual education could best be developed by the schools of education proposed to be supported by the University Grants Commission.

(e) Language laboratories

59. It must be clearly understood that there are many kinds of installations which are referred to as language laboratories. One, which may be called a phonetics laboratory or a speech laboratory, is used in a way which parallels the operation of physics or biology laboratories. It is a place of investigation and experiment, where the subject of the investigation is human speech. A laboratory of this kind may contain instruments such as the sound spectograph, speech synthesizer, and loop repeater. There are also psycho-linguistics laboratories where the connection between mental processes and human communication is examined.

60. Language laboratories which make use of tape-recorders along with a number of other recorders and a master control are particularly useful for the teaching of foreign languages. There is no doubt that the setting-up of language laboratories in the universities could make a significant contribution to the learning of English and other foreign languages and regional languages. This is important in view of the shortage of language teachers, especially foreign language teachers and the limitation of practice or drill in the ordinary class-room instruction.

61. The basic equipment of a language laboratory comprises a master control and a number of student positions—booths acoustically insulated on two sides having a class front and open at the back. In a booth there is generally a small twin track tape-recorder and a head-set with earphones and microphones. The booth are connected with the master control from which a teacher can guide any student individually or can play recorded tapes for them. The teacher can speak to the whole group or to an individual separately as well as listen to anyone of them whenever he likes. When a teacher wants the students to drill he can instruct them to do so with the help of the machine. The machine continues to function until a student

wants to switch it off. Students can get as much practice as they need in speaking the language and opportunity to hear the correct pronunciation.

62. In recent years a number of universities have set up language laboratories with assistance from the University Grants Commission and foreign agencies like the Ford Foundation. According to information available with the University Grants Commission, laboratories have been set up at the following places in India:

Delhi	(1) I I T
	(2) Department of Curriculum and Evaluation of the NIE
	(3) Delhi University
Calcutta	(4) The Institute of English
Bangalore	(5) Regional Institute of English
Hyderabad	(6) CIE
Pilani	(7) Birla Institute of Technology and Science
Poona	(8) Deccan College
Bombay	(9) Wilson College
Kanpur	(10) I I T

There are other laboratories such as the one owned by the Goethe Institute at Poona and the one of the Defence Services Laboratory at Pachmari for Tibetan and Chinese language programmes.

63. The main difficulty in the installation of laboratories is the high cost involving foreign exchange. The most recent installation in the country is the language laboratory set-up by the Department of Chinese Studies of the Delhi University with a grant from the Ford Foundation. It is a medium sized laboratory (24 students places) and costs Rs. 75,000 *f.o.b.* Japan, exclusive of freight, insurance and customs duty.

64. We understand that there has been some interest recently in the possibilities of constructing laboratories out of locally produced components and that the Ford Foundation held several discussions with Bharat Electronics and Indian Telephone Industries on this subject. The essential ingredients of language laboratory are available in India and it should be possible in the near future to set up language laboratories with local components. We understand that the Central Institute of English is actively considering the construction of all Indian made language laboratories, and suggest that this possibility should be fully explored.

Observations and recommendations

65. We are of the view that language laboratories should be set-up in as many universities as possible and in at least one university in each state. The cost of setting-up language laboratories in ten universities during the fourth plan would be Rs. 7,50,000 at approximately Rs. 75,000 per laboratory. The total expenditure involved in this would not therefore be prohibitive. It may, however, be mentioned that the cost of equipment and installation of imported 40 booth laboratories with facilities for student record-replay is Rs. 1,23,000. The recurring annual cost would amount to about Rs. 40,000. This size is usually the most economical to run, though of course it gives the monitor only about a minute for each student in an hour's session. There are also certain ways of cutting these costs. The initial cost can, for example, be reduced by having less than 40 booths. Cuts can also be made in the monitoring and/or materials preparation staff.

66. It is also to be stressed that careful planning is necessary before the setting-up of a language laboratory. Before a laboratory is set-up it must be ensured that a strong language teaching programme already exists. The appointment and training of additional staff for the preparation and use of tape materials will also be necessary. Acquiring a laboratory will in itself not be helpful for a language teaching programme. Where a good teaching programme already exists, a laboratory will in itself not be helpful for a language teaching programme. Where a good teaching programme already exists, a laboratory can contribute a great deal. The minimum needs of universities in regard to staff will be one full-time lecturer for approximately every 12 hours the laboratory is to be in operation and the appointment of another for each group of students which requires a set of materials to be written and pre-recorded. On the technical side a full-time technician with a diploma in sound engineering will be needed for the first year, and thereafter a part-time technician to attend to the laboratory during the hours of its operation.

67. We fully endorse resolution 43-45 adopted by the All-India Seminar on the Teaching of English (2-4 December, 1967) emphasizing the need for a more careful assessment of the costs versus the benefits of installing a laboratory, the full exploration of the possibility of producing laboratories from locally available components, and the training of technicians to operate them.*

General observations

68. The need for extensive use of audio-visual aids springs from a realization of the fact that teaching supplemented by "sight and sound" facilitates and enriches the learning processes. The aids bring to the university community what was hitherto impossible, i.e., contact with the best

*In this section of the report we have drawn on the material supplied by Dr. Michael N. Dobbyn, Visiting Professor, Central Institute of English, Hyderabad (Incharge of Language Laboratory and Recording Unit).

that is available in a given field of study. There is an acute shortage of competent teachers and other physical and academic facilities at all levels of education which is partly a consequence of the expansion in the number of students. The result is that some of our students are never exposed to the influences of the best minds. The audio-visual aids make the best expertise available to students even in institutions which cannot possibly attract teachers of high calibre.

69. The spectacular growth of knowledge in recent years has also rendered the conventional methods of teaching somewhat inadequate. The average student needs more skilful teaching in order to obtain an understanding of his field of study with speed and facility. With the help of audio-visual aids concepts are more precisely developed and presented to students in a manner which leaves an abiding impression on their minds.

70. Another advantage of audio-visual aids is that they can be repeated over and over again. Once the lecture of an eminent scholar or scientist is recorded on the tape it can be played any number of times. Similarly, the films can be exhibited repeatedly till they are fully assimilated. Thus audio-visual aids help not only to universalize the process of education but also to improve its quality.

71. It is also necessary to emphasize that the fullest value of an aid is realized when the teacher is fully trained to apply it to the best possible advantage. Modern technology has put many aids in the service of education and they can be used not only to supplement teaching but also for presenting complicated ideas and facts much more clearly and vividly than would be possible otherwise. There is no doubt that today these aids have become indispensable to the teacher and the better trained he is the more effectively and usefully he can utilize them.

72. The first important step in developing the use of audio-visual aids in the field of higher education is to create an awareness among university and college teachers that educational technology is possible and feasible. Unfortunately, we have not yet developed proper appreciation of the contribution which audio-visual aids can make to learning. Some central organization, for example, the Department of Audio-Visual Education of the NCERT and some university centre, like, the Centre of Advanced Study in Education at Baroda University should be encouraged and assisted to disseminate information on the role and application of audio-visual aids to the universities and colleges in the country from time to time. It would be extremely useful if a quarterly or bi-annual bulletin containing the information on the latest advances in the development and application of audio-visual aids in the developed countries of the world and on new experiments conducted in India is brought out. This would enable our university and college teachers to realize that has been achieved so far in this area in other countries and also in India during the past few years. Awareness of the performance and promise of new educational technology could engender a climate for adoption of existing aids and experimentation with new ones.

73. Fortunately, we do not have to begin from scratch in this endeavour. We have several interested organizations and a fairly large number of workers who are interested in the development of audio-visual aids in the country. The need is to initiate a process of pointed and meaningful discussion at appropriate levels and to involve university and college teachers in the actual use of audio-visual aids. We suggest that the University Grants Commission may sponsor four or five seminars at different university centres to discuss problem of resources, training, production and distribution of materials and information on audio-visual aids. The organisation of these seminars would help create a climate of opinion in favour of the application of audio-visual aids in and outside the class-room and for bringing together technicians in mass media and the university community in order to bridge the existing gulf between producers and users of programme and services.

74. Many of our universities should be in a position to set-up immediately audio-visual units by pooling the equipment and other facilities in its various departments already available with them. An inter-departmental committee of the university could advise the audio-visual unit in all matters concerning the proper utilization and maintenance of existing equipment, collection and use of new materials and equipments, especially of inexpensive and improvised aids, and in developing the units and as a useful service agency for all the departments. The UGC may explore the possibility of providing some assistance (Rs. 10,000 NR + Rs. 5,000 R for a period of five years) to such of the universities which are keen to set-up audio-visual units on an inter-departmental basis.

75. The UGC should also encourage research in the production and application of audio-visual techniques with special reference to higher education. Apart from encouraging individual research workers to undertake research in this field by earmarking some fellowships for the purpose, the Commission may also set-up small cells in selected university departments of education and teacher training colleges to enable them to carry out research on a continuing basis into the uses of different kinds of audio-visual aids in specific teaching-learning situations to enable the university and college teachers to have easy access to a large variety of aids and materials.

76. Steps should also be taken to set-up immediately three or four centres of educational technology in selected universities with the following functions:

- (i) To train personnel in educational technology and to provide specialised training in different fields of audio-visual education, including programmed learning. The centres would also train personnel for development of audio-visual materials and programmed learning in schools. This would be useful from the point of view of research in this area.
- (ii) To prepare teaching materials with appropriate teaching aids to suit the requirements of the universities and colleges and their media of instruction.

- (iii) To undertake extension work and to coordinate the working of audio-visual units in the university departments of education and training colleges in their region.
- (iv) To undertake research in the development of audio-visual aids at all levels and to provide research facilities to interested scholars.

77. The universities which have strong departments of the regional languages, education, psychology, sociology, electronics and engineering may be selected for the establishment of the proposed centres of advanced educational technology with the faculty of education as the co-ordinating agency. We have suggested the setting-up of units in the university departments of education and teacher training colleges for research into the uses of audio-visual aids. These units would work as feeder agencies for the centres of educational technology which, in turn, would supply the units trained personnel, clearing-house facilities and up-to-date information on the development and application of audio-visual aids.

78. The UGC may also set-up a standing committee with representatives from bodies, like, the Indian Institute of Mass Communication, Department of Audio-Visual Education of the NCERT, All-India Radio, Film Institute of Poona and Indian Association for Programmed Learning in order to coordinate the activities of the proposed centres of educational technology, the University Film Council when it is revived and other agencies interested in audio-visual aids and to advise the centres in regard to their programmes and policies.

79. We also suggest that the Department of Audio-Visual Education of the NCERT may be strengthened and its functions made more broad-based to enable it to extend its activities to the universities and colleges. It is understood that the department of audio-visual education of the NCERT has at present adequate facilities for training school personnel for use of audio-visual aids. This facility could be extended to the staff of the interested universities also. It may be necessary to further develop the present activities of this department. We recommend that the Ministry of Education of the Government of India may examine this and extend to the department whatever help is necessary to enable it to meet the requirements of the universities.

SUMMARY OF OBSERVATIONS AND RECOMMENDATIONS

1. The need for extensive use of audio-visual aids springs from a realization of the fact that teaching supplemented by "sight and sound" facilitate and enriches the learning processes. The audio-visual aids make the best expertise available to students even in institutions which cannot possibly attract teachers of the highest calibre. (Para 68).

2. The spectacular growth of knowledge in recent years has also rendered the conventional methods of teaching somewhat inadequate. With the help of audio-visual aids concepts are more precisely developed and presented to students in a manner which leaves an abiding impression on their minds. (Para 69).

3. Another advantage of audio-visual aids is that they can be repeated over and over again. Thus audio-visual aids help not only to universalize the process of education but also to improve its quality. (Para 70).

