4 : PRODUCING EDUCATIONAL MATERIALS

The equipment you need to produce good educational materials varies according to the scale and sophistication of what you want to do. At one extreme you can run distance teaching with one typewriter, a hand-operated duplicator and a bicycle. At the other extreme the production equipment at the British Open University is valued in millions of pounds. In this chapter we will look at general questions about production and more specifically about producing print and producing radio or audio tapes. The production of television or film is both expensive and complicated and is of limited relevance to teacher education programmes in many countries. It is not discussed here but references to it appear in Appendices 1 and 2.

Before discussing the equipment needed for production, it is necessary to ask which processes will be undertaken inside the institution and which outside. Any decision on this will depend on local circumstances. If, for example, you have a large educational materials centre next door to you, with under-used print and studio capacity, then it would make apparent sense to use their facilities rather than create your own. Similarly, if there is a well-developed local printing industry, with large numbers of jobbing printers competing for your work, then you may get an excellent service from outside and not want to set up your own printing organisation. Decisions will thus depend on what is available either from your own parent institution or outside and on the scale at which you are working.

There are general advantages and drawbacks in having your own production capacity. If you set up your own

printing workshop and radio studio you have the advantage that you control your own production rather than being dependent on somebody else. On the other hand, this means that a larger amount of capital needs to be invested in equipment and more of your management time - often a valuable and scarce resource - will be used in looking after production. When Botswana Extension College was first starting work, even with a very good printer, printing problems demanded roughly half the time of the deputy director of the College. If you rely on using printing works or broadcasting studios outside your own organisation then you have less control over them, but at the same time you do not have to resolve their management problems or invest capital in them.

Most distance teaching institutions have in fact set up their own print shops and many have built recording studios, or at least rehearsal studios in which they can do some preparatory work towards broadcasts. If you have the opportunity to acquire your own printing and broadcasting equipment we would recommend that you do so. You can start in a quite modest way: the Mauritius College of the Air, for example, started work with manual typewriters and a stencil duplicator. On the other hand, the absence of such equipment is not a bar to running distance education. If you are working in one department of a university which has its own printing unit, for example, you may well be able to launch your programme by relying entirely on the university service.

Planning

Advance planning of printed or broadcast materials is essential if these are to be produced at the right time and in the right quantities. We saw in Figure 5 some of the stages involved in the production of printed materials. The production of broadcasts follows essentially the same kind of procedure. In either case we need to start by getting agreement between all the people concerned on the educational content of our materials; then get them written or, in the case of broadcasts, scripts drafted and illustrative materials recorded; we may need illustrations; then as material is edited and put together it needs to be typed and checked and corrections made and again checked before it is produced.

The first thing to do in planning production is to work out a progress chart showing the stages through which the production of print or broadcasts will need to go. Once that has been done, it will be possible to work out roughly how long each stage is likely to take and from that to see what is the minimum period between having a first idea, for something printed or broadcast, and its being produced and distributed. In making this sort of calculation one should assume that some things will go wrong and some processes will take longer than the minimum hoped for.

In planning, too, it is necessary to consider who will have control over the various processes. As in a factory, the job of controlling progress is a key one. It can also be an unpopular job: the progress chaser needs to be somebody who can encourage and if necessary goad colleagues into producing materials on time and making emergency arrangements when things have gone wrong and they are not ready on time. It is thus a job which needs to be done by somebody with a fair amount of authority within the organisation.

Producing print

If you decide to produce printed materials within your own institution you are faced with questions about the kind of printing you prefer. There are three main types:

Letterpress printing : This is the traditional method and was used for most printed materials from its invention at the end of the fifteenth century until the 1960s. A skilled, trained printer sets individual letters of type; the type is then placed in a printing press, ink rolled over the type and the paper printed. In distance teaching, as in printing generally, this method is of declining importance. It is, however, still widely used in parts of the world where there are many small printers. It has a particular value if you are working in some non-Roman alphabets.

Stencil duplicating : In this process the text is typed on to a stencil and the keys of the typewriter cut through the surface of the stencil. The stencil is then placed on a duplicating machine and rotated by hand or electricity to

produce copies. As a refinement, an electronic stencil cutter will produce a stencil which can be used on a duplicator from an original which includes line drawings, or even photographs, as well as typed text.

Offset lithography : This is now the commonest form of printing even for relatively small editions or print runs. With lithography you start with a paper original; a plate, of paper, plastic or metal is then made using a photographic or electrostatic process, and is transferred on to a press. The press is fed with oil-based ink and water. It works on the principle that oil and water do not mix, so that the ink adheres only to the part of the plate which was black; this ink is then transferred to the paper.

To start a programme on a small scale, then, you may need no more than a typewriter and a duplicator. You can get up to a thousand copies from a single stencil if it is carefully typed and handled. Stencilling equipment is cheaper than offset equipment although the paper used for duplicating is often slightly dearer than the paper you need for offset printing.

