

## AUDIOVISUAL RESOURCES

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In the Caribbean, the facilities for the production of audiovisual software are more than adequate for the demands. Audiovisual or multimedia production centres exist at UWI Mona, UWI St Augustine and the Guyana Ministry of Education. The Guyana multilateral schools each have small audiovisual centres. The Trinidad senior comprehensive schools have video-tape recording (VTR) equipment. All countries have commercial radio; and Barbados, Jamaica and Trinidad and Tobago each have one commercial television channel. In many respects these are greatly under-used, essentially because educators with the time and talent to spare for teacher education for the creation and use of audiovisual resources for learning are few. Social studies educators appear to perceive the value of such resources more readily than science-educators do. To be sure, there are difficulties with the availability of hardware, electrical outlets and blackout; but resourceful teachers appear able to solve any difficulties of this kind. The main problem appears to lie in the priorities of teachers and, especially, teacher-educators. Science teacher-educators consulted in this survey knew that the audiovisual centres existed; generally they did not know what these centres had produced and clearly had not advised them or drawn on their resources. A list of audiovisual resources, and the extent to which they have been or have not been used in science teaching, follows.

### Radio and Television on Public Channels

Jamaica's Ministry of Education maintains an Educational Broadcasting Service which provides radio programmes for primary schools and television programmes and television sets for secondary schools, both including science as a component. The educational television service takes account of the double shifts in some schools, and the programmes are part of the curriculum development materials (4). Teachers' notes distributed each term allow teachers to prepare themselves for the lessons. There are also , or used to be, teachers' television seminars.

The Barbados Ministry of Education developed an educational television programme to support WISCIP/B, the first modification of Trinidad's WISCIP carried out by the Barbados Association for Science Education (BASE). As WISCIP/B eventually became WISCIP/C (the next modification from the Caribbean Regional Science Project) and then WISC, the West Indies Science Curriculum, the Ministry television teacher faced difficulties in keeping up with changes in the curriculum and its timing. Now that WISC is a published curriculum used by most secondary schools in Barbados, the Ministry has been able to revise the tapes which are telecast according to a timetable and outline of the programme sent to schools (42). Primary science is transmitted on both television and radio, supported by a timetable and

outline. Radio receivers have been supplied to primary schools as a matter of course and to some secondary schools and these, being Rediffusion, do not suffer from many of the problems experienced in Guyana (mentioned below). There are also programmes for children in out-of-school time (evenings and holidays). It is reported that the Barbados science programmes are used by teachers, but that they need guidance on follow-up activities (43).

Guyana has no television, but the Ministry of Education Curriculum Development Centre scripts radio programmes for primary schools, and provides them with radios, timetables, notes for teaching staff and wall charts which make the resource an audiovisual one rather than a merely audio one. An example of a science wall chart is shown in Figure 3 (44). The Guyana Ministry of Education materials distributed to teachers are outstanding in the Caribbean for the care taken in presentation, an important factor in marketing often overlooked by educators who expect teachers to respond positively to the ideas without being too critical of appearance. There is also a series on innovations in education addressed to teachers, parents and the general public, and broadcast at a time in the evening when the family is very likely to have its radio on while the evening meal is being prepared (45).

In Trinidad and Tobago there are some primary school radio programmes, although none for science. And while there is no educational television series per se, the Mucurapo complex of three schools (a junior secondary, a senior comprehensive and a highly selective secondary) has recently been very active in developing VTR tapes on education and in promoting their screening in colour at prime time (46). That educational broadcasting to schools in Trinidad and Tobago lags behind developments in Barbados, Guyana and Jamaica is very clear. Whether such broadcasting is effective is much less clear, and some educators doubt that teachers make much use of the programmes. Some possible reasons suggested in Guyana are: radios not working or stolen; no money to buy radio batteries; classes too large for children to hear or for a teacher to help. And teacher-educators in Guyana and Barbados have identified a need for in-school teacher education for educational broadcasting.

The conclusion is that the time has come to carry out a market survey or evaluation among teachers in at least the largest Caribbean countries, Jamaica, Barbados, Trinidad and Tobago, and Guyana. Enough experience and expertise exist to enable the design of television and radio programmes to move towards solving the needs of teachers as perceived by the teachers themselves.

### VTR Facilities in School

Microteaching and videotape recording came to the Caribbean in the early 1970s as part of the UWI/UNESCO Teacher Training Project. A few science teaching protocols were prepared, e.g. 'Laboratory Storage', 'Planning a Field Trip', 'Questioning in Science', and 'Blackboard Presentation' (3). The early equipment was not compatible with commercial television and it has since been supplemented, at the Multimedia Production Centre at St Augustine at least, by colour facilities which are compatible. Meanwhile, a large part of the tape library was lost when the air-conditioning failed, as it does frequently, a hazard to be taken into account in future.