4. The fullest value of an aid is realized when the teacher is fully trained to apply it to the best possible advantage. The aids have become indispensable to the teacher and the better trained he is the more effectively and usefully he can utilize them. (Para 71).

5. Until recently, little attention was paid to the use of audio-visual aids in our educational institutions partly because of lack of financial resources and partly owing to lack of proper appreciation of the role of audio-visual aids in teaching and learning. The impact of audio-visual aids has been very limited at all levels of education in India. (Para 5).

6. A questionnaire issued by the committee to universities and institutes of technology in order to have an estimate of the present use of audio-visual aids in institutions of higher education in the country indicates that universities have generally a good number of audio-visual aids and that the aids are frequently used and the response of students is generally enthusiastic. (Para 14).

Films, filmstrips and slides

7. Films, filmstrips and transparencies are being increasingly used in educationally advanced countries as visual materials which can be used in any teaching situation when it becomes necessary to demonstrate a point, a fact, an idea or a process. The slide has the additional advantage, which it shares with the filmstrip, that it can reproduce visual images which cannot be drawn on the black-board at all, howsoever skilful the teacher. Filmstrips are usually accompanied by self-contained teaching notes and as such

a skilfully made and carefully planned filmstrip is extremely useful as it can provide in one packet well-organised text and illustrated teaching material. The sound filmstrip would be useful in technical institutions in areas where skills and assembly of materials are needed to be taught. (Paras 15, 17 and 20).

8. The filmed lecture is in many situations superior to a tape recording of the lecture, as it involves both sight and sound and, imaginatively made, it can be superior to the lecture itself. It is also possible for a film to be a temporary substitute for a good lecture and thus help in overcoming the shortage of good teachers by filming lectures of distinguished teachers. Film can also be used for recording scientific experiments and as such has a special value in higher education from where research and new ideas emanate. (Paras 24 & 25).

9. It is understood that a committee appointed by the Commission has recommended that the University Film Council should be transferred to the IUB where it could have the benefit of being a part of the university system and that the Ministry of Education should provide adequate support to the IUB to continue and vitalize the activities of the council. It is hoped that the UGC will find it possible to take up this matter with the Government of India so that the University Film Council is revived at an early date. (Para 28).

10. The University Film Council, when revived, should make a comprehensive survey of the availability and use of films and filmstrips in higher education in India. The survey should also make a study of the use of films and filmstrips in higher education in other countries. It should also be a part of the survey to obtain information about the work done by international film and television organisations to promote the use of films and television in science and culture. (Para 29).

11. Serious attention will have to be paid to the production of educational films directly related to course contents in various branches of knowledge. The revived University Film Council could play a useful role in making a beginning in this regard. The council could also take up research to determine the areas in which the production of films and slides may be taken on a priority basis. (Para 30).

University broadcasts

12. The keen interest shown by the AIR in broadcasting educational programmes for the university community in India is most welcome. It is, however, clear that as yet there is no systematic attempt to reorient the programmes with the specific objective of supplementing and enriching classroom teaching, except for students of the correspondence course. (Para 39).

13. It would add to the value of university broadcasts if they are organized in such a way that a complete series of talks by eminent teachers

on some topic of interest to university students is planned and broadcast. (Para 39)

14. The AIR should explore the possibility of increasing the duration of university programmes and bringing about greater coordination among the programmes of various stations in order to avoid unnecessary duplication of themes. (Para 40).

15. In order to enhance the value of university broadcasts, tape-records of the lectures given by eminent scholars and outstanding teachers should be supplied to the universities or to the University Grants Commission for wider circulation. It would also be useful if scripts of educational talks broadcast by the All-India Radio are printed or cyclostyled and circulated as is done in some other countries. (Para 41).

16. It would be useful if the AIR could, in consultation with the UGC set-up a small committee to review the working of its university programmes. (Para 42).

Television

17. The main advantage of television in contrast to other audio-visual aids like films and film-projectors is its built-in system of distribution which enables students and teachers to watch the programmes telecast by the national or regional television centres without the aid of any technician. (Para 43).

18. It is understood that an internal and a global satellite are being launched over the Indian ocean in the near future and that every state will have relay stations which will provide additional audio channel thus facilitating simultaneous rendering into regional languages. The preparatory study of the pilot project prepared by the UNESCO expert mission in cooperation with the team of Indian experts appointed by the Government of India indicates that this system will play an important role in increasing expansion of educational facilities at all levels, lessening the isolation of the teacher and improving the quality of his education, unifying curriculum in science and mathematics in all the states and in promoting the teaching of all the regional languages of India. (Para 47).

19. There are two handicaps to the expansion of television in the country; the limited financial resources of the government, and the inadequacy of purchasing power of the people. It is, however, a matter of gratification that the government is making a beginning towards the expansion of TV facilities. (Para 48).

20. It would be helpful if more seminars on television like the one arranged by the Institute of Mass Communication are arranged and experts in TV technology and university curricula are brought together to plan TV programmes in order to use the projected satellite system as effectively as possible. (Para 48).

21. The open circuit television at Delhi could be used more fully for educational purposes with a little more investment in equipment and staff. It should be possible to televise lectures, demonstrations and operations by outstanding scholars and scientists. Appropriate samples of the work being done at the national laboratories, courses designed to keep teachers informed of the latest developments in their subjects, refresher courses and courses for correspondence students and of evening classes could be arranged when the time for telecast is increased in the near future, and television stations are set-up in other metropolitan towns. (Para 49).

22. The use of closed circuit television on a large scale may, however, be ruled out in the present stage of our development in view of high cost (about \$ 2,90,000 per unit) involving foreign exchange. If funds and foreign exchange are available, an attempt should be made to develop those areas of instruction in which there is acute shortage of qualified teachers and necessary equipment. Institutes where closed circuit television can be used with advantage provided they have adequate resources and technical know-how, are engineering and technical institutions, medical colleges and institutes and agricultural colleges and universities. (Para 50).

23. If for some reason, the setting-up of the satellite project is delayed or postponed indefinitely, it would be worth-while assisting one or two universities to set-up a CCT for instructional purposes. This will provide invaluable experience and experimental data for effective utilization of the facilities when the project is completed. (Para 51).

Programmed learning

24. There is a need for developing methods which will help assimilation of text materials and skills by the students at the optimum level in the shortest time possible. Research is, therefore, necessary regarding the functioning of the human brain in a teaching-learning situation, in development of instructional materials for students of different abilities and for different types of institutions and in identifying the situation, the concept and the conditions in which programmed learning can be most effective.

Some of the areas in which instructions can be developed through programmed learning are: (i) English as a library language; (ii) learning of Indian languages; (iii) teaching of foreign languages; (iv) science and mathematics; (v) professional and medical education; (vi) programmed learning for gifted and retarded students; and (vii) programmed learning in correspondence courses. (Para 55).

25. The need for proper training in the techniques of programmed learning has also to be stressed. It is only when the programmes are prepared with imagination and understanding that absorption at the receiving end is quicker and deeper. It would be useful to have active collaboration between the subject experts and the psychologist in the preparation of programmes, since the psychologist can bring to bear upon the subject-matter an understanding of the cognitive process of learning. (Para 57).

26. The centres selected for development of programmed learning should be concerned primarily with the training of personnel and production of materials. Research activities would follow and may have to be developed in a specialised institution. To begin with, a few university centres might be selected for development of programmed learning and those interested in the development of instructional material in the university sent for training abroad, if necessary. These and other programmes of audio-visual education could best be developed by the schools of education proposed to be supported by the University Grants Commission. (Para 58).

Language laboratories

27. Language laboratories should be set up in as many universities as possible and in at least one university in each state. The cost of setting-up language laboratories in ten universities during the fourth plan would be Rs. 7,50,000 at approximately Rs. 75,000 per laboratory. The recurring annual cost would amount to about Rs. 40,000. There are of course certain ways of cutting these costs. The initial cost can, for example, be reduced by having less than 40 booths. Cuts can also be made in the monitoring and/or materials preparation staff. (Para 65).

28. Careful planning is necessary before the setting-up of a language laboratory. Before a laboratory is set-up, it must be ensured that a strong language teaching programme already exists. The appointment and training of additional staff for the preparation and use of tape materials will also be necessary. The minimum needs of universities in regard to staff will be one full-time lecturer for approximately every 12 hours the laboratory is to be in operation and the appointment of another for each group of students which requires a set of materials to be written and pre-recorded. On the technical side a full-time technician with a diploma in sound engineering will be needed for the first year, and thereafter a part-time technician to attend to the laboratory during the hours of its operation. (Para 66).

29. Resolutions 43-45 adopted by the All-India Seminar on the Teaching of English (2-4 December, 1967) emphasizing the need for a more careful assessment of the costs versus the benefits of installing a laboratory, the full exploration of the possibility of producing laboratories from locally available components, and the training of technicians to operate them are fully endorsed. (Para 6).

30. The first important step in developing the use of audio-visual aids in the field of higher education is to create an awareness among university and college teachers that educational technology is possible and feasible. Some central organization should be encouraged and assisted to disseminate information on the role and application of audio-visual aids to the universities and colleges in the country from time to time. It would be extremely useful if a quarterly or bi-annual bulletin containing the information on the latest advances in the development and application of audio-visual aids in the developed countries of the world and on new experiments conducted in India is brought out. (Para 72).

31. The University Grants Commission may sponsor four or five seminars at different university centres to discuss problems of resources, training, production and distribution of materials and information on audio-visual aids. (Para 73).

32. Many universities should be in a position to set-up immediately audio-visual units by pooling the equipment and other facilities already available with them. The UGC may explore the possibility of providing some assistance (Rs. 10,000 NR + Rs. 5,000 R for a period of five years) to such of the universities which are keen to set-up audio-visual units on an inter-departmental basis. (Para 74).

33. The UGC should also encourage research in the production and application of audio-visual techniques with special reference to higher education. (Para 75).

34. Steps should also be taken to set-up immediately three or four centres of educational technology in selected universities. The universities which have strong departments of the regional languages, education, psychology, sociology, electronics and engineering may be selected for the establishment of the proposed centres of advanced educational technology with the faculty of education as the coordinating agency. (Paras 76 and 77).

35. The UGC may also set-up a standing committee with representatives from bodies like the Indian Institute of Mass Communication, Department of Audio-Visual Education of the NCERT, All-India Radio, Film Institute of Poona and Indian Association for Programmed Learning in order to coordinate the activities of the proposed centres of educational technology, the University Film Council when it is revived and other agencies interested in audio-visual aids and to advise the centres in regard to their programmes and policies. (Para 78).

36. The Department of Audio-Visual Education of the NCERT may be strengthened and its functions made more broad-based to enable it to extend its activities to the universities and colleges. It is understood that the department of audio-visual education of the NCERT has facilities for training school personnel for use of audio-visual aids. This facility could be extended to the staff of the interested universities also. The Ministry of Education of the Government of India may examine this and extend to the department whatever help is necessary to enable it to meet the requirements of the universities. (Para 79).

ANNEXURE I

OBSERVATIONS OF EXPERT BODIES

(i) The Standards Committee (1961-64)

The committee appointed by the University Grants Commission to undertake a systematic and objective investigation of problems relating to the standards of higher education in Indian universities has recommended an increasing use of audio-visual aids such as teaching machines, television, radio, films, tape-recorders etc. The committee says, "Unfortunately, universities and colleges in India are not fully alive to or even aware of the significant progress that has been made in this field. It would, therefore, be necessary for a central agency like the University Grants Commission to collect and communicate information about various teaching aids to the universities and colleges. It would even be desirable for the Commission to organize regular exhibitions of such equipments in the universities."