There are, however, a number of disadvantages in using stencils. First, it is a fairly slow process: few duplicators will produce copies as quickly as an offset machine. This need not be a barrier: a distance-teaching project run by the UNRWA/Unesco Institute of Education for teachers in Palestinian refugee camps used stencil duplicators to produce 14 000 lessons a month each of 15-20 pages. A further disadvantage is that it is not easy to produce illustrations on a stencil. Very simple illustrations can be drawn straight on to a stencil. For anything more complicated, you will need an electronic stencil-cutter. This makes it possible to produce illustrations but at the expense of producing a less-clear typescript and of producing the stencil very slowly. It may take 10-20 minutes to produce each stencil in this way.

As against all that, it must be stressed that duplicating equipment is the cheapest kind of printing equipment on the market and makes it possible to start in a small way with far lower capital investment than

is required for offset printing.

The simplest form of offset equipment requires two machines. The first is a plate-maker. With this, you take an original which is typewritten or drawn and make from it a paper, plastic or metal plate. Paper plates will give you reasonable quality reproduction for 500-1000 copies; if you are producing more copies than that you will either need to make a new paper plate or use a metal plate. Then, second, you need a press. The processed plate is put on the press and copies are printed from that. Presses vary in size, sophistication and speed. The smallest and simplest machines will take A4 (210 x 297mm) paper as will a duplicating machine but they are generally faster than a duplicating machine. Offset machines are also more complicated to operate. To operate an offset litho machine satisfactorily, you need a trained or experienced printer, or at least somebody who has had several weeks training in the running and maintenance of a machine. In contrast you can probably learn how to operate a duplicating machine in a few hours or at the most a day or two.

If you want to reproduce photographs, then you will need to replace the plate-making machine with a camera and use the plate produced by that camera instead of the one from the platemaker. Cameras are more expensive than platemakers by a factor of between 4 and 10 times. If you want to set up letterpress printing, or print in several different colours, you will need to get specialist advice.

The kind of equipment you have thus affects the way material is produced for printing. If you only have a duplicator and no other printing equipment, then your typist will have to type everything directly on to a stencil. More often, however, you will want to include illustrations as well as text and so will be using either a stencil cutter or offset litho. In these circumstances there are two stages in the preparation of text before a plate is made. First the typist needs to produce a text and an illustrator needs to produce any drawings, illustrations or diagrams which go with it. Then, at the second stage, these need to be put together or "pasted-up". At the paste-up stage it is also possible to incorporate headings, using a typeface larger than is available on the typewriter if you want

one, drawings, symbols to guide the student through the work and so on.

The typist may be working with any kind of typewriter. Generally speaking electric typewriters will produce better results than manual but have the disadvantage that they do not work during powercuts. A golfball or daisy wheel typewriter will allow you to alter type styles and, within a narrow range, type sizes. Recently, word processors have become available at prices which some small educational bodies can afford. A word processor consists of a typewriter keyboard, a small computer and a printer. Whatever is typed can be stored in the computer memory. With the printer you can produce a typed version of anything in the memory. Then, if you want to alter what has been written, you can type in just the alteration instead of retyping the whole document. Where you have two or three succesive drafts, as there were of this book, a word processor can save many hours of typing. But be careful: you need a hundred percent reliable mains electricity supply to run a word processor successfully.

It is not possible here to recommend particular machines, either as typewriters or as plate-makers or presses or duplicators. The best general advice is to be guided by other people's experience in your area and to check on service arrangements and how readily the machine you choose can be serviced and repaired locally. Guidance on how to set up a small-scale printing unit of this kind is to be found in the Commonwealth Secretariat publication 'Equipping Small-Scale Printing Units'. See Appendix 1 for details.

We can now see that the stages of producing print vary slightly according to the equipment we use but have broad similarities. They are set out in Figure 7. In all we start out with a typist and possibly an illustrator: both are worth their weight in gold. And, in all of them, we end up with the need to collate large numbers of sheets of paper. You can buy collating machines which will put your pages in the right order. On the other hand you can go for a labour-intensive approach and employ teams of collators, thus increasing employment. Many distance teaching institutions, concerned to keep the people in jobs, have succeeded in preventing the introduction of collating machines.

