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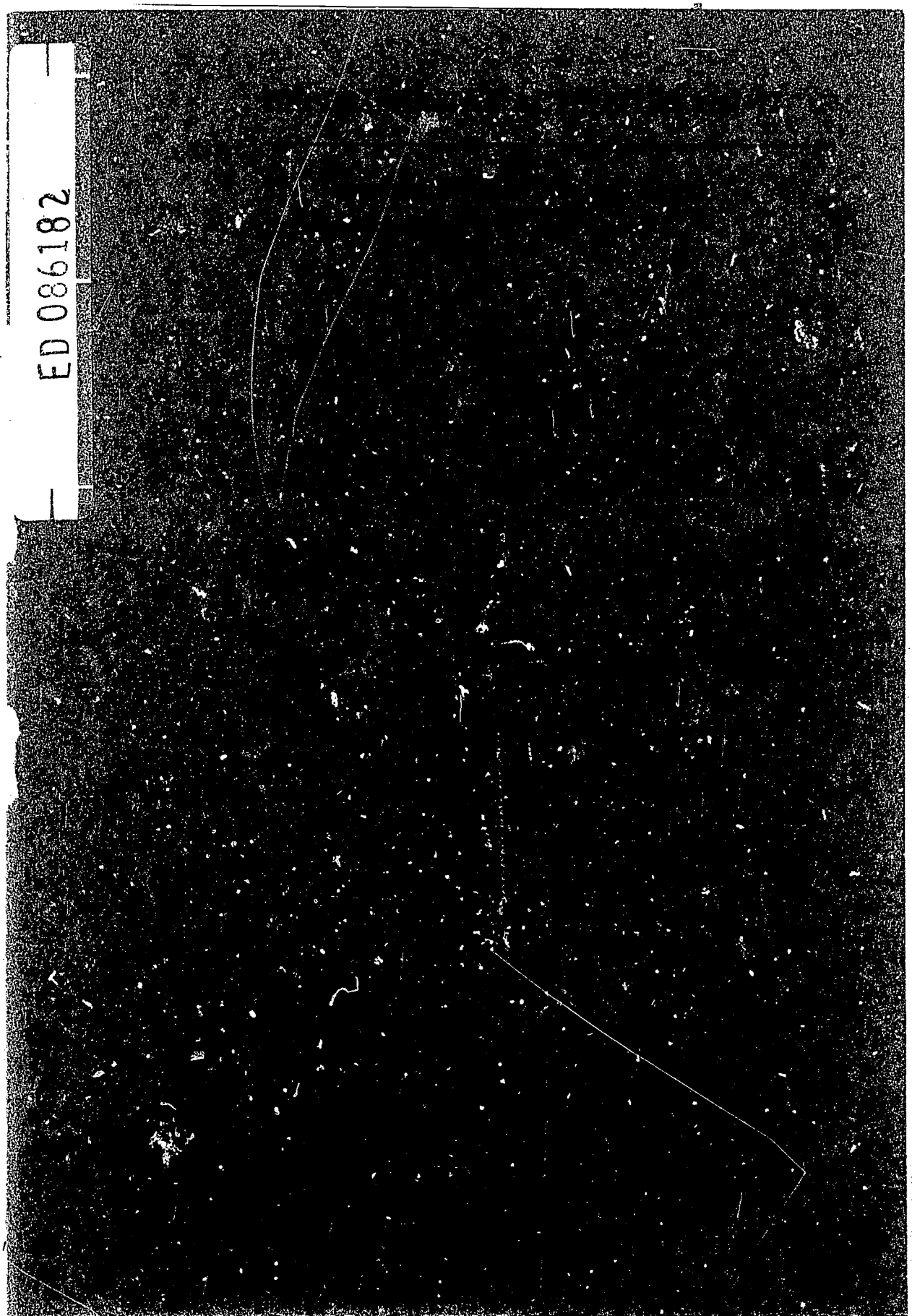
ABSTRACT

This report by the Committee for Television and Radio in Education (the TRU Committee) summarizes the activities of the Committee in the field of instructional media from 1967-1972. The Committee, which is funded by the Swedish government, plans and conducts experimental projects concentrating on the development, production and evaluation of teaching material in which television and radio or video and audio tape are integrated parts. The TRU Committee has its own production unit and has produced 58 package courses, including 755 television programs or films, and 709 radio programs, audiotapes, audio-cassettes or radiovision programs at all instructional levels. TRU also evaluates and sponsors instructional equipment and conducts experiments such as one designed to compare the educational effect of color television with monochrome television in the teaching of anatomy. The TRU Committee feels that the results have been encouraging in all areas and recommends that the TRU Committee should be reorganized into a central resource for educational development work and the design of teaching aids. (JG)



EXPERIMENTAL ACTIVITIES 1967–72

The Committee for Television and Radio in Education (the TRU Committee)

Summary of the Final Report

CONTENTS

The directives issued to the Committee

The Committee for Television and Radio in Education (the TRU Committee) was appointed in February 1967 by the Swedish Minister of Education and Cultural Affairs.

Technical developments and the encouraging results of experiments, both in Sweden and abroad, in the use of new media in education had raised the hope that these audio-visual aids would make education more efficient, both as regards the achievements of the students and the rationalization of the educational systems.

According to the directives, the Committee was to study the effects on education of these new media, when connected with broadcasting, for example, as a way of expanding adult education, or when integrated with formal education, for instance, at schools and universities where the programmes are distributed on video- and audio-tapes. It should be pointed out that the Swedish Broadcasting Corporation (SR) has a department for the production of educational programmes for broadcasting. The production of programmes for schools, which is financed with state funds, is intended both for the nine-year compulsory school and for the non-compulsory secondary school (*gymnasium*).

The Committee was not meant to initiate basic research work but to plan and conduct experimental projects concentrating on the development, production and evaluation of teaching material in which television and radio or video- and audio-tape are integrated parts. As a government committee, the TRU Committee is unique, in that it has a production unit connected with it, and one of the Committee's tasks was to develop and test suitable methods of approach, as regards planning and production by the unit.

The members of the Committee are representatives of educational authorities and the voluntary adult-education associations. The chairman is the former Minister of Education, Dr. Ragnar Edenman, now Governor of Uppsala County.

The TRU Committee's first report

The first report of the TRU Committee was presented in May 1971, (Government Official Report, SOU 1971:36). Apart from a brief survey of the experimental projects and the results obtained at the time, the report was mainly devoted to organizational questions.