(ii) The Education Commission (1964-66)

The Report of the Education Commission has underlined the fact that "over a large area of education, the content and quality are inadequate for our present needs and future requirements, and compare unfavourably with the average standards in other educationally advanced countries. What is worse, the large gap between the standards in our country and those in advanced countries is widening rapidly." It has been further observed that "A majority of teachers teach mechanically and listlessly...with a few bright exceptions, they do not make experiments in the methods of teaching." "Many students", according to the Education Commission, "now come from comparatively or entirely uneducated homes and are ill-prepared at the secondary level to undertake genuine university work; they have little experience of independent study; their curiosity is unquickenened and learning for them is mainly a matter of mechanical memorisation. There is, as a rule, little discussion of intellectual matters with their teachers or fellow students; their main duty is considered to be to attend to uninteresting lectures usually given in a language which they understand inadequately."

The question of improving teaching methods assumes paramount importance. The problem of teaching methods in higher education, as the Education Commission recognises, has been a relatively neglected one in India so far. It recommends, in this connection, that the problem may be examined by the UGC through a special committee appointed for the purpose, and also that schools of education whose establishment has been recommended by the Commission, may make a special study of teaching methods. The report places great emphasis on the importance of new methods and techniques for improving the quality of education at all stages

of education. More specifically, the Education Commission has suggested that the use of microphones and tape-records of lectures by distinguished professors should be considered as possible methods for overcoming the problem of handling large number of students without corresponding increase in educational expenditure, or the number of faculty members.

(iii) Hale Committee on University Teaching Methods

The Committee on University Teaching Methods appointed by the University Grants Committee of the UK, issued a questionnaire to find out the interest of teachers in visual aids, the adequacy of the supply of visual aids in quality and quantity, reasons for non-use of sound recorded material, etc. The committee found that 65% of the teachers in the sample were interested in using visual aids in the course of their teaching. The use of visual aids, however, varied widely from subject to subject. The greatest interest was shown by geographers (96%), and biologists (92%) followed by engineers (82%), physicists (81%), and chemists (78%). The least interest was shown by lawyers (23%) and mathematicians (24%). Generally speaking, the teachers of arts subjects showed less interest than teachers of science. Opinion was equally divided as to whether the supply was adequate in quantity. Only a small minority of university teachers (12%) used sound recorded material. Unsuitability of the respondent's subject was given as a reason for non-use by 62% of the sample.*

(iv) University Grants Committee on Audio-Visual Aids in Higher Scientific Education

The University Grants Committee of the UK, appointed a committee in February, 1963 to survey the current use of audio-visual aids in teaching and research in the pure and applied sciences in institutions of higher education in Great Britain and to assess their potential usefulness and possible lines of development. The committee was convinced that these aids can help improve the quality of teaching and the communication of ideas. As the committee says, "A mode of communication which makes both an oral and a visual appeal, with the lecturer selecting the aid most helpful to him and to his students, promises to be more successful than simple oral communication". The main recommendations of the committee are attached (annexure II). A summary of the survey of audio-visual aids in foreign countries undertaken by the committee is also attached (annexure III). The most outstanding recommendation of the committee is the establishment of a national centre for audio-visual education and of central service units in institutions of higher education.

(v) Conference on the Use of Film in Higher Education and Research

In order to study some aspects of the use of film within universities and other educational and research organisations and to help make its potentialities more widely known, a conference on the use of film in higher education and research was held at the College of Advanced Technology,

**Report of the Committee on University Teaching Methods* p. 98-99.

Birmingham (now the University of Aston), in September, 1964. The conference discussed various problems relating to the film in higher education including the role of the producer. Following the conference, the department of scientific and industrial research set up a working-group on film and scientific research. A summary of the observations and recommendations of the group is attached (annexure IV).

(vi) UNESCO Studies

The UNESCO undertook an enquiry addressed to some 4,000 universities throughout the world, with the aim of discovering their resources and involvement in films for distribution purposes. The final report of the enquiry is awaited. Some recent publications by UNESCO e.g. a catalogue of films for use in university teaching in physics, chemistry, biology, botany, zoology, ISFA, Paris 1962 and ISFA study of films for university teaching, *World Screen Bulletin*, I, 22(1964) show the increasing attention which UNESCO is paying to the role of films in universities.

(vii) Seminar on Film in a Developing Society

The Films Division of the Ministry of Information and Broadcasting, Government of India, organised a seminar on film in a developing society at Bombay on June 25-28, 1966. The recommendations of the seminar are in the form of suggestions to the Ministry of Information and Broadcasting and to the Films Division. Among other things, the seminar has recommended more effective coordination between films and other media of mass communication in tackling national problems. The seminar also recommended the initiation of a research, training and development programme. The main recommendations of the seminar are attached (annexure V).

(viii) Seminar on the Role of Documentary Films in National Development

The Indian Institute of Mass Communication organised a seminar on the role of documentary films in national development from May 1-4, 1967. The seminar emphasised the need for proper recognition of the media of mass communication as an essential infrastructure for social and economic development of the country. The seminar also recommended the production of well-planned specialised films. The seminar suggested that the Ministry of Education and/or NCERT should direct the planning and production arrangements for strictly educational films. A summary of the main recommendations of the seminar is given in (annexure VI).

(ix) Seminar on the Need for Television in India

The Indian Institute of Mass Communication organised a seminar on need for television in India on January 17-19, 1968 in New Delhi. The seminar recommended that the television should be recognised not only as an important aid to development but as one of its pre-requisites. The seminar also recommended that institutes of higher technical education and agricultural universities should consider the possibility of introducing television both for training and programme planning. The main recommendations of the seminar are attached (annexure VII).

ANNEXURE II

MAIN RECOMMENDATIONS OF THE UK UGC COMMITTEE ON AUDIO-VISUAL AIDS IN HIGHER SCIENTIFIC EDUCATION

1. Determined efforts should be made to overcome the present shortage of suitable teaching films at higher educational levels. Enthusiasts in cinematography in various institutions should be encouraged to produce teaching films of general value in their disciplines, working in close cooperation with their central units and in consultation with colleagues in other institutions who have like interests.

2. The films produced should be submitted to the appropriate assessing panel of the national centre for inclusion in its catalogue, and should then be made easily available by hire or purchase to other institutions in the country.

3. If sequences from research films are thought to be of value for teaching purposes, extracts of the film should be sent to the appropriate assessing panel at the national centre for appraisal. The selection of suitable sequences should then be the task of the national centre.

4. Research films should be made available through the national centre to other institutions.

5. The national centre should arrange for the processing and printing of films at a reasonable cost.

6. Where a permanent record is required of a lecture or talk which has been televised and recorded on video-tape, it should be transferred on to film. Films should also be made of appropriate educational programmes after negotiation with the broadcasting company concerned.

7. When a longer film is made, it should preferably have a magnetic sound track so that teachers can either retain the original commentary or record their own.

8. All educational films imported from abroad should be exempt from import duty. Their appraisal should be undertaken at the national centre which should also be responsible for procuring such films as are deemed to be of value, translating or dubbing them when necessary.

Consideration should be given to the preservation of master copies of films and tapes which are clearly of educational value.

9. The central service units should hold a stock of overhead projectors for use by individual lecturers and should assist with the production of transparencies or, when required, should produce them in the unit.

10. Overhead projectors should form part of the standard equipment of lecture theatres and, where possible, they should be built into the lecture bench.

11. Built-in projectors should be low-mounted so as not to obscure the vision of any member of the class and the lens should not be detachable.

12. The design of projectors should be such that overlays are interchangeable.

13. Central service units should maintain a stock of cassette-loaded projectors for use by individual lecturers in smaller lecture rooms and in laboratories, and also by individual students for private study and revision, perhaps in association with tape-recorded material.

14. Central service units should provide facilities for the production of short, single-concept films.

15. The library services of the central service unit should catalogue and store copies of these films for use in their own institutions and should ensure that details of them are notified to the national centre for inclusion in the national catalogue.

16. The library services of the national centre should make provision for the scrutiny of all teaching and research films submitted for inclusion in the national catalogue and for the extraction of those sections which would be particularly suitable for 8 mm cassette-loaded projectors.

17. The experiment involving inter-university discussions between Cambridge University and Imperial College, should be repeated between separate colleges, within individual colleges and on a regional basis.

18. Institutions setting-up extensive CCTV installations should consider whether a good-quality video-tape recorder is likely to prove to be economic despite the present high cost and should look for advice to the national centre.

19. If CCTV is used for large overflow classes, the students should be sub-divided into small groups with a junior lecturer or demonstrator in-charge to answer questions and lead discussions. The formal lecture should be short enough to allow adequate time for discussion.

20. The value and potential of CCTV are manifest and we would urge institutions to take full advantage of them.

21. In the field of teacher training we think that film and CCTV are by no means mutually exclusive and we recommend that urgent consideration be given to the production of films specifically for teacher training.

22. The educational uses of CCTV should be closely studied by a body representative of both educational and broadcasting interests.

23. A closer co-operation should be established between the broadcasting organisations and those engaged in higher education.

24. An allocation of channels in the UHF band should be made to several universities for experiments in local educational broadcasting.

25. Universities, training colleges and technical colleges should carry out research into the possible uses of programmed instruction in their respective spheres and on the techniques of applying it. Such research should include computer-based teaching machines, and should involve the use of programmed instruction as part of the planned application of educational technology as a whole.

26. University departments of education and teacher-training colleges should conduct in-service courses in programmed instruction and in programme writing, and thus increase the supply of good programmes. It is of great importance that teachers should be released for this kind of training.

27. Institutions of higher education should consider providing some programmed courses for first-year students.

28. At all levels, in subjects where considerable factual information has to be assimilated, use should be made of programmed instruction, so that teachers can spend their time in assisting students to use their knowledge rather than in helping them to acquire it.

29. In teacher-training establishments, students should be taught programmed instruction as a 'special method' and should learn the basic principles of programming.

30. Appropriate establishments should be encouraged, and, where necessary, financially assisted, to play their part in validating new programmes.

31. Where the demand for language teaching in scientific and other departments would not justify a separate language laboratory installation, modern-language departments should provide for the needs of other departments.

32. There are several ways in which oral instruction by means of a master tape could be combined with other forms of visual aid or with programmed instruction, but there is need for more research into which medium is best suited to any particular teaching situation. This could be carried out both by the national centre and by the universities and colleges themselves. The central service units should help to initiate experiments in individual university departments in collaboration with the national centre and with university departments of education.

33. Central service units should be given adequate facilities to enable them to improve teaching and strengthen communication throughout the field of higher education.

34. The services provided by the central unit should cover the whole field of communication.

35. The central units should supply the national centre with information on research apparatus and techniques used in their institutions and so maintain a two-way link between the universities and colleges and the national centre.

36. In close co-operation with subject experts and with appropriate institutions, central units should initiate and organise new research in the field of teaching methods.

37. Some of the large university centres should accept graduates who wish to train in educational technology. In this field they would naturally work in conjunction with the university's own department or institute of education and other appropriate departments.

38. The central service unit should have proper academic status within the university, with representation on appropriate university committees.

39. A national centre should be established, to concentrate on services which cannot be rendered satisfactorily by smaller units, on the exploitation of new aids, on the training of staff for university or college central units, on providing a co-ordinated cataloguing and library service and a comprehensive information and advisory service.

40. The centre should be able to advise on experiments and on research in audio-visual techniques, as well as on the applications of aids for instruction.

41. The centre should provide adequate courses of instruction on new methods and applications for its own junior staff and, provided the numbers were small, it should undertake the training of audio-visual technicians from university or college centres.

42. The centre should have a large selection of equipment so that its staff could demonstrate all methods of presenting audio and visual information.

43. The library of the national centre should collect and catalogue material for reference, loan or purchase. This material should not only include books, journals and theses but catalogues on films, video-tapes, slide collections, sound recordings and teaching programmes.