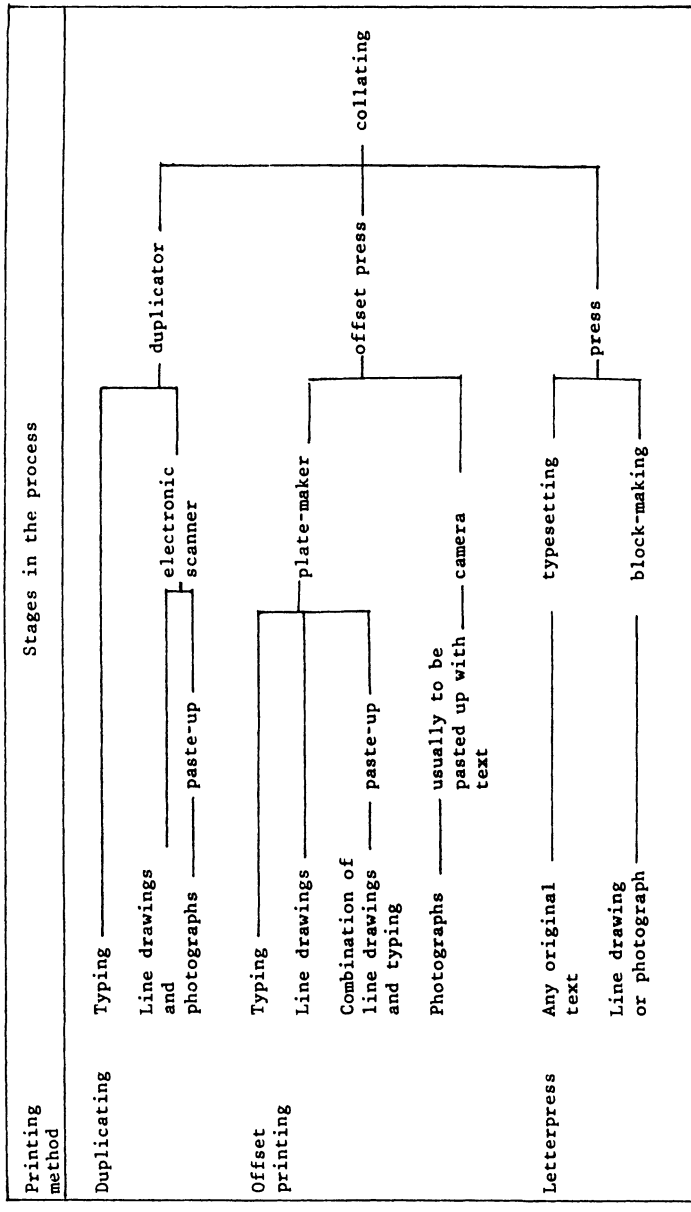

Figure 7: Alternative printing processes

Producing radio programmes and tapes

To make programmes of a quality fit to be broadcast, you need access to a radio studio. Indeed, many broadcasting stations require that programmes should actually be made in their own studios in order to maintain the necessary quality. The studio will, for example, have equipment for mixing or putting together recordings from various different sources and fading up and down sounds. But, if you are to make broadcasts or tapes, it will be useful to have at least a minimum of equipment for your own institution.

The first piece of equipment to acquire is a broadcast quality reel to reel portable tape recorder. Tape recorders of this type, which can work from batteries or from mains electricity, will produce recordings of acceptable quality to be broadcast if they are used with a high quality microphone. With a portable recorder, you can record interviews in the field, or with your own staff or students wherever they are, and use the tapes as a starting point for your own programmes. Recent improvements in the technology mean that you may be able to use a cassette recorder instead. Before doing so, however, check that your radio station can copy from cassettes on to a reel-to-reel recorder.

The next most useful piece of equipment is a broadcast quality table-top recorder. These recorders normally work on mains electricity only. You will also need a means of linking this recorder with your portable one. In that way you can copy tapes from one to the other as well as originating recordings on your table-top recorder. If you want to edit tapes - cutting parts out of them, or putting together recordings made at different times or places - you can do so at very little extra expense provided you have a suitable table-top recorder. To edit tapes you need an editing block, which is simply a strip of metal with a groove to take the tape. With that, you need a razor blade to cut the tape and sticky-tape in order to stick tapes together. Or you may leave this process to the radio station.

You may want to use your tape recordings, not as the basis for broadcasts, but in order to make cassettes which can be distributed to your students. If there is

a small number of students, who will meet together in centres equipped with cassette recorders, you can make cassette copies if you have a cassette recorder and a means of linking this to your table top recorder. That process is, however, slow. It will take half an hour to copy each half-hour cassette. If you want to make cassettes on a larger scale, then you need access to a multiple copying machine which can make a number of cassette copies at a time and do so in a much shorter period than their playback time. Again, you may wish to have this equipment under your own control or may use similar equipment at a radio station or an educational materials centre if there is one near you.

As with making printed material, so with broadcast material, specialist staff are needed. To make recordings you need somebody who has had some training in handling broadcast equipment, making recordings and preferably in editing and splicing tapes. You may not need a full-time broadcasting technician, but you do need somebody who had training over a period of a few weeks or months in such skills.

Summary

1. In deciding how far you should have your own production facilities, consider:

   1.1 what other facilities are available outside your own institution but conveniently near;

   1.2 the advantages of controlling your own production by doing it internally;

   1.3 the administrative complications of running things for yourself.

2. Advance planning and good progress control, tempered by pessimism about things working out as planned, are necessary if you are to produce materials on time.

3. For printed materials choose, according to your circumstances, between duplicating, offset litho and letterpress, taking into account:

   3.1 the cheapness and ease of operating stencil duplicators;

   3.2 the versatility and speed of offset litho equipment;

   3.3 the advantage of letterpress printing for some alphabets.

4. You will need good typists and probably illustrators; they are most valued members of staff and should be cherished.

5. To make broadcast quality programmes or audio tapes you need access to a radio studio, but will find it useful also to have a portable broadcast quality tape recorder and a table top broadcast quality tape recorder.

6. If you are to produce cassettes on any significant scale you will need to have, or have access to, equipment for the multiple copying of cassettes.