In the section containing recommendations, there was first a discussion of what needs for television/video-tape and radio/audio-tape programmes existed in different sectors of the educational system and what chances there were of satisfying these needs. After a presentation and discussion of various conceivable alternatives for the organization of state-assisted production of television/video-tape and radio/audio-tape programmes for educational purposes, the Committee expatiated on the reasons for its point of view. The main points of the recommendations were as follows:

(1) The TRU Committee's production unit should be incorporated with the schools-broadcasting part of the Swedish Broadcasting Corporation's educational-programmes unit to form a state-run production unit outside the Swedish Broadcasting Corporation.

(2) The unit should constitute a foundation under the direct control of the Ministry of Education and Cultural Affairs.

(3) The production for broadcast instruction should be financed by state grants to the unit and should be decided by the government authorities on the recommendations of the unit, which would co-ordinate the wishes of the authorities.

(4) Production intended for distribution on tapes would be commissioned by educational authorities, publishers, etc.

Directives for a new Committee

On December 30th, 1971, the Committee for Further Radio and Television Activities in the Educational System was set up. In the directives issued to the Committee, it was noted, among other things, that the advisory bodies that had commented on the TRU Committee's report »had on the whole concurred with the idea of a continuing use of radio and television for educational purposes», but that »in respect of the form of organization recommended by the TRU Committee there is wide disagreement in the views of the advisory bodies».

Referring to the fact that the work of several other Commissions might affect the choice of a definitive organization for the production, the Minister of Education and Cultural Affairs stated that there would be no immediate changes in the organization, as proposed by the TRU Committee. Since the TRU productions for pre-school and adult education had been most favourably received, the future activities, which did not necessarily have to be in the nature of experiments, should be concentrated on adult education at all levels and pre-school education. The new Committee was set up to plan and conduct this production. The chairman of the new Committee is Mr Leif Andersson. When the time arrives to decide upon the definitive organization of the production, the new Committee is expected to make a proposal.

The final report from the TRU Committee

In the directives issued to the new Committee, it was stated that the TRU Committee would conclude its work with a report on its experimental activities. In the report now presented by the TRU Committee, there are accordingly detailed accounts of the activities in the various sectors, as well as a discussion of the results. The report is set out as follows. Part I contains a description of the TRU organization and its resources. Part II contains accounts of the activities in the various sectors. These accounts are very concentrated, in view of the fact that the appendices to the report contain accounts *in extenso* by the groups of experts that were in charge of the activities in the various sectors, as well as accounts by a number of joint consultative groups that studied the paedagogic, organizational and financial effects of the use of TRU material in specific educational circumstances.

Part III, finally, contains a summary discussion by the Committee of the experimental activities and their results. The final chapter (Chapter 10), summarising the conclusions and recommendations, is reproduced in its entirety at the end of this summary.

The TRU production unit

When it started in 1967, the TRU production unit took over a large part of the equipment that a private company had assembled for commercial television production. The unit now has about 140 employees, but other persons are engaged for production work as experts and free-lance collaborators. The staff consists mostly of television and radio producers and technicians, while experts in special subjects are employed for the various projects.

The TRU production facilities at present comprise the following:

(*a*) A double television studio (studios A and B, covering 360 square metres and 160 square metres, respectively).
(*b*) A small automated television studio, equipped with complete remote control (studio C, covering 60 square metres).
(*c*) Central equipment (three video-tape machines and three film scanners, which serve both the above-mentioned studio units).
(*d*) Sound-recording and film facilities.
(*e*) A graphic studio and scenery workshop.

A government grant totalling about 60 million Swedish crowns was spent on TRU experimental activities during the financial years 1967/68–1971/72. However, the production unit's total assets were somewhat greater, since its activities produced certain revenues.

The multi-media teaching materials devised and produced by the TRU unit are included in a "product pool". A comprehensive catalogue, published in October 1972, contains information about the teaching material produced by the unit, in certain cases in co-operation with other organizations, between 1968 and the autumn of 1972 inclusive. The catalogue lists 58 package courses, including 755 television programmes or films and 709 radio programmes, audio-tapes, audio-cassettes or radio-vision programmes (coloured slides combined with audio tapes). Printed material has been published for 48 of the package courses.

The TRU experimental activities

Here follow brief descriptions of the activities in the six different sectors in which TRU has been conducting experiments.

Nursery schools

In July 1969 the TRU Committee was entrusted with the task of conducting experiments with programmes for pre-school children, in consultation with the 1968 Committee on Child Centres. The work was concentrated on television programmes for 5–6-year-olds, with special reference to what are called "single children", i.e. children who watch the programmes in their homes without an adult person being present. The television programmes so far produced have, on the one hand, been about subjects of a Civics nature and, on the other, been aimed at providing a stimulus for games, imagination and activities. By December 1972 a total of about 45 pre-school programmes had been produced. The length of the programmes varies between 15 and 25 minutes. Some of the programmes were pre-tested on children by observing their reactions while watching. Quite a number of revisions were made on the basis of the results obtained.

In the autumn of 1971 the first pre-school programmes from TRU were broadcast on the national network. Audience research has shown that an average of about 55 000 children aged between 3 and 6 years watched the programmes in the spring of 1972. This figure is the equivalent of 12 per cent of the whole age-group.

The experimental activities have so far been on such a limited scale and have lasted for so short a time that it is difficult at this stage to give any comprehensive opinion of them. According to what TRU has found, the results observed have nevertheless been definitely favourable. A large proportion of the children aimed at has watched the programmes. The programmes have interested the children to a great extent and have stimulated them to indulge in a number of activities. They have also been popular and proved to be suitable for use in many nursery schools.

The general school system

TRUAS is the section for the non-compulsory school level, i.e. the secondary schools, and also the vocational training of adults (labour-market training). At the secondary-school level, the work is directed towards the production of complete teaching systems. The courses are tested at some schools and a study of the comprehensive use of several courses at the same school is planned for 1973–74. TRUAS is developing multi-media systems which will cover, wholly or partly, the following subjects for secondary schools: Educational and Vocational Guidance, 2-year courses in Business Economics, Vehicle Technology and English, and 3-year courses in Swedish, Civics, Physics, Technology and Russian.

Instructional systems in Mathematics, Physics and Chemistry are being worked out for the labour-market training. In these courses, the students work individually and at their own speed. Their pre-knowledge, age and ability to study theoretical subjects vary much more than in the secondary schools.

Descriptions of the following three courses will serve as examples of how the systems have been planned and how the teaching systems are designed.

The *Technology Course* takes two years. The following subject sections have been integrated into this block subject: Mechanics, Engineering Drawing, Theory of Stress

and Strain, Theory of Materials, Manufacture and Standard Items. At present, comprehensive components for an one-year course, equivalent to 200 out of 330 lessons, have been produced.

The learning units, which comprise about 10 lessons, are the keystones of the system. As regards the methods employed, the unit is divided into three phases: the preparatory section, the learning-cum-work section and the follow-up section. The motivational build-up, subject concretization and study planning take place during the first phase. In the middle section, exercises alternate with studies. In the follow-up section, the knowledge gained is applied to examples based on reality. The unit ends with a diagnostic test, which the pupils themselves correct.