44. University and college centres should inform the national centre of all films made in their institutions which are likely to be of value for teaching purposes.

45. The national centre should assume the responsibility for importing and exporting films and, if necessary, video-tapes needed for teaching purposes, and should take steps to ensure that this is done with a minimum of delay.

46. The library should form an integral part of the national centre.

47. The library service of the national centre should include both teaching and research films.

48. To serve all the needs of higher scientific education both in England and Wales, and in Scotland, the governing body of the centre, which we suggest should be called the council for educational technology, should be fully representative of the academic staffs of universities, colleges of advanced technology, central institutions, training colleges and colleges of education if the centre were to cover all level of education there would need to be additional representatives of schools and further education establishments.

49. To meet the immediate need, directors of central units should be sought among the academic staff and in existing central units in universities, in industry, in the armed services and in the film and television fields.

50. Permanent training provision for potential directors should be arranged at an early date with appropriate institutions.

51. A director should normally have a rank equivalent to that of senior lecturer.

52. Deputy directors for larger units and trainee-directors should be sought among young science graduates.

53. In view of the great shortage of technicians, special training arrangements should be made at technical colleges with the assistance of the City and Guilds of London Institute.

54. Summer schools and other vacation courses in the use and potential of communication media should be arranged for teachers.

55. Institutions of higher education should actively develop the use of audio-visual aids and should be given the necessary funds for this purpose.

56. It is essential that the national centre should be financed solely from public funds.

ANNEXURE III

USE OF AUDIO-VISUAL AIDS IN FOREIGN COUNTRIES REPORT OF THE UK UGC COMMITTEE ON AUDIO-VISUAL AIDS IN HIGHER SCIENTIFIC EDUCATION

Great Britain: A substantial proportion of departments in the universities possessed the more conventional aids—epidiascope, tape-recorder, 16 mm film projector, filmstrip projector, slide projector, still camera and cine-camera. The proportion of those using a particular aid varied from 24 per cent (cine-camera) to 68 per cent (epidiascope). The use of the newer aids—closed-circuit television, video-tape recorder, language laboratory, 8 mm cassette-loaded projector, overhead projector, overhead projector and teaching machines—was, however, very slight. Of these closed-circuit television was used most, in 8 per cent (63) of the departments. The pattern of use for research was broadly the same as for teaching, but on a smaller scale. As was to be expected the aid most widely used in research was the still camera.

United States of America: In the United States, out of approximately 2,400 available very-high-frequency channels, about 700 are reserved for educational television. There are at present about 145 educational television stations, and the number is growing at the rate of about one per month.

In addition to the considerable amount of educational television broadcast to schools and to the general public, about one-third of the educational television stations broadcast courses for degree credits, organised by universities.

Comparatively few attempts have been made in the United States to link up universities by television in order to make wider use of the best teachers. Where it has been tried success seems to have been restricted by inter-university rivalry. It is more satisfactory where 'satellite' colleges (generally not offering the full university course) have been linked up with the main university.

A number of universities have their own film libraries. At Pennsylvania State University, for example, the film library has 6,000 films. It not only gives free services to the university departments but also hires out films to schools and other institutions and provides operators. The Educational Services Inc. (ESI) at Watertown, Mass., produces films for the MIT and for various other learning centres. Language libraries are used mainly for beginners in language learning and for remedial work. Programmed instruction is used mainly in early stages of courses and more often in scientific and technical subjects than in the arts. At Harvard, however, it is used at quite advanced levels.

West Germany: A central institute has been set-up in West Germany which covers the following aspects of scientific films for instruction and research:

- (a) the use of film as a research tool in all scientific fields;
- (b) the production of instructional films for universities and technical colleges; and
- (c) scientific film documentation.

France: In November, 1963, the Council of the Organisation for Economic Co-operation and Development, Paris, negotiated an agreement with the French Government for the setting-up at the University of Nancy of a pilot experiment in the operation of a lower-power television station. The aims of this experiment were three-fold:

- (a) to explore the potentialities of a university station in relation to the problems facing scientific and technical education, and to study the use of television as a teaching tool;
- (b) to study the future development of the project to cover continued professional training for engineers and the retraining of technicians and teachers, both in advanced and in developing countries; and
- (c) to carry out research on methods whereby television could be used to relieve teacher-shortage, on its value in the improvement of teaching practice and on the evaluation of television teaching.

Japan: Apart from, but in line with, the extensive educational broadcasting at high school level in Japan, lectures are broadcast by the Nippon Hoso Kyokai (NHK) as part of university extension courses. State universities in Japan, unlike some local authority and private universities, do not have extra-mural courses. There are five privately-run correspondence courses and NHK broadcasts radio lectures for students following these courses in English, law, economics and Japanese history. The university of Tokyo uses number of aids, for example, CCTV in the department of surgery and micro-films in the library.

Russia: The technical institute at Moscow has been using films and teaching models and have recently installed several teaching machines. The growth of interest in new teaching aids is much facilitated in the Russian Socialist Federal Soviet Republic (RSFSR) by the existence of the Academy of Pedagogical Science (APS). Teachers in higher education as well as in schools look to this body for support in adopting new ideas and in conducting large scale experiments. The report of a series of conferences dealing with teaching aids and programmed learning was issued in 1963 by the publishing house of the APS on behalf of the central committee of the RSFSR Pedagogical Society (General Editor: V.M. Taranova). This report deals with the use of teaching films, tape recorders, and teaching aids in general, and with the design of teaching machines, including those electronically controlled.

ANNEXURE IV

SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS OF THE DSIR WORKING PARTY ON THE FILM IN SCIENTIFIC RESEARCH

1. An information centre should be established, preferably in one of the government research establishments, to put inquirers in touch with other research workers, sources of supply of equipment, existing consultancy services and laboratories willing to undertake specialist work. One of the activities of this centre would be to assemble, for ready consultation, papers on techniques and applications.
2. A central research photography unit, incorporating the information centre should be established to conduct research and development on the techniques of scientific photography, and to encourage the use of these techniques in industry and the universities by rendering technical assistance and consultancy services where these are not otherwise readily available. The unit should if possible be set up within an existing government research establishment which already has good photographic, library and workshop facilities. The unit should be financed jointly by government and industry.
3. A department of scientific photography should be established in a university or college of advanced technology, preferably where there are existing interests in applied photography and research activities in applied science and technology. This would train scientists, provide teachers, and carry out basic research.
4. Short advanced courses in scientific photography for graduates, directed particularly to the needs of scientists in industry, should be provided by colleges of advanced technology.
5. The development of central photography units in universities should be encouraged. These would ensure the effective use of expensive equipment, provide technical information and assistance within the universities, and assist with the production of research film and film for advanced teaching.
6. Universities, with the help of their central photography units, should form their own libraries of "concept film" as an aid in advanced teaching.
7. A research film library should be established to assist with the further development and distribution of research film.

8. DSIR should be invited to compile a directory of users of cinematography in research in the UK, based on the information already collected. This would be primarily an aid in the location of research film, but would also be useful to those seeking advice on the applications and techniques of cine-photography.

9. Consideration should be given to the making or compiling of a film or films illustrating the techniques and applications of scientific photography, for showing to potential users to demonstrate the value of film in university and industrial research and development.

ANNEXURE V

RECOMMENDATIONS OF THE SEMINAR ON FILM IN A DEVELOPING SOCIETY

The Films Division organised the seminar on film in a developing society at Bombay on June 25-28, 1966. The recommendation of the seminar which are in the form of suggestions to the Ministry of Information and Broadcasting and to the Films Division are reproduced below.

Suggestions to the Ministry of Information and Broadcasting

1. There should be more effective co-ordination between films and the other media of mass communication in tackling national problems.
2. The financial structure of the Films Division must be radically revised. The Films Division must be either subsidised to the extent of all its requirements or its revenues from rentals, sales of films and prints, etc., must be ploughed back in addition to its annual budget with a view to stressing on quality and not on quantity.
3. The accent must be as much on quality as on quantity.
4. The films of the Films Division were by and large ineffective because the content was not convincing. Only a rosy, one sided picture was presented. The film-makers must be given the freedom to present a balanced picture of the country. The other side of the medal too must be presented. Besides, humorous and satirical approaches should be allowed to be used occasionally.
5. The head of the Films Division should be a creative film man in keeping with the heads of the other media.
6. The suggestion made by Prof. Jerzy Teopltz, the Polish filmologist, must be implemented. According to him, the Films Division must have independent, semi-autonomous units consisting of the director, the script-writer and a financial-cum-production administrator.
7. Since both the selection and execution of subjects left much to be desired, the following has been suggested:

The Films Division must have a more direct and final say in the selection of subjects, in the treatment and in the content itself, so that the films of the Films Division will be more meaningful, more filmic and more effective. Subjects should be suggested by the various ministries on the basis of urgency and priority in their own lists with details of

what they want. All such subjects must come to the Films Division and not go to the Ministry of Information and Broadcasting and for a joint meeting with the other ministries. The Films Division must select from this list and on its judgment the final list of subjects for each year. The lines of approach with detailed contents are to be drawn up by the FD, of course, in consultation with subject specialists. This will replace the present unsatisfactory system of sponsorship and consultants.

8. All the departments are to be assessed and augmented to meet the present requirements. This is with special reference to the music department and the film library.
9. Planning for all equipment must be done on a realistic long-term basis. Camera and sound equipment in the FD should be assessed and immediate arrangements must be made to augment them.
10. Research and scripting having been neglected so far, adequate financial provision must be made for this to cover the basic needs like location survey, research and payments. The present system of directors forced to write scripts with inadequate facilities should be radically changed.
11. A research, training and development programme must be initiated to plan tomorrow's needs today.
12. The working conditions and pay scales of the FD staff must be reviewed on a realistic basis taking into account the market rates.
13. The directors and the technicians must be provided with facilities and opportunities to study film as a medium in a regular manner. Towards this end, a library of films classics, both Indian and foreign, must be set-up. Besides the library of books and magazines must be augmented. Financial provision must be made for all this.
14. A monthly bulletin must be published to promote the Indian documentary movement.
15. There should be an annual documentary film festival, which should be sponsored by the Ministry but organized by an independent body, at which the best documentaries and short films produced in India in all sectors should be screened and prizes given. There should be also an annual seminar like the present one.
16. In certain circumstances, when other ministries like defence, and labour have large requirements of specialised films, they may be encouraged to set up their own units in consultation with the Films Division. This would lead to a certain amount of decentralization.
17. Training films and cartoon films should be made in a larger number and they should be adequately exploited.
18. The Films Division must be left completely free to put in the newsreel whatever is newsworthy in order to make the newsreel a responsible

and objective news medium, which will be accepted by the people with greater enthusiasm.

To make the newsreels more interesting, authentic sound and syno-sound should be used. Adequate equipment must be made available to all cameramen.

Three leading newsmen should be associated with the film advisory board as an advisory panel for newsreels.

19. Newsreel coverage of visiting dignitaries must be minimised. Compilation films about such visits should be also minimised, if not stopped.
20. The distribution of films must be rationalised. It should be done audience-wise, taking into consideration that there are several types of audiences. A film made for villages should not be shown in the cities. Films must be so made and adapted that there is scope for audiences to identify themselves.
21. Adequate supply of prints must be made available to branch offices and to mobile field publicity units.
22. Audience research should be done in an organized manner by an independent body, with which the marketing research organizations in the private sector should be associated.