New schools in Trinidad and Tobago have also been equipped for VTR although the education of teachers for this medium is not yet really

off the ground. The exception is the Macurapo complex mentioned earlier, where first class videotapes in colour are being made, especially in social studies. There are few science tapes so far, and the Association for Science Education of Trinidad and Tobago (ASETT) has been invited to act as consultants to fill this gap.

Some teacher educators are cool to the idea of demonstration lessons on film, since there is a risk that teachers will regard these as models when they would be unsuited to the styles of many teachers. It has been suggested that different ways of teaching the same topic could be collected together into a film, although this has not yet been tried.

### Sound Tapes

Almost any teacher-educator or teacher has fairly easy access to a cassette tape recorder which is portable and capable of picking up at least the teacher's transactions in the classroom. In a region where most of the postgraduate teacher education is in-service (in the sense that the student teachers spend most of their time in their own schools), the teacher-educator can fairly quickly build up a library of realistic examples of teacher behaviour and children's responses. Student-teachers, in turn, can tape their experiments in teaching for home study as described in the Science Teacher Education Project Theory into Practice (Hayson and Sutton, 1974), or invite their tutor to comment on a lesson at which the tutor was not present. Tapes produced in this way often have inaudible patches and are likely to be useful only to the particular teacher and tutor. Tapes which demonstrate nothing of interest are of course erased. Teacher and child behaviour in the face of a sound tape recorder has proved to be much more natural than when they are conscious of a camera.

Guyana's Primary Methodology Project, which includes the teaching of science, collects on sound tape the good things that teachers do. Assuming that the strategies are fairly general ones (e.g. questioning, motivation), these are analysed to produce handbooks of the strategies, to provide the bases for workshops (7). A very few teachers are experimenting with self-paced learning/auto-instruction, and one such **biology** teacher makes sound tapes for inclusion in her package (47).

### Photographs

Once again stimulated by the social studies teacher-educators, the School of Education at UWI St Augustine is in the process of building up a collection of black and white and colour photographs related to science and its applications and to science teacher-education (48). The potential of this resource has not yet been fully realised, as teacher-educators have not yet taken enough time to advise the staff photographer on suitable subjects.

In the teaching of life science, and the life science component of integrated science, microscope slides are well known and good slides are made by teachers and laboratory technicians. When, as is often the case, the teacher needs to project the image, he uses a microprojector. From Appendix 5, item 102, we see that microprojectors are not common in schools, and some educators question their value anyway; and teachers do not find them easy to understand and use. An alternative is the 35 mm colour picture, available from commercial suppliers or, given suitable equipment for photography, made locally. Although some scientists have made such photographs, they have not

yet been mass produced. Much easier to photograph by the amateur are macro-pictures of local specimens to demonstrate biological principles, and Dalgety and Farley (1979) have observed that one of the best investments a teacher can make is to purchase a camera. A good set of some 30 slides was produced in Jamaica to support the ecology component of CISC, and offered to CROASE (49). The British Council turned these into multiple sets, which were distributed to CXC integrated science pilot schools. It should not be a difficult matter to finance and execute much larger scale reproduction and distribution.

In the teaching of physics, particularly kinematics, photography as a tool is well understood and all the equipment and most of the materials are available. The strategy has, however, been accorded low priority in the issues facing physics educators, and not much has been produced. It is hoped that schools will in the future be offered class sets of diffraction slides made from a design by Whitworth (1979) as soon as a source of high resolution film and chemicals is found.

### Other Visual Software

Equipment exists at UWI Mona and UWI St Augustine for the production of overhead projector transparencies from masters, for example the set of masters produced for Nuffield Advanced Level Chemistry. Under the sponsorship of OAS, the Physics Department of UWI Mona has designed and produced a set of transparencies to illustrate applications of physics (17). Item 27 in Appendix 5 shows that overhead projectors are more common in schools than they used to be. There does seem to be constant difficulty with obtaining replacement lamps for the projectors, and pens, which have a habit of 'disappearing', are not always in good supply.

Astronomy is becoming a feature of integrated science courses, and star maps for Caribbean latitudes have been produced. The Jamaica type, drawn by John McDougall (14), is a set of twelve maps, one for each month; it was published in the journal of the Association of Science Teachers of Jamaica, Science Notes and News (1973), and has also been extensively copied from Gestefax stencils and distributed by the Science Education Centre (23) and the Astronomical Society of Jamaica for use in workshops. The Trinidad type is a single map spanning 12 months and latitudes 60°N to 60°S - more complex but more useful to some users. Drawn by Father Benedict (50), this map was printed in ASETT's Journal in Science for Trinidad and Tobago (February 1979, p.43).