The printed material for the first year's syllabus comprises two set booklets (which contain work problems related to several units), 21 unit booklets and two teacher's guides with instructions on methods, work schedule, keys to exercises, and diagnostic tests. Ten television programmes on videotape are included. The radio-vision programmes are eight in number and a further four are planned for the first year's syllabus. The pictures are in colour and each package contains an average of 20 pictures.

The instruction in *Business Economics* comprises nine lessons a week in the first year's syllabus and eight lessons a week in the second year's syllabus. If, as a cautious estimate, we reckon that these are 25 effective working weeks in each academic year, the learning period comprises about 420 lessons. The TRUAS course covers the whole of this learning period.

The aims of the course are first broken down into suitable posts and are then distributed over 13 study packages. One study package normally covers 30–40 lessons. The backbone of each study package is an exercise book, in which situations and problems are presented for the pupils to solve. In order to cope with the exercises, it is often necessary for the pupils to learn to apply the methods of business economics and to obtain knowledge about facts, background, etc. They do this mainly by studying the methods booklets and the material booklets, respectively.

The methods booklets are designed as a modified form of "programmed instruction", that is to say, the pupils work at their own speed for one or more lessons with material that step by step leads up to the goal. In most of the study packages, there are one or more such methods booklets. They form the foundation for the learning of particularly important principles, concepts and methods, where either there is a need for over-learning or the learning has been judged to require considerable concentration on the part of the pupils. At the end of the methods booklets, there is, as a rule, a short diagnostic test, by which the pupil himself can check what he has learnt.

The pupils obtain the necessary facts, background information, etc. for an exercise either with the aid of authentic material, such as reference books, periodicals, specialised literature and contacts "out in the field", or in the material booklet belonging to the study package. The material booklet gives detailed information about important concepts, for instance, and is arranged alphabetically under headwords. There is a detailed teacher's booklet for each study package.

Five television programmes, ten radio-vision programmes and six audio-tapes are also included in the course. The most important function of the television programmes in the multi-media package is to show environments and to supply motivation.

In the labour-market training, *Mathematics* is one of the general subjects taught in a large number of courses varying in scope, irrespective of the type of vocational training which the individual is receiving.

The method chosen by TRU is based on a close interaction between sound and printed pictures in the study material. Practically all the information in the course, which is called "Mathematics in Sound and Pictures", is given via audio-tapes.

After having listened once or several

times to the audio information which forms part of a certain section of a study booklet, the student does the exercises belonging to that section. The exercises are generally so designed that an answer can be entered directly in the booklet. An appendix to each study booklet contains solutions of all the problems.

"Mathematics in Sound and Pictures" consists of a total of 17 study booklets, one for each of the main subsections of the subject. There is a cassette tape, varying in length between 30 and 50 minutes, for each study booklet. Each section of the tape is, however, a maximum of 10 minutes in length. In all, the material is estimated to cover about 80 hours of instruction.

Higher education: Social Sciences and Medicine

As regards higher education, the work began in the Social Sciences sector with two subjects in which there were a marked shortage of teachers, that is to say, business economics and political economy. The later projects in the sector have related to vocationally oriented courses (YRK courses). These are courses which are entirely new to the universities and consequently there has been a shortage of both teachers and teaching aids. Since the courses are vocationally oriented, special demands are made that the teaching aids shall provide opportunities for perfecting proficiency and shall include practical work.

Projects in the medical sector were at first mainly devoted to experiments involving the use of colour television. Later, a course in defence and disaster medicine was produced, among other things. Like the YRK courses, this is a new subject, in which both teachers and teaching aids are in short supply.

In these two sectors, the following study packages have been produced (the amount of instruction covered by the pre-produced material is given in parentheses). Business Economics (32 hours), Political Economy (52 hours), Educational Technology (one term), Labour-market Technique and Personnel Administration (one term), Internationalization of Teaching (some educational games), Dissection Guidance in the Anatomy of the Central Nervous System (five lessons), Propaedeutic Obstetrics (one television programme and two films), and Defence and Disaster Medicine (45 hours).

As an example of how a course package is designed, a description is given here of the study material in *Labour-market Technique and Personnel Administration*.

The YRK course, entitled *Labour-market Technique and Personnel Administration* is divided into eight blocks. The blocks cover 2.5–3.5 weeks and end with a test. About a third of the teaching time in the syllabus consists of unsupervised instruction. The emphasis is placed on problemorientation and connection with reality. The teaching aids were designed with a view to their providing a general reference framework of facts and presenting different approaches to problems. They are also intended to provide an opportunity for different alternatives, as regards learning and expression, so that different educational backgrounds and aims on the part of those following the course will not make it difficult for them to complete their studies. Television programmes, audio-tapes and text material are largely integrated with one another. The package comprises eight television programmes and 36 audio-tapes. The working periods with the pre-produced teaching aids may be designed in the following manner. In one television programme the pupil is given a description of different working environments. Interviews with those taking part in the television programme are presented on audio-tapes. These interviews may be more penetrating and more personal than those that can be carried out in front of a television camera. There is a compendium containing facts from the programmes and questions to be answered by means of group work based on the material. After the group work, the pupils can study the contents of a further audio-tape, in which those taking part in the previous programmes discuss the problems facing the pupils and comment on

their own earlier statements from different points of view. An effort has been made to avoid features that date too easily. Instead, the teaching aids are intended to be complemented by duplicated topical material prepared by the local course organizers.

Higher education: Technology and Natural Sciences.

The directives issued to the TRU Committee included an assignment to produce "taped television lessons" for a new Faculty of Technology in Linköping. The assignment was the outcome of a decision reached by the Swedish Parliament in 1965 to the effect that instruction at the new College of Technology should be based on two-shift systems and television courses. This was expected to promote rationalization appreciably. In contrast to the voluntary experimental activities in other sectors, the courses here were organized on a compulsory basis. The following package courses have been produced in this sector (the number of television programmes in the package and the number of pages in the printed material, respectively, are given in parentheses): Algebra (20, 346), Numerical Methods and Programming (23, 330), Engineering Drawing (17, 42), Differential and Integral Calculus (94, 1,749), Physics (35, 485), Mathematical Statistics (38, 720), Engineering Mechanics (3, 730), Strength of Materials (41, 800), Automatic Control (2, 50), Linear Programming (6, 196), Mechanical Technology (10, 100), and Applied Electronics (15, 0).

A description of the course in *Strength of Materials* shows how the approach to the television medium has evolved from the passage in the directives on "the taped television lesson" and at the same time serves as an example of how the course package is designed.