Suggestions to the Films Division

1. While it is an accepted fact that film-making is a concerted team-work, it should be also recognised that it is ultimately one person who creates the film and that is the director.
2. In view of this Prof. Jerzy Toeplitz' suggestion is to the point. According to him, the FD must have independent, semi-autonomous units consisting of the director, the script-writer and a financial-cum-production administrator.
3. The FD must have a "creative cell" from which will emanate all the ideas and subjects for all films, which must be socially oriented.
4. Experimentation is sadly neglected. It must be given priority. Since there is budgetary provision for the making of four films every year by the FD on its own, experimental, off-beat films should be made every year.
5. The film-maker has little time to replenish himself with creative ideas. Opportunities and facilities must be provided for film-makers to study film as a medium. This must be made part of "in-service" training.
6. There must be creative collaboration between the director, the script-writer, the cameraman, the editor, the music director, the sound engineer and others right from the planning stage.

7. Because of the large number of films a producer is called upon to handle, he is unable to do justice as a producer. It is recommended that the production of films must be organised in a more realistic manner, by making the director the producer, wherever possible and necessary.
8. The present system of directors forced to write scripts with inadequate facilities of money and time should be radically changed.
9. A research, training and development programme must be initiated to plan tomorrow's needs today.
10. The working conditions and pay scales of the FD staff must be reviewed on a realistic basis taking into account the market rates.
11. All the departments are to be assessed and augmented to meet the present and future requirements. Planning for all equipment must be done on a realistic long-term basis. Immediate arrangements must be made to augment the equipment.
12. Films with humorous and satirical slants should be made.
13. There must be an annual seminar on short films.
14. Titles must be presented in a much more artistic manner.
15. New voices and new commentary writers must be associated with the newsreels and documentaries.
16. There must be experimentation in regard to voices and sound track.
17. Newsreels "in depth" must be prepared. Photo essays, anticipatory items, monthly editions etc., are some of the items to which attention should be paid.
18. Newsreel cameramen should be provided with facilities to buy newspapers and magazines. In fact they need research assistants to keep track of news and developments.
19. The producers, directors and script-writers should go with field publicity officers and study reactions of the public to their own films.
20. Training and cartoon films must be produced in a larger number.
21. Three leading newsmen should form an advisory panel for newsreels and this should be associated with the film advisory board.
22. Copies of both lists of suggestions must be cyclostyled and made available in the Films Division and to all outside participants.
23. A small committee is to be formed to define and describe the word "documentary film" so that this could be a guide to bodies like the films advisory board, the state awards committees etc.
24. Detailed requirements of the various departments are given in the annexure (eight numbers)...(Not reproduced).

ANNEXURE VI

SEMINAR ON THE ROLE OF DOCUMENTARY FILMS IN NATIONAL DEVELOPMENT MAY 1-4, 1967

RECOMMENDATIONS

The seminar emphasized the need for proper recognition of the media of mass communication as an essential infrastructure for social and economic development of the country. It recommended that communicators and communicating agencies should undertake a regular and continuous campaign to persuade the planners and administrators to give communication its rightful place. For this purpose the Indian Institute of Mass Communication should undertake the collection and distribution of materials which illustrate the effectiveness of the role that mass communication media have played in the economic and social development of other countries.

2. The seminar strongly felt that the existing allocations of resources for different media of communication are highly inadequate and need to be greatly augmented. Keeping in view the extent of illiteracy in the country, the seminar emphasized the role of the film in communication, education and dissemination of information.

3. The seminar was conscious that for effective use of film throughout the country and particularly in the rural areas, it would be necessary to provide a very large number of mobile vans and projection facilities at fixed points. In this context it was suggested that a study should be made to ascertain the comparative costs of covering the entire country by TV as against providing the requisite number of film projection facilities. It is possible that in the long run, TV with its built-in system of distribution may prove to be a cheaper medium, as it can be developed into available and even a profit-making organisation.

4. The seminar felt that while all-out efforts for augmentation of resources should be continued, there was urgent necessity for adopting measures which would ensure the maximum returns from the existing meagre funds. In this context it was suggested that :

- (i) the present system of compulsory exhibition of short films should be continued;
- (ii) the production of films should be carefully planned: films should not be made on subjects which have a narrow appeal, or can be effectively portrayed through other visual media such as filmstrips; and

(iii) the emphasis should be on quality of films.

5. The seminar took note of the fact that although the Films Division is the prime organisation for the production of short films in the country, its resources are extremely meagre and recommended that its budget should be increased at least five folds. It recommended that the present financial structure of the Films Division should be rationalised to enable it to make use of its revenue. The ministries should pay for the films sponsored by them over and above these which are produced by the Films Division on its own.

6. Considering the increasing importance of the short film and the demands made on the Films Division, the seminar suggested that a thorough study should be made of the working of the National Film Board of Canada, is that such a national or central film board could be set-up in India. This board could have the following three wings each with a separate liaison officer :

- (i) Production and liaison
- (ii) Distribution and liaison
- (iii) Capital equipment including maintenance and technical research and liaison

The production wing would produce newsreels, general documentaries and specialised films for various ministries, directly and through private agencies.

The distribution wing would co-ordinate the distribution of short films which is at present being done by the Films Division, the state governments, and the private sector.

The capital equipment wing would assess the capital equipment and other requirements of government and private bodies producing films and liaise between them and the government and the Planning Commission.

7. The seminar recognized the need for associating the private sector with the national developmental effort and recommended that:

- (i) Government should appeal to big commercial and industrial houses and through chambers of commerce to them to sponsor the production of an increasing number of public utility and instructional films.
- (ii) Private producers should be given a large share in the production of short films.
- (iii) Films Division should purchase a larger number of films made by the private producers on their own and release them on its theatrical circuit.

- (iv) Government should explore the possibility of enabling the private producers to show the documentary films produced by them on their own by direct arrangements with the cinema houses.
- (v) Private agencies should be encouraged to organise sales of prints of government films in addition to what is already being done in this sphere by the Films Division itself.
- (vi) The Ministry of Information and Broadcasting should represent to the Ministry of Commerce to provide the requisite foreign exchange for essential equipment and raw materials to the private documentary producers for short films so that they are not bracketed for this purpose with film studios.

8. The seminar recommended the production of well-planned specialised films of the following categories:

(i) *Films for rural audiences specially in the field of agriculture*

These should be instructional in nature and produced on regional basis.

(ii) *Educational films*

Hardly any such films are being made in the country at present. The Ministry of Education and/or NCERT should direct the planning and production arrangements for instructional and educational films.

(iii) *Children's films*

Films should be made for children to inculcate in them the scientific outlook.

(iv) *Films to project India's image abroad*

These should be made in a manner which fits in with the requirements of the countries where these are to be screened. During a crisis, the Indian point of view should be effectively and speedily presented abroad. For the production of such film, government should explore the possibility of using Indian film talent abroad.

9. The seminar focussed attention on the urgent need for fuller utilisation of short films produced in the country and recommended the following measures to be coordinated by the proposed Film Board:

- (i) An effective non-theatrical exhibition circuit should be built up embracing factories, educational institutions, hospitals, big commercial houses, panchayats etc.

- (ii) 16 mm theatres should be set-up by local government bodies in the smaller towns and bigger villages for the regular screening of feature films as well as documentaries. Entrance to them could be with or without money.
- (iii) Well-stocked film libraries should be set-up in each district.
- (iv) Screening of educational films and documentaries in halls of colleges and universities. The University Grants Commission should be requested to ensure that such use is encouraged as a part of the extra mural activities of these institutions.
- (v) The facilities available for servicing and maintenance of projection equipment, which are extremely inadequate, should be augmented.
- (vi) Efforts should be made to exploit Indian short films commercially (in theatres as well as TV) in foreign countries.

10. The seminar recommended the need for manufacture and supply of low cost projectors and other ancillary equipment for exhibition of films.

11. The seminar strongly recommended the need for research and evaluation of the impact of documentary films on the audiences. There should be a proper neutral machinery for scientific evaluation and assessment of films on a regular basis.

12. On account of the need for increasing the number of short films, the seminar recommended that training facilities for the personnel engaged in the production of films should be provided on a bigger scale. It noted the existing facilities at the Film Institute at Poona and other institutes in the country. The seminar also emphasized the need for proper training of film users including field publicity officers.

13. Recognising the need for a documentary movement in developing countries particularly in South-East Asia, the seminar recommended the setting-up of a regional institute providing training facilities under the auspices of one of the agencies of United Nations.

14. A committee may be set-up in the Institute of Mass Communication to follow up the recommendations made by the seminar.

ANNEXURE VII

SEMINAR ON THE NEED FOR TV IN INDIA

RECOMMENDATIONS

1. In view of the importance of television, as the most effective medium for mass communication, the seminar recommended that television should be recognised not only as an important aid to development but as one of its pre-requisites. To achieve this objective it was felt that a proper atmosphere of awareness and urgency should be created among the public and policy-makers.
2. The seminar felt that in the present stage of Indian development TV as a mass medium was destined to play a significant role in promoting national integration, increasing food production, intensifying the family planning campaign, improving the quality of education for aiding in its expansion and eradicating illiteracy. The seminar recommended that this nation-building potential of TV should be increasingly publicised through different mass media, like radio, press, etc.
3. In order to achieve the above objectives, the seminar recommended that the Government of India should take concrete steps immediately for setting-up television stations as proposed by All-India Radio at Bombay, Madras, Calcutta, Kanpur and for strengthening the Delhi Station.

The seminar also noted the existence of an earth station for reception and transmission of television signals to and from Ahemadabad and recommended that another television station should also be set-up at Ahemadabad.

It is urgent that these stations may be brought into service by 1970 as the first phase of TV development in India.

The seminar noted with satisfaction that the UNESCO is likely to consider India as a suitable base to conduct a pilot satellite TV experiment by 1970. In this context the above mentioned timing is of particular significance in as much as it will enable India to take advantage of it purposefully.

4. The seminar felt that the satellite technology is only in its experimental stages and although India should take every opportunity to utilize its technological capability as and when they become a

reliable facility, it cannot afford to skip the necessity of establishing a time-proven land-based microwave link system for connecting at least the major stations.

5. At the development of TV in the country would depend upon the availability of receivers at a reasonable price, the seminar felt that the policy of government regarding TV receivers needed to be reviewed with a view to stepping-up the production of low cost TV sets and bring them within reach of the common man and of the community.
6. The seminar suggested that the government's policy regarding levy of duties on TV receivers also needed to be reviewed. To stimulate the growth of TV receivers' industry, it recommended that in addition to the two firms already licensed other well-known radio manufacturers should be permitted to produce TV receivers of their own design on a competitive basis provided on payment of royalty to the foreign collaborators would involve.
7. On the question of maintenance of TV receivers, the seminar recommended that the manufacturers and suppliers should be required to provide adequate service and maintenance facility in all areas where TV receivers are installed.
8. The seminar also recommended that institute of higher technical education and agricultural universities should consider the possibility of introducing television both for training and programme planning.
9. It was recommended that as a follow-up to this seminar the Indian Institute of Mass Communication should explore ways and means of educating the public on the role of TV in national development.

ANNEXURE VIII (A)

BUDGET ALLOCATIONS, NUMBER OF FILMS AND FILM-STRIPS AVAILABLE WITH DIFFERENT STATE AUDIO-VISUAL DEPARTMENTS

S.No.	Name of state	Annual budget of A.V. unit	Film		Filmstrips	
			No. of titles	No. of prints	No. of titles	No. of prints
1	2	3	4	5	6	7
1.	Andhra Pradesh	6,800	329	539	424	616
2.	Assam	N. A.	200	200	150	150
3.	Bihar	3,900	405	409	N. A.	N. A.
4.	Gujarat	47,000	750	780	385	385
5.	Jammu & Kashmir	N. A. 7,000	100 36	100 36	100 436	100 436
6.	Kerala	—	292	292	436	436
7.	Madras	20,000	896	1297	851	1451
8.	Maharashtra	80,000	1560	1660	1269	1324
9.	Mysore	80,000	1105	1250	N. A.	N. A.
10.	Punjab*	27,250	226	249	137	137
11.	Rajasthan	2,10,000	1951	2510	696	696
12.	Uttar Pradesh	N. A.	1289	1289	1089	1089
13.	West Bengal	N. A.	471	668	14	14
14.	Pondicherry	35,000	236	236	91	91
15.	Himachal Pradesh	63,000	324	328	678	678

*Before the formation of Haryana State.