The multi-media system was planned for a basic course comprising 153 hours of instruction, 14 hours of which are intended for portions of the subject of Engineering Mechanics that are of particular importance for the Strength of Materials and 9 hours of which are for laboratory work.

The design of the instruction was planned in the autumn of 1968 on the basis of a model, new at the time to the TRU, according to which television sections should not exceed 10–15 minutes. For this reason, practical examples of the theory just gone through were inserted, so that an hour of television instruction consisted of 1 – 6 television sections (the shortest lasted about 2 minutes) with more or less time-consuming activity on the part of the student himself between or after the sections.

The aims of this part of the production were that everything included in the course should be presented via television. Experience of the use of the parts of the course first produced resulted, however, in the later television programmes acquiring a different function. They were made somewhat longer and are shown at the beginning and/or the end of an hour's instruction. The programmes contain information that may help the student to understand certain relations and phenomena, while deductions and proofs, which were earlier included in the television programmes, are now, as a rule, to be found only in the course booklet. They are presented there in programmed form and this provides more opportunity for individualizing the teaching.

So far, 41 television tapes (=television lessons) have been produced and the production of additional sections is in progress. According to the plan, two or four hours of television instruction are followed by two assistant-supervised hours. About 65% of the total number of hours consists of television instruction.

A course booklet in 21 parts contains an account of the aims, addenda to the text book, problems and guidance in solving the problems. A detailed solution is given for the problems that are meant to be worked out between and after the television sections. The other problems also have complete solutions in the form of step-by-step guidance.

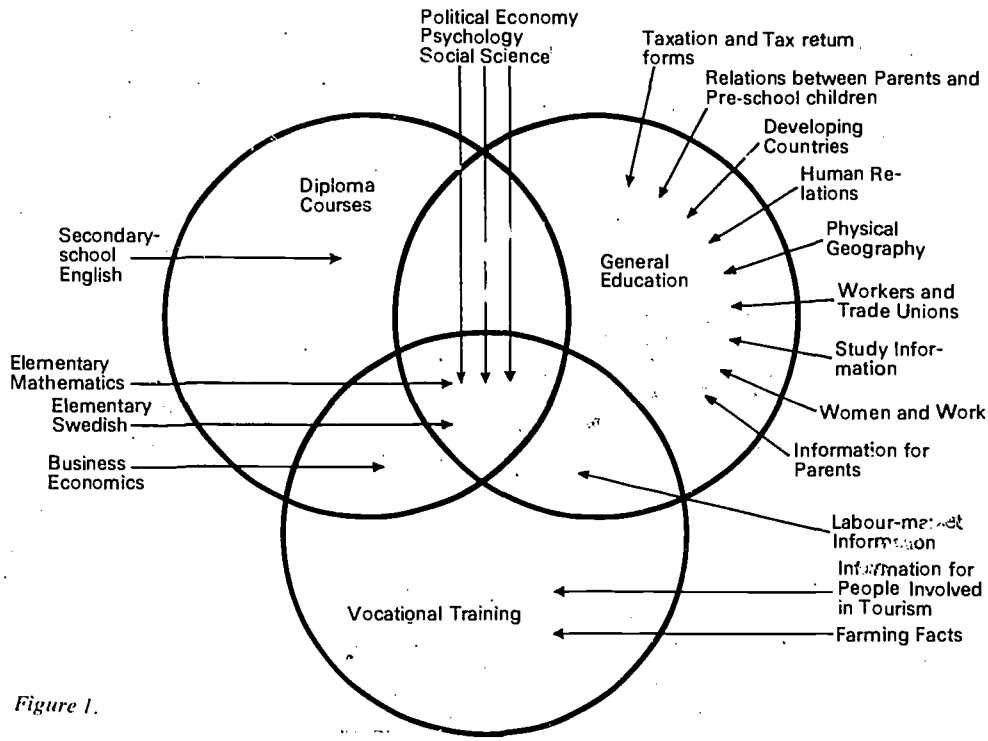


Figure 1.

Adult education

In the directives issued to the TRU Committee, it was stated that television and radio should "increasingly be able to meet the demand for adult education" and provide opportunities for reaching groups that otherwise would remain neglected in educational matters for geographical or other reasons. In conjunction with the 1967 reform in adult education, the TRU adult sector was given the task of concentrating its efforts primarily on two diploma courses at secondary-school level in English and Business Economics. At he suggestion of the TRU group of adult-education experts (TRUVUX), the main aim of the work changed later on, so as to place the emphasis on courses of a more general nature and on basic courses with no special qualifications in view. The reason for this was an effort to meet the requirements of those groups which were most neglected from the educational point of view—those whose only theoretical education was that given in the 6–7-year primary school.

Up to and including the spring of 1972, the TRU has produced and broadcast on the air 24 courses or programme series. The aims have accordingly varied very much, as regards sectors of adult education, target groups, subject fields, medium and method combinations, etc. TRUVUX has summarised its objectives as follows:

(*a*) To spread its contributions over different sectors of adult education (diploma courses, vocational training, general education).

(*b*) To produce courses for target groups with different educational requirements and educational backgrounds, with the main emphasis on people with short-term education.

(*c*) To produce courses in different subject fields (proficiency subjects, such as Swedish, Mathematics, Civics, Economics, Science, Psychology and Human Relations, etc.).

(*d*) To try out different combinations of medium and method (television+course textbook, television and/or radio+