ANNEXURE VIII (B)

AUDIO-VISUAL AIDS IN UNIVERSITIES AND COLLEGES: EXISTING FACILITIES

<i>S. No.</i>	<i>University/Institution</i>	<i>Name and number of aids</i>	<i>No. of times the aids are used</i>	<i>Proportion of teaching staff using aids</i>	<i>Proportion of students using aids</i>	<i>Size of the class</i>	<i>Students reaction</i>
1	2	3	4	5	6	7	8
<i>(A) Universities</i>							
1.	Allahabad	1. Video Tape-recorder —2 2. Film Projector 16 mm—4 3. Epidiascope —5 4. Still Camera —4 5. Cine Camera —2 6. Tape-recorder —1	b: d b: d b: c	c c		a to d	c
2.	Calcutta	1. Film Projector —1 2. Epidiascope —3 3. Microfilm Reader	d e d	b b c	— Science & Medicine Medicine	a b —	c c c
3.	Gauhati	1. Film Projector 16 mm—5 2. Epidiascope —10 3. Still Camera —20 4. Tape-recorder —10 5. Cine Camera —1	Often	c b b b b	—	b b b b c	c
4.	Gujarat	1. Film Projector 2. Tape-recorder 3. Filmstrip Projector —1	a a c	c c c	Arts 5% Science 25%	b b b	c c c
5.	Jodhpur	1. Film Projector 16 mm—2 2. Epidiascope —4 3. Still Camera —4 4. Tape-recorder —1	a c	Negligible	Arts negligible Science 50%	b c	b
6.	Karnatak Deptt. of Chemistry	1. Epidiascope —1	—	—	—	—	—

1	2	3	4	5	6	7	8	
	Deptt. of Geology	1. Epidiascope	1	d	b	—	b	—
	Deptt. of Zoology	1. Film Projector 35 mm—1	Through out year	—	—	All students	b	c
		2. Epidiascope	—1					
	Deptt. of Geography	1. Slide Projector	—2	d	a		a	c
		2. Epidiascope	—1			20		
		3. Still Camera	—3					
	Deptt. of Education	1. Film Projector 16 mm—1	—1	d	a		d	c
		2. Film Projector	—1			All students		
		3. Epidiascope	—1					
		4. Tape-recorder	—1					
	Deptt. of Foreign Languages	1. Film Projector 16mm—2	—2	—	—	Arts 1 %	—	—
		2. Tape-recorder	—1					
	University College of Education	1. Film Projector	—1	c	c	10%	c	c
		2. Epidiascope	—1	d		40%	a	
		3. Tape-recorder	—1	b		40%	a	
7.	Madurai	1. Film Projector 16 mm—1	—1					
		2. Epidiascope	—1	b	a	All	c	c
		3. Microfilm Reader	—1					
8.	Punjab							
	Deptt. of Zoology	1. Film Projector 16 mm—1	—1					
		2. Film Projector 8 mm	—1	c	a	150 students	—	c
		3. Epidiascope	—2					
		4. Cine Camera	—2					
	Deptt. of English	1. Tape-recorder	—1	b	c	30%	a	c
	Deptt. of German	1. Tape-recorder	—1	b	a	—	a	c
	Deptt. of Ancient Indian culture	1. Still Camera	—2	e	b	10%	b	c
	Deptt. of Geography	1. Film Projector 16 mm—1	—1	a	a	100%	b	c
		2. Epidiascope	—1					
		3. Still Camera	—1					
		4. Cine Camera	—1					

NOTATIONS:—

Col. 3

- a —Less than 5 times
 b —5 to 24 times
 c —25 to 49 times
 d —50 to 100 times
 e —More than 100 times

Col. 4

- a —More than 75%
 b —50% to 75%
 c —Less than 50%

Col. 6

- a —Under 20
 b —20 to 49
 c —50 to 80
 d —more than 80

Col. 7

- a —Unenthusiastics
 b —Moderately enthusiastic
 c —Very enthusiastic

1	2	3	4	5	6	7	8
	Deptt. of Botany	1. Film Projector 16 mm—1 2. Epidiascope —1 3. Still Camera —1 4. Cine Camera —1	d d e e	b	All students of the department	b	c
	Deptt. of Anthropology	1. Epidiascope —1 2. Still Camera —2	Used frequently	c	All students	All size of classes a	c
	Deptt. of Pharmacy	1. Epidiascope —1	b	b	All students		c
	Deptt. of Biophysics	1. Film Projector 16mm—1 2. Epidiascope —1 3. Still Camera —1 4. Line Camera —1 5. Tape-recorder —1	b e e c c	c b c c	All students		c
55	9. Rabindra Bharati	1. Video Tape-recorder —1 2. Film Projector 16mm—1 3. Epidiascope —1 4. Cine Camera —1 5. Tape-recorder —1	b c b b c	c	30% to 70% 100% 50% 20% to 100% 25% to 100%	a d d d a	b c a c c
	10. Ravi Shankar	1. Film Projector —1 2. Epidiascope —2 3. Tape-recorder —2	c	—	Arts	a	b
	11. Saugar	1. Film Projector 16mm —7 2. Epidiascope —5 3. Still Camera —23 4. Cine Camera —1 5. Tape-recorder —7	e	c	Arts 5% Science 50% Engineering 25% T.T. 7% Medicine 10%	b	b
	12. Sri Venkateswara Deptt. of History	1. Slide Projector —1 2. Still Camera —1 3. Tape-recorder —1	All students of the Department	b	c	a	c

1	2	3	4	5	6	7	8
13.	Shivaji						
	Deptt. of Physics	1. Film Projector 16mm —1 2. Epidiascope —1	b	c	—	b	b
	Deptt. of Chemistry	1. Film Projector —1 2. Epidiascope —1	a	a	All students	a b	c
	Deptt. of Botany	1. Film Projector 35 mm—1 2. Epidiascope —1	b	b	All students	a	b
	Deptt. of Zoology	1. Still Camera —1 2. Slide Projector —1	c	c	—	a	c
	Deptt. of English	1. Tape-recorder —1	b	a	Arts	a	c
14.	Utkal	1. Film Projector 16 mm—1	c	a	80% Arts & Science	a	c
15.	Udaipur						
	Deptt. of Geography	1. Film Projector 35 mm—1 2. Epidiascope —1 3. Cine Camera —1	— — —	— — —	— — —	— — —	— — —
	Deptt. of Physics	1. Epidiascope 2. Still Camera	c a	c	10% few	a	b
16.	Vikram	1. Micro-film Reader —1	b	c	All research scholars	b	c
	School of Studies in Physics	1. Epidiascope —1 2. Tape-recorder —1	a a	c c	— —	b b	c c
	School of Studies in Geology	1. Epidiascope —1 2. Still Camera —1	b	a	—	a	c
17.	Visva-Bharati						
	Deptt. of Physics	1. Film Projector 16mm —3	b	b	Mostly Science	a	—
	Deptt. of Education	1. Film Projector 2. Still Camera	b	c	Small percent- tage	b	c
	Deptt. of Fine Arts & Crafts	1. Slide Projector —1	c	c	—	b	c
	Deptt. of Agriculture	1. Slide & Filmstrip projector	—	—	All students	—	—

1	2	3	4	5	6	7	8	
18.	Varanaseya Sanskrit Vishwavidyalaya	1. Epidiascope 2. Tape-recorder	—1 —1	a	—	—	b	—
19.	Kashi Vidyapith	1. Film Projector	—1	b	b	100 students	c	b
20.	Tata Institute of Social Sciences	1. Film Projector 16mm 2. Tape-recorder	—1 —1	b	c	—	b	b
21.	Birla Institute of Technology & Science Pilani.	1. Film Projector 35mm 2. Film Projector 16 mm 3. Epidiascope 4. Still Camera 5. Cine Camera 6. Tape-recorder	—3 —3 —5 —2 —1 —4	d c, e	—	100%	—	—
<i>(B) Arts Science and Commerce Colleges</i>								
1.	C.L. Jain College, Firozabad.	1. Epidiascope	—1	e	b	Science (all students)	b	b
2.	St. John's College, Agra.	1. Film Projector 16mm 2. Film Projector 16mm 3. Epidiascope	—1 —1 —1	c	c	Arts 30% Science 75%	b	a to c
3.	Agra College, Agra.	1. Film Projector 16mm 2. Epidiascope 3. Tape-recorder	—1 —1 —1	a e b	c	All students	b	c
4.	Deccan College, Poona	1. Film Projector 16mm 2. Filmstrip/slide projector 3. Still Camera 4. Tape-recorder	—2 —1 —1 —7	—	a	—	All	b

1	2	3	4	5	6	7	8
5.	Hamidia Arts & Commerce College, Bhopal.	1. Film Projector 16mm —1	a	c	Arts 25% Commerce 25%	—	c
6.	Government College, Neemuch.	1. Epidiascope —1	b	c	About 50	a	b
7.	Barahseni College, Aligarh.	1. Film Projector 16mm —1	b	c	120 students	a, b	c
8.	St. Joseph's College for Women, Alleppey (Kerala).	1. Film Projector —1 2. Epidiascope —1	a	c	Arts 80 Science 80	a	b
9.	Vimla College, Trichur (Kerala).	1. Film Projector 16mm —1 2. Still Camera —1 3. Tape-recorder —1	c	c	Arts & Science 75%	b	c
10.	Govt. College, Sehore (M.P.)	1. Film Projector 16mm —1 2. Still Camera —1 3. Tape-recorder —1	a	c	—	d	c
11.	Govt. College, Guna.	1. Film Projector —1 2. Epidiascope —1	—	b	100 students 100 students	a	c
12.	Govt. Science College, Gwalior.	1. Film Projector 16&8mm 3 2. Epidiascope —1 3. Tape-recorder —1	a	a	Only Science	b	c
13.	M.L.B. Arts & Science College, Gwalior.	1. Film Projector —1 2. Tape-recorder —1	b	—	—	—	—

1	2	3	4	5	6	7	8
14.	M.T.S.Mahavidyalaya,1. Film Projector Bhind (M.P.)	—1	a	b	—	a	b
15.	D.S.B. Govt. College, 1. Video Tape-recorder Nainital. 2. Film Projector 16 mm—1 3. Film Projector —3 4. Epidiascope —2 5. Still Camera —5	—1	b	c	—	a b c	c
<i>(C) Professional Institutions and Colleges</i>							
59	1. Indian Institute of Technology, Madras.	1. Epidiascope —1 2. Still Camera —1 3. Cine Camera —1 4. Tape-recorder —2	a	—	—	—	—
	2. Indian Institute of Technology, Delhi.	1. Film Projector —2 2. Epidiascope —1	e	c	—	c, d	c
	3. Maulana Azad College of Technology, Bhopal.	1. Film Projector 16 mm—1 2. Epidiascope —1 3. Still Camera —1 4. Tape-recorder —1	a b c a	c	80% 35% 2% 10%	a	b
	4. Govt. Ayurvedic College and Hospital, Gwalior.	1. Epidiascope —1 2. Still Camera —1	d	c	100% Science	c	b
	5. M.B. Patel College of Education, Vallabhvidyanagar.	1. Film Projector 16mm—1 2. Epidiascope —1 3. Still Camera —1 4. Tape-recorder —1	b	c	—	b	c

1	2	3	4	5	6	7	8
6.	State Institute of Education, Sehore.	1. Epidiascope 2. Tape-recorder	—1 —2			75%	
7.	A.G. Teachers College, Ahmedabad.	1. Film Projector 16mm 2. Filmstrip Projector 3. Tape-recorder	—1 —1 —1	a	c	—	b c
8.	Secondary Teachers' Training College, Ahmedabad.	1. Film Projectors 2. Epidiascope 3. Tape-recorder	—3 —1 —1	b	c	40%	a c
9.	Central Institute of Education, Delhi.	1. Film Projector 16mm 2. Epidiascope 3. Still Camera 4. Cine-Camera 5. Tape-recorder	—2 —1 —2 —1 —2	e	c	25%	— c
09 10.	R.B.S. College, Agra	1. Film Projector 16 mm 2. Epidiascope 3. Tape-recorder	—1 —1 —1	e	b	Extensively used	a to d c
11.	A.C. Training College, Jalpaiguri	1. Film Projector 2. Still Camera 3. Cine Camera. 4. Tape-recorder	—2 —1 —1 —1	b	c	20%	c b
12.	Thiagarajar College of Preceptors, Madurai.	1. Film Projector 16mm 2. Epidiascope 3. Camera 4. Tape-recorder	—1 —1 —1 —1	b	c	100%	b c
13.	Annammal Training College for Women, Tuticorin.	1. Film Projector 35 mm 2. Camera 3. Epidiascope	—1 —2 —1	d	a	100%	b b
14.	St. Xavier's T.T. College, Palyamkatti.	1. Film Projector 16mm 2. Tape-recorder	—1 —1	b	c	80%	b c

1	2	3	4	5	6	7	8
15.	Govt. College of Education, Belgaum.	1. Film Projector 35 mm—1 2. Film Projector 16 mm—1 3. Epidiascope —1 4. Still Camera —2	c	c	—	d	b
16.	Tatya Tope State College of Physical Education, Shivpuri, (M.P.).	1. Film Projector 16 mm—1 2. Still Camera —1 3. Tape-recorder —1	—	b	c	b	b
17.	Laxmibai College of Physical Education, Gwalior.	1. Film Projector 16 mm—2 2. Epidiascope —1 3. Still Camera —1 4. Cine Camera —1 5. Tape-recorder —2	d	b	All students	b	b

ANNEXURE IX

THE EVALUATION OF TELEVISION PROGRAMMES FOR SCHOOL CHILDREN IN DELHI*

Those who only a few years back began the great work, starting almost from scratch, with limited amounts of personnel and equipment and almost no experience at all, can indeed "point with pride" at their achievement: to have created in that short time an organization capable of providing upward of 120,000 students in the middle and higher secondary schools of Delhi with several television lessons per day, each one of which is certainly given more care, more preparation and more logistics support (through experiments, models, films, etc.) than any ordinary class-room lesson could ever hope for.

The Delhi School Television Project was not instituted for the general purpose of finding out whether television could be of any help in teaching. That this is the case is already well known from many years of experience in many different countries under many different conditions both of teaching and of industrial development. The project was established in order to find out what might possibly be accomplished in alleviating the specific difficulties of the higher secondary schools in Delhi, especially in the teaching of physics and chemistry. It was of course assumed that if and when useful experience would be gained here, then television could and would be extended into other teaching subjects and into other levels of teaching.

From its very beginnings educators everywhere had their eyes on television as a potential aid to education. Hardly ever did an innovation in the field of education spread as rapidly throughout the world. Beginning in some of the more industrialized countries—where the United States, England, France, Italy and Japan were its foremost users—it soon became a regular instrument of teaching in cities and regions of countries as widely distant from each other as Chile, Argentina, Nigeria, Rhodesia, Kenya, Thailand and Indonesia, to name only some of the more outstanding examples.

Some of the possibilities and advantages of television in the class-room are obvious: films, plays, live shows, visits to industrial plants, to places with different people and different customs, to factories and fields and mines, to foreign countries all over the globe—all of this can be brought to the students on television. No school can ever hope to bring that much to its own students, even if they do occasionally rent some films or slides. Geography, History and a whole list of other teaching fields can present supporting materials on television, including documentaries, trips to museums and exhibitions and even meetings with famous persons. All of these would obviou-

* Extracts from the report of Mr. Paul Neurahi.

sly be advantage in almost any setting the world over. In schools in Delhi they would certainly be of great help in the task of widening the horizons of students whose schools are in most cases short of equipment to afford such presentations.

More specifically related to the situation in the higher secondary schools with their shortages of laboratory space and equipment but also their shortage of well trained teachers are other possibilities of class-room television.

The drawbacks of teaching by television are equally obvious: In our discussions with teachers we used to summarize them by saying "yes, we know: It has only two dimensions, one color and no smell; and you can't talk back to it". The last of course is, in the class room setting, the worst: students can not ask question or further amplifications from the television teacher and he in turn can not observe their faces and be guided by them to either emphasize or repeat things just said or to ask questions to make sure that they have understood what he wanted to say. On a more sophisticated level of discussion it may be added that teaching by television does in most cases not offer to the student sufficient opportunity for identification, positive or negative, with the teacher which is at least for younger students one of the most essential aspects of all teaching.

During the preliminary evaluation, summer 1962, when television was still in its first growing pains, both technically and organizationally, there was widespread antagonism among the teachers both against television as a teaching medium and against the administration which, in the opinions of many teachers had foisted television upon them without proper consultation and preparation. Many of them claimed that in the preparatory workshops of 1961 they did not have enough of a possibility to put forth their own ideas, that they were made too much mum to act as rubber stamps who could only approve and work out in detail plans that had been drawn up by higher authorities. From our own experience we know that this was often unfair criticism. Still it appears relevant for the future expansion to other cities to point once more at the necessity of spending as much effort as possible not only on the technical and organizational planning but also on the psychological preparation of the teachers who may have to be won over more thoroughly than is visible from any formal approval, before operations can come to a good start.

By 1964 the situation had much improved. Criticism by now was less often of television as a medium *per se*, but usually of concrete flaws concerning its organization or concerning concrete lessons or topics or the mode of delivery of individual television teachers. Thus criticism and the discussion of it had become much more constructive. By and large those teachers who had experience with television found it a good and useful thing to have, even though they might criticize many of its aspects, while most of those who did not have it, wanted it.

Over-all comparisons between all television and all non-television

schools can not be made, because on the average the television schools are better equipped than the non-television schools. At the same time the total number of "well-equipped" and of "poorly-equipped" schools is not large enough to allow for reliable comparisons even within these groups. Thus most of the general statements that follow below are being made concerning the "medium-equipped" schools, which comprise the large majority of the schools in the sample and also among the schools of Delhi. Supplementary statements about "well-equipped" and "poor equipped" schools will be added in various places.

Before any further details on over-all statement can be made: By and large the television schools did somewhat better in the tests than did the non-television schools. That holds by and large within each of the three categories of schools: "well", "medium" and "poorly" equipped. However, it holds only on an over-all basis: individually there are any number of tests in which in some instances the television and in some instances the non-television students did better—it is only that the television students did better more often. The superiority of the tests results from the television schools is not sufficient to consider it as proof positive that results can in general always be expected to be better in television than in non-television schools. But the results are sufficiently consistent that one can expect that with the improvement of television lessons, through improved training of television teachers and of production the superiority of test results from television schools over those from non-television schools will systematically increase.

The impact of television on teachers, regardless whether they approve of it or not, is first of all that they see that the higher authorities care about teaching. Furthermore: the fact that the teachers themselves are getting more and more involved in annual discussions about straightening out the syllabus arouses in many of them a new sense of responsibility for the work that they are doing. The seriousness with which teachers, who in their daily routine have hardly ever a chance to speak out on educational matters of relevance, participate in these annual discussions is a sight to behold.

The results of comparative tests show that even in the area of formal examination knowledge—as distinct from a general widening of the horizons—some inroads are being made: while students from television schools did not do better in all examinations—on the contrary: in some they did worse—than those from non-television schools, they did per saldo better more often.

The impact of television on students does not exhaust itself in these matters. There is first of all the fact that within the ordinary school day the television lessons provide a break in the routine, thus making school itself more interesting. It is not necessarily each individual lesson, its content and presentation, some of which on occasion the students may find boring—it is their total reaction—although most of the time they listen and watch very attentively.

The following questions seem to need clarification:

- (1) What is the proper function of television in the class room?
 - (a) What should the television teacher teach?
 - (b) Who shall teach on television?
 - (c) How can television lessons best be fitted into the syllabus?

- (2) What are the best means of integrating the production of television lessons in the studio with their consumption in the class room?
 - (a) What is the best allocation of responsibilities between All-India Radio and the Directorate of Education?
 - (b) What are the best ways of bringing television as an instrument of teaching closer to the teachers themselves?

Recommendations

(1) That discussions be had, either at the directorate or by some appropriate body of teachers to clarify how much priority shall be given to the one, how much to the other kind of shortages outline above and consequently how much of the resources available through television shall be allocated to relieving the one kind and how much to relieving the other.

(2) That these discussions include the question raised above: what kind of teaching shall be expected from the television teacher, what kind of contribution shall be expected from him towards the raising of standards of teaching and therefore what should be done about giving him the necessary training for this special task.

(3) That the teachers in the schools be acquainted with the main arguments brought forth in these discussions and with the decisions made, so that they may know what to expect and what not to expect from the television; and that they may know what of their criticism should be directed at the shortcomings of television and what at policy decisions with which some of them may happen to disagree.

(4) That the question who shall teach on television be rediscussed in the light of past experience and future demands, whereby the need for new teaching methods, rather than for better preparation and delivery of average class room lessons shall be central point of discussion.

(5) That as long as the present system is continued, of having only regular class-room teachers teach on television, systematic staff training for television teachers be instituted, with an aim not only towards improving their performance in front of the camera from a production point of view, but also specifically directed towards the improvement of teaching methods.

(6) That occasional guest lectures be given by scientists, engineers, college or university professors, etc. (In order to make sure that they do not

talk above the heads of the students and that their talks fit in with the requirements of the syllabus, the television teachers would have to consult with them in advance about both subject matter and level of the talk). Two steps in this direction have already been taken before: at one point several television lectures were prepared by members of the Department of Science Education; they went over extremely well and were remembered by many teachers quite favourably long afterwards. In addition some model lessons were presented to group meetings of teachers by outsiders, including American and English guests. These did not go over so well, probably because they were not connected with the regular school television programme.

(7) That television lessons be prepared for class-room teachers—to be presented to them at suitable monthly or special meetings, specifically on the subject of teaching and teaching methods. Speakers for these special lessons could be experts on teaching in general or specifically on the teaching of the subjects under discussion (currently physics and chemistry). They could very well include some class room teachers who are known for their excellence in presenting material to their classes; these teachers could presumably share with their fellow teachers some of their experiences, particularly by discussing certain teaching difficulties that they have encountered over the years and their ways of coping with them. (There would of course be no need to limit these lectures to the usual 20 minute length. They could last any suitable length of time followed by discussion among the teachers present.)

(8) That this whole question of the distribution of time and topics between class-room and television teacher be rediscussed in the light of past experience either on the directorate level or by an appropriate body of teachers; that these discussions be focussed on the pedagogical implications, rather than on the more technical question of how to enable the class-room teacher to keep in line with the television teacher. Which in turn implies that this question is linked with the earlier one: what is the proper function of television in the class room?

(9) That once some over-all policy has been developed concerning this question, the syllabus be re-examined and topics be redistributed between class room and television teacher in accordance with this policy.