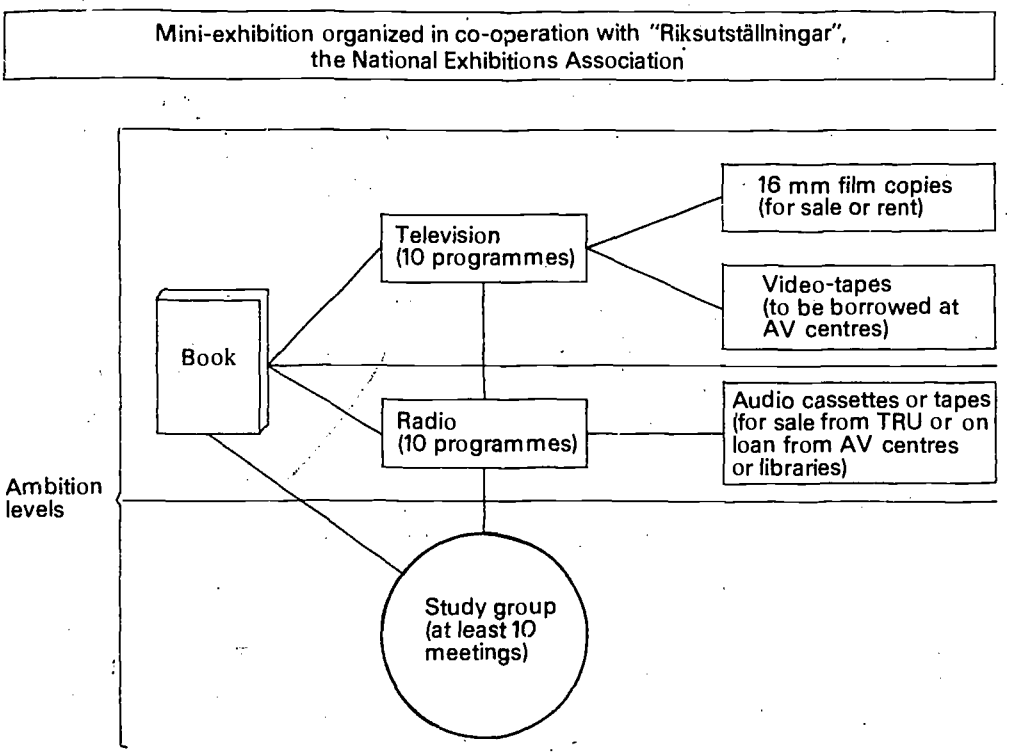


Figure 2. Developing Countries

course textbook+correspondence course, regional radio+regional course textbook, etc.).

(*e*) To make the courses suitable for both study groups and private students.

(*f*) To give the courses a flexible lay-out (courses split up into units, different medium combinations, etc.), enabling participants with varying ambition levels to make use of them.

Figure 1 shows how the courses offered are divided into the three main sectors of adult education mentioned above.

Figures 2 and 3 illustrate how two of the courses are designed, as regards medium combinations and the possibility of using them at different ambition levels.

Developing Countries (Figure 2)

The aims of this course are to inform participants of the problems prevailing in the developing countries. The main target group is constituted by persons who have little or no knowledge of these countries or the conditions which prevail there.

Women and Work (Figure 3)

A course on women's situation on the labour market and as housewives. The course was produced in three versions, one for nationwide use and two regional versions.

The summary of information about the different courses shown in Table 1 may also be regarded to a certain extent as a report on the results of the projects, though the assessments of the experiments as a whole are discussed in the last part of the summary. As concerns the figures in the table, it is important to stress that the courses are directed at different target groups, that they have been complemented in varying degrees by printed material, that they have been broadcast at times differing in popularity etc.

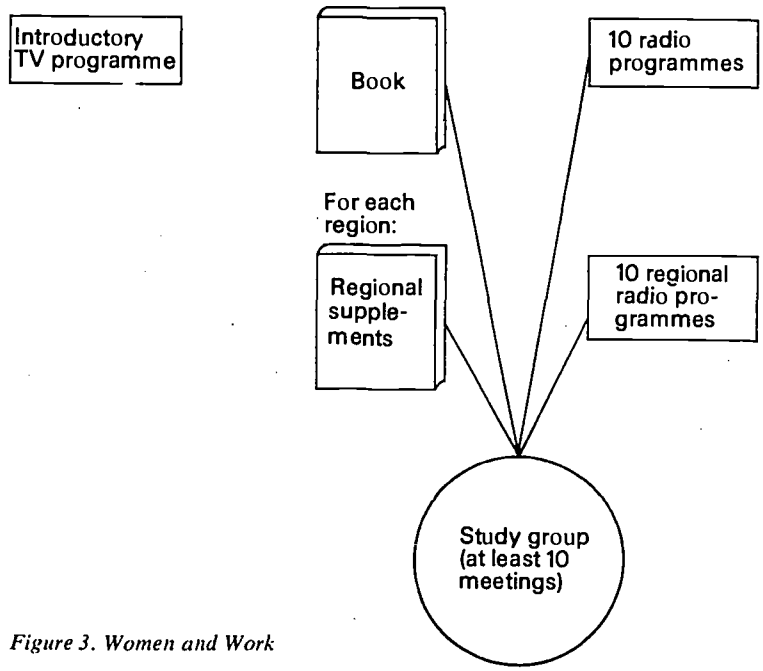


Figure 3. Women and Work

Other experimental activities

Outside the sector-bound and product-oriented activities, permanent technical and paedagogic development work is in progress. Some of the more extensive projects of this type are mentioned below.

In 1968 the TRU conducted a technical and paedagogic *evaluation of video-tape machines* for teaching purposes. After the TRU had published its report, several tape-recorder manufacturers made improvements and additions to their machines, which in fact yielded results when the TRU repeated its test in 1969. (See TRU Reports Nos. 2 and 3. Investigation of video-tape recorders for educational purposes. In English.)

Various projects in which teaching aids were used for group instruction gave rise to the idea of a more refined *electronic-response system*, enabling the right answer to be recorded both in respect of an individual and in respect of a group and subdivided into different questions. The cost of the development of a prototype for this was paid for by the TRU. The apparatus is called ESAU (Electronic Response Analysis System for Teaching). ESAU consists of a central unit linked to a number of pupil keyboards. The central unit is also linked to the required number of television monitors for presenting results.

The main aim of an experiment in the use of *colour television* to give instruction in Anatomy was to compare the educational effect of colour television with that of monochrome television. The idea was to study the effects of the different influence situations on the pupils, as regarded learning and experience of the instructional situation. The experiment was conducted at the Institute of Anatomy and Histology at the University of Uppsala. The experiments showed that the teaching programme presented produced a greater degree of retention when it was presented in colour. The student who followed the programme in colour gained on an average, 15% more marks in the knowledge test than those who followed the programme on monochrome television. When the test was repeated after about a month, the colour group's marks in relation to the monochrome group were, on the whole, the same. The differences observed were statistically certain. (See TRU

Table 1. Average TV audience, textbooks and correspondence courses sold and course members.

Course (first term given in brackets)	No. TV-programmes	No. Radio Programmes	Total No. TV broadcasts until Spring 1972	TV audience per programme[a]
Secondary-school English (A.T. 68)		94		
Business Economics (A.T. 68)	21	50	5	225 000 (2)
Brush-up Time (English) (A.T. 68)	22			
Psychology (A.T. 69)	16	22	6	235 000 (2)
Social Science (A.T. 69)	6	26	5	185 000 (1)
Elementary Mathematics (A.T. 69)	20	18	8	293 000 (2)
Elementary Swedish (A.T. 69)		32		
Farming Facts (A.T. 70)	5		2	48 000 (1)
Labour Market Information (A.T. 70)	6	16	5	273 000 (3)
Labour Market Information in Finnish (A.T. 70)	2	5	8	170 000 (1)
Human Relations (A.T. 70)	20		3	230 000 (3)
Developing Countries (A.T. 70)	10	10	5	709 000 (5)
Study Information (A.T. 70)	17		2	A.T. 70: 265 000 S.T. 71: 130 000
Dictionaries on Television (A.T. 70)	32		1 (2)	A.T. 70: 105 000 (1) S.T. 71: 80 000 A.T. 71: 145 000
Information for people Involved in Tourism Regional production (A.T. 71)		10		
Political Economy (A.T. 71)	31	40	5	125 000 (5)
Relations between parents and Pre-school Children (A.T. 71)	10		4	250 000 (2)
Physical Geography (A.T. 71)	10		4	600 000 (4)
Workers and Trade Unions (A.T. 71)	5		3	130 000 (1)
Women and Work (also regional (S.T. 72)		30		
Series for Parents (S.T. 72)	10		1	203 000 (1)
Taxation and Tax return Forms (S.T. 72)	5		3	729 000 (2)
Total				

[a] No. of broadcasts covered by survey given in brackets.
[b] No. of parts given in brackets.