(10) That discussions be had whether under these circumstances the present arrangement, including the present time allocation, really can serve its intended purpose. If that should be the case, then means will have to be found to enable the teachers to conduct both preparatory talk and follow-up in the time allotted and to persuade them to conduct both in the sense in which they are intended.

(11) That discussions be had about the most useful form of the guidance notes. It would appear that this could best be deliberated and decided by some suitable body of teachers.

(12) That the possibility of adding a "listener's corner" to the television lesson be explored, perhaps in the form of a trial period of a few weeks.

(13) In order to improve contact between the two departments it would appear useful if the directors of the two departments could meet together fairly regularly for the discussion of matters of policy and educational problems, in addition to the straightening out of technical problems. That part of these conferences be shared with appropriate officers from both departments who are involved in aspects affecting educational television directly or indirectly.

(14) That the two departments appoint an appropriate group or committee with representatives from both, plus any additional outside experts that they may deem advisable, to re-discuss completely the best allocation of responsibilities for educational television as a whole and for its various phases, together with the best technical arrangements for implementing such policies as may result from any decisions based upon the findings of that group.

(15) That, independent of this over-all discussion, either another or the same group take up the more technical questions involved in the best location of television teachers, liaison officers, etc. together with such measures as might be possible right now for the intensification of cooperation between the two departments. Particular attention should be paid to bringing the zonal school inspectors closer into the picture.

(16) That the annual workshops be re-instituted, perhaps somewhat along the same lines as those of 1961 and 1962, perhaps along other lines more suitable to today's needs.

(17) That the small group-discussions be retained nevertheless, because they serve a different function. In addition they can serve as a preparatory step towards the bigger meetings, with many issues already clarified in advance and many suggestions already worked out in detail by these local meetings.

(18) That an editorial board or an advisory board be appointed or elected in some suitable manner, consisting of teachers, that takes responsibility for the newsletter, thus making it an institution of the teachers themselves; this group to include both middle and higher secondary school teachers.

(19) That a full time editor—also a teacher—be appointed for the newsletter, together with such part time aids as he may need (and the appropriate help for typing etc.).

(20) That emphasis of the newsletter be shifted towards educational matters, teachers' own experience with either television or with the teaching of those subject matters that come over television. That a more gainly form be found for the newsletter so that teachers may look upon it as reading matter to be perused at leisure rather than as an official circular (cyclostyled) that one reads if one must and does skip if one can.

(21) That television teachers and producers visit schools regularly more often and on a scheduled basis, both to keep contact with the schools and to observe their own performance in the class room.

(22) That as many teachers as feasible be invited in the course of the year to visit the television centre in order to get acquainted with possibilities and limitations of presentation on television.

(23) That to such extent as this may be possible, classes too be invited occasionally together with their teachers to visit the centre.

(24) That some of the special television programmes for teachers deal specifically with problems in connection with television teaching and the best utilization of television in the class room; that these particular programme be announced ahead of time and comments by teachers be invited in the day's subject of discussion and that some of these comments be discussed at these programmes. The rest of the comments could then be discussed in the monthly newsletter.

ANNEXURE X

A NOTE ON PROGRAMMED LEARNING

Learning has been defined “is the process by which the activity originates or is changed through reacting to an encountered situation, provided that the characteristics of the change of activity cannot be explained on the basis of native response tendencies, maturation or the temporary status of the organism, e.g., fatigue, drudgery etc”. Thorndike stipulated and demonstrated that learning takes place by establishing “bonds” or connection between stimulus and response and that the reward tends to establish connection between stimulus and response whereas punishment tends to break the connection i.e., rewards strengthens learning and punishment discourages it. Reward and punishment being associated with pleasure and pain, it was assumed that pleasurable activities encourage learning and painful activities discourage it. This hedonistic view of learning did not account for learning in situation where learning took place without pain and pleasure. Thorndike himself and later other psychologists, notably Skinner, of the Harvard University, showed that a response could be repeated if it was reinforced. Not much was known about what happens exactly by reinforcement. It was, however, clear that reward and pleasure are not identical, that learning may take place without either and that learning does take place with reinforcement which can be stimulated in different ways and planned to ensure occurrence of the desired response. Professor Skinner demonstrated that differential effects can be achieved by manipulating the arrangement of reinforcement. The kind and the schedule of reinforcement are not arbitrary but are to be worked out in detail on the basis of psychological principles.

Although Sidney Pressey had actually designed several self-testing devices in the 1920's, it was Professor Skinner, who in his famous article “The Science of Learning and the Art of Teaching” published in 1945 pleaded for application of the knowledge derived from behavioural psychology to class-room procedures and suggested automated teaching devices as a means of doing so. Wrote Professor Skinner, “inspite of discouraging evidence to the contrary, it is still supposed that if you tell the student something, he then knows it.” He emphasised that to acquire or learn behaviour a student must engage in behaviour. It is not enough to attract student attention but, more important, the attention of students should actually be directed to what the teacher wants them to learn. Reinforcement, i.e., the knowledge of the correctness of the learnt behaviour, must come immediately after the student has shown the desired behaviour. It must be immediate and frequent; the knowledge that the student is right is sufficient reinforcement to encourage him to learn more. Professor Skinner also pointed out that “holding students together for instructional purposes in a class is probably the greatest source of inefficiency in education”. In his view, if a certain beha-

viour is expected of a student after the learning experience, he must be encouraged to perform in that manner during the learning session itself. A student learns better and is motivated to learn more if the step taken by him is confirmed to be correct, that is to say, if the learnt behaviour has been reinforced. It is easier to learn one step at a time. If the behaviour to be learnt is analysed into parts which are properly spaced and arranged in logical sequence, it would be easier to learn the whole desired behaviour by learning one step at a time. There should be few errors in the learning process so that the student practised correct responses and these responses are reinforced immediately by knowledge of results so that he makes closer approximation to the responses which are the desired outcome.

The essence of programme lies in writing it in such a way that every student will eventually be able to complete it without a mistake. The key to the programme is to ensure that the student tries the correct answer. The material presented to the student may be in the form of a book or simple machine or a complicated computer. In every case, the student gives his response and then checks the correctness of the response. This technique has more relevance to learning at school and its application will be limited to only a few areas (e.g. language learning) at the university stage. Some psychologists question whether learning is really inhibited by making a mistake. They believe that it would be desirable to anticipate an error. It is possible, thus, to construct a programme which is quite different from that of Prof. Skinner, namely, the "Branching Programme" which presents different materials depending on a student's answer to a question. For example, if a student chooses a wrong answer from a multiple choice test he may be given an explanation as to why his answer was wrong and how he arrived at it. If a student demonstrates that he does not understand some aspect of the material, the programme may "branch" to instruct him in his weak points or to instruct him in previous learning which he has perhaps missed or has not learnt well. Another kind of branching programme may instruct him to go ahead and try more difficult problems if his mastery over the material presented to him is satisfactory.

Programmed learning in some selected countries

UK

Programmed learning is becoming increasingly popular in the UK. It is estimated that there are currently 49 organizations concerned with the promotion of programmed learning in the UK. A recent survey (1966) revealed that programmed learning has been extensively applied in the UK, especially in the armed forces and industry and to some extent in education and has led to extensive application and research. The number of commercially available programmes is reported to be over 1500. Two national centres; one for education and the other for industry, have been set-up to promote programmed learning. Short and one-term courses in programmed writing are available in some colleges and departments of education in the universities and one-year advance diploma courses are given in Birmingham and Sussex Universities. A meeting of the National Council on Programmed Learning has been held every year during the past five years.

The technique of programmed learning has proved especially popular in military and industrial training. In fact, much of the research in programmed learning in the UK has been carried out by the armed forces. In industry, the introduction of programmed learning has led to saving of time as well as to high level of achievement. It was estimated in 1966 that five to eight per cent of the British firms were using programmed instructions and that this percentage was rapidly increasing.

The use of programmed learning in schools, colleges and universities in the UK is yet largely experimental and is not coordinated in the same way as programmes in industry and the armed forces. Nevertheless, it was reported in 1964-65 that 4.7% of educational institutions in England were using programmed materials. Programmed learning in schools has been supported by big and small educational machines which are used for classroom instructions, basic teaching in mathematics and for revision and as a means of teaching a child who has missed work through absence.

USA

As in the UK, programmed learning has made considerable progress in the educational programme of the armed forces of the USA. American industry is also making extensive use of programmed learning for in-service and pre-service training.

Recent surveys reveal that a significant proportion of the American schools and colleges use some kind of programmed learning. Mathematics and science programmes are most popular and so are programmes dealing with language teaching and grammar. Majority of programmes are used as part of class-room instructions, remedial work and home work.

Several foundations are supporting programmed learning in institutions of higher learning in the USA. The Carnegie Foundation has recently given a grant to Harvard University for developing programmed learning under an all-university committee for programmed instruction, involving both the development and testing of programmes and research on all aspects of programmed learning. Under this programme the public school systems of nearby towns have joined with the Harvard Graduate School of Education to solve some of the important problems of American education. Some institutions have been assisted by the Carnegie Foundation for programming of lessons in foreign languages. Medical colleges have also received support for promoting programmed learning on material in anatomy, physiology, biochemistry, pharmacology, pathology and microbiology. Programmed learning in educational institutions has been liberally supported by private foundations, public school system and noted publishing firms in the USA because it is recognised as a modern "educational wonder drug" which will make the bad teacher "less bad" and the good teacher a better teacher. It has also been found possible for computer-based programmes to be used on a time-sharing basis by large clientele of schools, enabling 1000 and more students to be taught simultaneously and individually. Computers have also been used for enriching the curriculum, for guidance and counselling, for administering tests, for organising pupil personnel services,

for identifying weaknesses of students and the patterns of their behaviour in a given hypothetical situation. Simulation of organization of a whole school has also been attempted for finding new solutions to implement instructional media. G.F. Cogswell constructed a detailed, dynamic model of a school to simulate a school organization in terms of school characteristics (such as resources, procedures, organisational set-up etc.) and student characteristics that influence the school instructional plan. The model devised the most suitable procedures of teaching, specified time allocation for home work, indicated the stage at which assessment was to be made and help given by the teacher so that the students of different abilities may complete the course in the minimum possible time.

The use of programmed learning in American industry has gained momentum because it has been recognized as perhaps, the only quick and efficient method of imparting vocational training to in-service and pre-service personnel at a time when the progress of technological revolution has created a large number and variety complex jobs requiring skilled labour.

The application of the technique of programmed learning in associations with computers is wide-spread at several levels of education, in industry and the armed forces in the USA. There is some evidence to show that computer-based instruction is more effective than programmed texts and both together could be more effective than either. In computer-based instruction, the "branching concept" of programmed learning is usually used. If the student's response is correct, he branches to the next item, otherwise the computer guides him and puts to him another question. The student, therefore, progresses quickly or slowly depending on his power and speed.

A computer controlled class-room teacher (called "class") was devised by the System Development Corporation in the USA, with programmes stored on the magnetic tape. As the student goes through the tape, his responses are processed and the answer is flashed back. The system handles 20 students at a time and besides teaching the class, it keeps record of how the students fared at each step of the lesson.

Programmed Learning and the UNESCO

The developing countries are finding it difficult to find an effective, efficient and economical way of overcoming the shortage of trained teachers and competent personnel. This has been recognised by the UNESCO which has accepted programmed learning as a promising solution to some of the instructional problems of these countries. The UNESCO has established three experimental projects in programmed learning, one each in Africa, Asia and Latin America. The first workshop was conducted in Jordan in June 1963. The UNESCO has also sponsored development of programmed learning in Ghana, Nigeria and the UAR. The Governments of South Africa, Zambia, China (Taiwan), Israel, Korea, Pakistan, Philippines, Syria and Thailand have taken steps to introduce programmed learning on an experimental basis.

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