Total No. text books sold etc, 30.6.72	Correspondence courses sold until including 30.6.72	No. of study group members until and including S.T. 72	No. of course members at folk high schools until & including S.T. 72	No. of course members in municipal adult education until and including S.T. 72
55 881 (3)	4 107	4 017	1 304	2 170
137 662 (4)	24 996	13 304	207	2 906
28 574 (1)		4 167	311	425
21 870 (2)	1 322	1 310	1 517	517
60 898 (2)	2 024	3 490	2 534	633
45 033 (3)	4 119	11 611	642	155
294 653 (6)	14 976	8 743	948	1 772
36 405 (5)	306	5 200		
6 264 (1)	131	1 019		
1 197 (1)		90		
14 155 (4)		529		
8 842 (1)		971	328	
2 000 (1)		233		
16 788 (5)	253	215	56	40
3 883 (1)		68	8	
136 000 (4)			362	132
3 215 (3)		1 202		
873 320 (46)	52 234	56 169	8 217	8 750

Report No. 4. Experiments with colour television in the teaching of Anatomy. Summary in English.)

In order to test the practical use of *television cassettes*, the TRU, in co-operation with Svenska TV-kassett AB, has conducted experiments with the above-mentioned material in Propaedeutic Obstetrics. The material was prepared for distribution via two different television-cassette systems, EVR and VCR.

The experiments were conducted at Karolinska Hospital in Stockholm and were followed up by surveys and observations, among other things, in order to study the technical problems connected with the use of the different apparatuses. The main aims of the experiment were to gain experience of how instruction can be organized with the teaching aid and to provide an opportunity for assessing the quality of the two television cassettes, primarily from a technical point of view.

Conclusions and recommendations

(Chapter 10 of the Report)

The TRU experimental activities have covered several different sectors of the educational system. Some of the production has been devoted to items for children of preschool age and has consisted primarily of broadcast television programmes. As regards adolescent pupils, the TRU's task was primarily to carry out experiments with multimedia systems for teaching certain subjects in the secondary school. Only in some isolated cases has broadcasting entered into these latter activities. Within the framework of the school experiments (TRUAS), the TRU has also developed teaching materials for labour-market training. In the field of higher education, the TRU's efforts have been concentrated on a number of projects in the social science and medical sectors, as well as on the production project for the Faculty of Technology at the University of Linköping, i.e. programmes produced specifically for use on tape. The TRU has produced a number of courses and programme series for adult education. Their aim and pattern have varied, but they have all contained items from broadcast radio and/or television programmes.

The activities, from 1967, when the TRU Committee came into existence, to the summer of 1972, when the new Committee took over responsibility for further production, have been presented and discussed, both in the reports from specialist and joint groups attached as appendices to the Report and also in the previous sections of the actual Report. There are many common features in the work in the different sectors but on the basis of the partly dissimilar aims the summary discussion has been divided into two chapters. Accordingly, in Chapter 8 the results of the work for the secondary schools and higher education are primarily discussed, while mainly nursery-school work and adult education are dealt with in Chapter 9.

The regular educational system

In the Committee's directives, it was stressed that one of the most important aims of the experiments in the regular educational system and higher education was to achieve rationalization effects by economising on teachers. It must be emphasised that one of the most important reasons for this was the shortage of teachers, which made it difficult for the education authorities to meet their require-

ments and to expand the educational system. With the aid of radio and television, the idea was to provide opportunities for increasing the number of education facilities without more teachers being required. This would make teacher resources available for expanding sectors, for example, adult education. As a result of the change in the supply of teachers, some of the need for economising on teachers has disappeared and the resources have then been released for use in the educational development work aimed at increasing the efficiency and quality of the instruction and at covering needs in various sectors in which there are deficiencies.

The work in the sectors of the educational system that were primarily concerned may therefore be described as follows.

The experimental activities in the secondary school coincided with the introduction of new curricula. The TRU wished to give the new curricula a realistic basis in the classroom by meeting the demands for greater pupil activity, emphasis on the pupils' ability to co-operate, and greater individualization of teaching.

In labour-market training (AMU) there has been a great shortage of teaching materials, particularly as the AMU organization, with its successive intakes and the heterogeneous structure of its student groups, requires facilities for an individualized curriculum. The TRU's work has mainly covered some of the theoretical subjects that a large proportion of the course participants all study.

As far as higher education is concerned, one of the first projects in the Social Sciences sector concerned the half-term course in Business Economics, among other things, because the shortage of teachers had created great difficulties in giving the instruction. The later projects in this sector concerned certain vocationally oriented courses, (YRK courses), in which there has been a shortage both of teachers and of teaching materials, since these study courses are completely new to the universities. In these vocationally oriented courses, special demands are made on the teaching materials that they shall provide opportunities for improving proficiency and shall contain practical work.

The most important factor in the task of producing "taped television lessons" for the Faculty of Technology at the University of Linköping (LiH) was the endeavour to use the two-shift system and television to give instruction at the new University with lower costs for localities and fewer higher teaching appointments. In this sector, too, however, the experimental activities came to be concentrated at an early stage on making the overall learning situation of the students as efficient as possible.

It is characteristic of the TRU experimental activities as a whole that modern and partly untried methods have been used for the planning of teaching and the design of teaching materials. A thoroughly prepared description of aims is a prerequisite for the construction of efficient multi-media systems. The starting point in the project work was therefore the development and formulation of such detailed descriptions of aims for the courses. The majority of the projects in higher education were dependent in this respect on the work of developing new or revised syllabuses carried on by special groups of experts appointed by the Office of the Chancellor of the Swedish Universities (UKÄ).

The TRU engaged planning groups consisting especially of teachers for the task of specifying curricula and syllabuses in the descriptions of aims that guided the project work. The planning group was then able to co-operate with the project group, consisting of experts in particular subjects and TRU specialists, so that the descriptions of aims and the project work were adapted to each other. The efficiency of this co-operation and also of the teamwork in the project group has been constantly improved.

In general, a course is divided into several study units, which are planned as fairly independent entities. This arrangement provides a greater freedom of choice for teachers and pupils than conventional teaching aids, since for certain parts of a course other material and methods of working can be

chosen. Considerable freedom of choice can also be offered in the units.

The use in teaching of individual media, such as radio/audiotape and television/video-tape, has been incorporated in systematic planning, in which attention is paid not only to how material is to be presented but also to how it is to be handled and what methods of working are suitable, in order to achieve the objectives of the instruction. In general, the project work has resulted in multi-media systems, which contain, among other things, recommendations about various methods of working.

The purpose fulfilled by the admixture of audio-tapes and video-tapes in the media combinations is, above all, to stimulate, to provide motivation and to supply the concrete quality that sound and moving pictures can give to teaching. These elements can also provide experiences that affect attitudes and can, as a result, give the instruction a more personal association. By giving the pupils joint experiences and close contact with different environments and people, they can serve as a point of departure for discussions and active group work. This is particularly important in case studies and training games, when the students, individualy or, above all, in groups, have to prepare some material and to carry out assignments.

It is particularly in the YRK courses that TRU has tried out such methods, partly in the form of work periods included in the time-table, when the pupils work on the study material without the guidance of a teacher. The favourable outcome of experiments with group work of that kind, including practical cases and other study activities, means that the TRU will produce and try out new items that in varying degrees are based on simulations and games.

A further reason for the choice of audio- and video-tapes for certain items is that these media increase the possibilities of individualization. For example, the combination of audio-tapes and printed material has made it possible to introduce considerably individualized instruction in labour-market training (AMU).

According to the directives, the development work was to result in practical experiments. Such experiments are indeed a natural stage in the modern design of teaching materials. The purpose of trials of teaching materials is primarily to check whether the aims of the instruction provided have been fulfilled and to obtain a basis for a revision of the teaching materials. A number of educational institutions have been engaged in TRU trials. The work has produced favourable results, in that it has shown how the teaching materials functioned and has led to their being gradually improved. It would, however, be erroneous to expect these trials to be able to give unequivocal results that would "prove" that a multi-media system is "better" than traditional teaching. Neither can trials of experimental material for various courses serve directly as an evaluation of the experimental activities as a whole. Far too many factors are impossible to check for it to be feasible to secure objective measurements of all results by the available methods of behavioral science. The Committee bases its evaluation of the activities on an overall assessment from both analyses of the conditions for the experimental activities and all the observations and experiences reported.

The Committee states that one of the main results of the experimental activities is that, by applying modern methods of planning teaching and designing teaching materials, the TRU has produced teaching-aid systems with which it has been possible to show that the overall educational aims of the curricula and syllabuses can be realised in the instruction, while at the same time the educational results have been satisfactory. In several cases, the study results have been judged to be definitely better than previously. The multi-media systems differ from the traditional textbooks in that they are based on an overall planning of the instruction, which also pays attention to the overall educational aims, for example, through the choice of working methods. The TRU has been able to develop and test new

and unconventional teaching materials and methods of instruction and working to an extent that would probably not have been possible if the development work had been carried on along the customary lines.

One of the overall aims is the individualization of the teaching. The only way of increasing individualization on a substantial scale which seems to be realistic at present is to develop teaching materials and working methods that permit a large amount of variation. An example of this from the TRU production is the above-mentioned instruction in labour-market training and the satisfactory experience of the YRK courses, including group work without teacher guidance on practical cases and simulated training situations. The design of the TRU courses for the Faculty of Technology at the University of Linköping (LiH) has also been described by the LiH-UKÄ-TRU joint group as an important step in the development of more individualized teaching materials. For various reasons, there have so far been no chances of using all the possibilities that the teaching materials would seem to afford in this respect.

One of the reasons for this is that the more individualized teaching based on a study material presupposes that the teacher will acquire a new main function. It is no longer a question of presenting facts and passing on knowledge by "teaching from behind a desk" but of providing motivation, guidance and feedback for individual students who are studying on their own or in small groups. Not least the natural opposition on the part of many people to innovations and reforms means that a general acceptance and application of this new teacher role require efforts for further training and grounding in the material in question.

Technical developments, for example, in the cassette-television sector, will clearly make it easier to utilize teaching materials for increased individualization. They can also give the students greater freedom of choice, for example, as regards the organization of their studies, and technology can also facilitate the spread of education to new places.

The use of resources in the form of teachers, teaching materials and technical equipment must be based on assessments of various rationalization effects. It is not possible, however, to conduct any comprehensive cost-benefit analyses of development work of the type carried on by TRU, since it is difficult to measure its educational quality and other such effects.

In several cases, however, the use of the TRU products has already produced appreciable rationalization gains. By careful planning of instruction, primarily as regards the work of analysing aims and objectives, it has been possible to shorten courses, the effort required for local course planning has been reduced, etc. and by providing conditions for private study, individually or in groups, a cut in the teacher-supervised instruction has been achieved. Thanks to this, it has been possible to transfer some of the teachers' services to other fields. As a result of the development work, it has also been possible to introduce courses in new study localities more quickly than would otherwise have been feasible.

The TRU's practical experiments have in the vast majority of cases been conducted under the same conditions, as regards resources, as conventional teaching in respect of teacher allocation, for example. Only when the grants and budget systems have been changed so that the decision-makers have a greater freedom of choice between different forms of teaching and teaching materials will it be possible to make full use of the advantages afforded by the multimedia systems.

The experimental work has been based on close contact with various teaching bodies and teachers, for example, in working out descriptions of aims and objectives. During the experimental period, effectual forms of co-operation for this purpose were developed, which should make the subsequent work easier. The TRU's activities may be regarded as complementing both the work on the analysis of curricula and the research and development work carried out by the

education authorities and the production of teaching materials by the publishing companies. A prerequisite for the TRU experiments was also close co-operation with different publishing companies. In some cases, this co-operation concerned the actual production, while in others the finished product was manufactured and marketed under agreements with various publishing companies. Owing to the way in which they were organized, the TRU experimental activities have accordingly resulted in products which have directly benefited the regular educational system. The fact that the TRU has acquired full rights to all material can both reduce the cost of the products to the consumers and facilitate the modification of the material for new purposes. Among the projects that have already led to the marketing of products, mention may be made of two of the package courses for AMU, the secondary-school course in Business Economics and the YRK course in Educational Technology. The latter is also an example of how a course that was produced for a definite target group in institutionalized education can be used, directly or after minor adjustments, in other sectors, for example, in the armed forces, by various organizations and in company-sponsored education in Sweden and abroad.

On assessing the situation as a whole, the TRU Committee feels that the experimental activities have produced such favourable results that it can recommend that use should be made of the TRU's resources in the form of finished products, collected educational and technical know-how and technical equipment for further development work for the regular educational system and for other educational activities run by the state or with state support.

The point of departure for the development work should be the forms of co-operation between the TRU and various authorities etc. which are now functioning and the work should be based on the opportunities for co-ordination between local and central production. In this connection the TRU's resources can be utilised for work concerning entire projects, in which centralised production is justified. On the other hand, the TRU can co-operate with local organizations, either for the production of certain parts of teaching materials or in a consultative capacity. It is important to stress that the know-how and the resources collected by the TRU are not limited to the use of radio/audio-tapes and television/video-tapes but embrace all phases in the planning of instruction and the design of teaching materials. Sound and pictorial elements are essential for all modern teaching, albeit on varying scales. The availability of the "heavy media" (radio/audio-tapes and television/video-tapes) is therefore a prerequisite for comprehensive activities.

A central organization for development work of the type conducted by the TRU may also be needed, to be ready to deal with new educational requirements in connection with the expansion of the educational system with new student groups and new subjects, the use of some new technique or new distribution forms or in conjunction with organizational reforms, for example, the introduction of recurrent education.

The pre-school sector

The TRU experimental activities in the pre-school sector have not yet been on any great scale, but the results so far have been definitely encouraging. A large proportion of the children who were aimed at, i.e. primarily the children aged 5–6-years who do not attend any nursery school, have seen the television programmes produced by the TRU. These programmes have also been used in many nursery schools. They have interested the children in a high degree and have stimulated them to a number of activities. The series for parents, which were produced within the framework of the TRU's adult-education work but were closely linked to the pre-school activities, have also been popular.

In its comments on the first report of the Committee on Child Centres, the new TRU Committee stressed the great importance

that should be attached to the use of radio and television programmes in the work of realising the educational plan for the pre-school proposed in the report. The TRU Committee agrees with the recommendations made in the comments. The TRU should be regarded as a central resource, which, in co-operation with the supervisory authority, can be responsible for important tasks, as regards educational development work and the state-supported production for the pre-school. This does not only apply to projects (for example radio and television programmes and supplementary material) for children inside and outside the child-centre organization but also to the further training of nursery-school staffs and to parent training.

Adult education

TRU's experimental activities in adult education have been characterized by great comprehensiveness, for example, as regards the choice of subjects, level and planning. The first courses were mainly devoted to qualifications-oriented studies at secondary-school level but later the aim of the work was chiefly to try to reach the groups that were most neglected from the educational point of view and thereby to contribute to the community's efforts to stimulate compensatory education. What was offered was therefore mainly series of programmes of a more general character and basic courses that did not lead to any special qualifications. During the whole of the experimental period, courses were simultaneously produced for particular target groups, for example, farmers, housewives and those who had the necessary qualifications and opportunities for following a course at the university level.

The inclusion of broadcast radio and television programmes has been the common denominator for all the projects. Radio and television have in this connection primarily been used as mass media and the aim has been to reach the entire general public, supplying information about and incentives for different study activities. Another aspect of the distribution over the air was also of current interest, viz. the possibility of broadcasting educational programmes to people who find it practical, for example, for geographical reasons, to cover their educational requirements in this manner.

In order to provide an opportunity for active study of the contents of the courses, printed material was produced for the majority of courses. Through co-operation with various publishing companies and correspondence schools, the programmes have in certain cases come to be parts of larger package courses. A predominant ambition in the experimental activities was that the material should stimulate and be suitable for group study, either in study circles or in some other form of organized adult education. Both planning, production and the follow-up have therefore been based on close co-operation, especially with the different educational associations.

Many of those studying on their own as well as the study groups have had difficulty in listening to the programmes when broadcast and for all these people it is necessary that the programmes should also be available in other forms, for example, on tapes, which can be borrowed from audio-visual centres, libraries, etc.

Even in its first report, the Committee pointed out that one of the main conclusions drawn from the experimental activities in adult education was that production and broadcasting must be accompanied by extensive information, service and outreach activities, especially if the groups that are most neglected from the educational point of view are to be reached. There have been in fact constant attempts in the TRU section for adult education to find new and better approaches for such activities, alongside the actual production work. Thus, for example, in recent years several measures have been initiated to give the activities a regional basis, partly by producing programmes in co-operation with local and regional organizations and partly by carrying out experiments with regional TRU-consultants.

The results of the 24 courses or series of programmes for adults that the TRU pro-

duced and broadcast on the air between 1967 and 1972 cannot be specified in simple figures. It is, for example, impossible to know how many viewers and listeners the programmes have had, what benefit has been derived from the programmes or what study activities they have stimulated. Available statistics do not give a completety fair picture of the total results either, but the Committee feels that an encouraging assessment of the experimental activities can, for example, be based on the information that, as far as several of the series are concerned, an average of about 250,000 persons watched the television programmes. In the case of some series, the average number of viewers was over 600,000. Furthermore, during the period from the autumn term of 1968 to the spring term of 1972, a total of 873,000 copies had been sold of the courses textbooks and booklets published in conjunction with the courses. During the same period 56,000 study-circle members were enrolled in circles that used TRU material. This material was used by 17,000 participants in courses at folk high schools and in the adult-education schemes administered by local authorities, and 52,000 correspondence courses were sold in conjunction with the TRU courses.

These figures are accordingly taken into account in the Committee's overall evaluation that the experimental activities have yielded very good results. The courses offered by the TRU constitute, and will constitute to an increasingly large extent, an active part of the community's efforts to bridge the educational gaps by providing stimuli to different study activities and by offering study material which can be utilised at different ambition levels and in conjunction with different forms of study, individually or in groups.

The TRU Committee accordingly feels that in the foreseeable future there will be an increasing need of educational programmes on radio and television, as well as of complementary projects in conjunction with the programmes. The work should in future be co-ordinated with the community's other efforts, as regards the three main types of adult education—the vocationally oriented, the type based on school curricula, and general adult education. The highest priority should be given in this connection to those whose formal education is deficient.

The adult-education sector is in the process of expansion and further reforms may be expected during the next few years, among other things, as a result of several inquiries which are now in progress. The organization of the production resources for radio and television in education must, of course, be adjusted to this fact.

Organization

The recommendation that the TRU should be used as a central resource for some of the needs of the educational system and other government organizations in respect of educational development work and teaching-aids design has organizational consequences in connection with the implementation of the Teaching Aids Commission's proposals and the proposals from several commissions of inquiry now in progress, including the 1968 Educational Commission (U 68).

In accordance with the proposals in its first report, the TRU Committee feels that the special public resources in this sector should be concentrated in one unit. However, it will be incumbent on the new TRU Committee, in accordance with its directives based on the TRU's experiences and proposals, to submit final proposals on how the organizational problems are to be solved.