A quarterly Review of International Visual Communication Design

Issue number 2, October 1971

Price per issue 1 US dollar
Published in London by the International Council of Graphic Design Associations

Contents include
Television as universal educator
Defining the goals of education
Laser holography as a new medium

for visual communication
Visual study in teaching animation
Research into variability of sign perception in horizontal motion
Audio-visual hardware

The book in an audio-visual world
Visual communication and education
Some views on the recent VisCom 71 congress and exhibition on the learning industry

Patrick Wallis Burke
Introduction by John Halas

There is little doubt that during VisCom 71, ICOGRAOA was successful in bringing together the design profession and the Learning Industry, but the real integration of the two professions will be a painful and long process.

A book containing all that was said by the many eminent speakers who contributed, will be published in the Spring of 1972. It should serve as a valuable reference source on many aspects of visual communication, the re-organization of knowledge and the role of the designer in these processes.

In the meantime, we are devoting this issue of Icographic to the publishing of a small selection of some of the views that were expressed during this unique congress. It was unique in that it was organized by the only representative international body that speaks for more than 20,000 designers. It was unique in that it provided a forum for designers, educators, industrialists and technologists to discuss how the television sets, videotape recorders, teaching machines, film projectors, computer data systems, that are being installed in schools all over the world can be matched by effective learning programmes that are appropriate to these new media.

Learning is beginning to move away from the almost passive process in which the teacher explained a text and children followed it. Systems that promote inquiry and discovery are becoming the foundation upon which most of the new educational materials are being built.

In his book, The Act of Creation, Arthur Koestler says something that sums up much of what VisCom 71 was concerned with:

'The traditional method of confronting the student not with the problem but with the finished solution, means depriving him of all excitement, to shut off the creative impulse, to reduce the adventure of mankind to a dusty heap of theorems. Art is a form of communication which aims at eliciting a re-creative echo. Education should be regarded as an art, and use the appropriate techniques of art to call forth that echo. The novice, who has gone through some of the main stages in the evolution of the race during his pre-natal development, and of the evolution from savage to civilized society by the time he reaches adolescence, should then be made to continue his curriculum by re-capturing some of the decisive episodes, impasses, and turning points on the road to the conquest of knowledge. Our textbooks and methods of teaching reflect a static, pre-evolutionary concept of the world. For man cannot inherit the past, he has to re-create it.'
To design a television system not merely for social communication, but also capable of responding to a whole range of intellectual values and spiritual problems, is at the heart of the design challenge and of our present dilemma.

Aubrey Singer contributes a challenging and controversial view of some of the problems raised by television broadcasting. He is at present Head of Features Group for BBC Television (United Kingdom)

Television as universal educator

Aubrey Singer

Television as Universal Educator!!!

This title is not mine. I disown it and dislike it. It plays on words and makes assumptions. It treats different realms of experience as if they were alike. The use of the word Educator in this title tacitly equates the use of Television by the Educationalist with the use of Television by those who use the medium to win and hold large audiences.

Secondly, the title is too broad in its implications. By all means cast a net over the subject but let the mesh be fine enough to hold something when it is finally hauled in. Just as a Television programme depends on constraints to enhance the subject so should a title have some limits. Perhaps a better title for this particular address would be Image Bound versus Imagination Unbound or You Pay Your Money What's the Choice? or more popular perhaps in today's terms The Ecology of Television or How our Culture was Settled by the Pioneers but Cultivated by Unrestrained Education and the Subsequent Erosion that took place? Nevertheless, although the original title is not mine, this address is! At the outset I must declare that it is a personal statement. The opinions expressed in it do not necessarily coincide with those of my employers.

As a Programme Executive by my programme output must I stand or fall. I am committed to the belief that television can only establish its right to be considered as a serious medium by the undertaking of serious programme enterprises, designed for transmission at peak hours and also designed to maximise that part of the general audience who are in some way pre-disposed to be interested in the matter at hand. If I am engaged in 'Education' it is from the position that it 'is learning not teaching, drawing things out not forcing them in'.

Of all organisations my own, the one I work for, the BBC applies itself most assiduously to this position. It equally applies itself to the more formal educational programme designed to teach. It is after all charged in its Charter with the task of disseminating information, education and entertainment. Those of us engaged in this general factual programming would in fact be unwilling to be looked upon as Educators (except in the widest sense of the word). Nor incidentally do we consider ourselves, in our programme making function, as mass-communicators. We know only too well that communication is a two way interaction not a one way dissemination. We know too that mass is composed of individuals in small groups around television sets.

What we, the makers of those programmes are, is Impresarios of Fact - Mass Disseminators - Individual Stimulators.

More of this later. At this moment I had better try to define the terms under which we might be prepared to accept of ourselves and of our part in the medium, the term Educator.

In his book Education Through Art Herbert Read poses the question 'What is the purpose of Education?' Naturally he answers it and in doing so states terms in which television and those who work in it might be called Educators. Forgive me if I quote this at length.

"We can answer the question" says Herbert Read 'when we elect for a Libertarian conception of democracy. The purpose of education can then only be to develop, at the same time as the uniqueness, the social consciousness or reciprocity of the individual. As a result of the infinite permutations of heredity, the individual will inevitably be unique and this uniqueness will be of value to the community.

But uniqueness has no practical value in isolation. One of the most certain lessons of modern psychology and of recent historical experience is that education must be a process not of individualism but also of integration which is the reconciliation of individual uniqueness with social unity'.

This platonic definition was written in 1942 at the time of the first thousand bomber raid, just as the anti-aircraft gun predictor was laying the basis of the computer, before the emphasis has shifted to integration at the expense of uniqueness. It is however a definition with nobility of vision, leaning toward learning rather than teaching. It is a definition of education within which television would be willing to be termed Educator.

Now one of our dons - Raymond Williams - once trenchantly pointed out that "there are probably no masses at all only operators in the mass media trying to form masses". This is certainly true of the Educators of television - the Impresarios of Fact. They have to compete with other channels and with other television programmes for peak hour programme spaces. They therefore have to maximise their audience to ensure that their programmes reach as many of those as possible who are pre-disposed toward the subject. It is no good doing a programme on art or science for those with no interest in the subject. This way lies the worst assumptions, patronisations and excesses of the mass media. There has to be community of interest before there can be communication, and
The Impresario of Fact, the Mass Communicator, the Stuffed Mule on the principle of shared enthusiasms. He believes that 'Everybody ought to be taught' is cold-bloodedly different from 'Everybody ought to know'. He believes in excitement, stimulation, involvement by students. These people, myself included, work alongside colleagues who are indeed engaged directly in so-called Educational Broadcasting. Their relationship to the definition of Educator we have adduced is that of Educationalist. They are different in that they do have a mission to teach. They do believe in limited audiences, in that 'only people who want to be taught about this subject need watch'. In doing this they tend to play down those skills which lie at the heart of communication. The skill of getting, gripping, and holding an audience.

In Britain, such Educational Television comes in three categories: Schools Television, Further Education and The Open University. In explaining and exemplifying what goes on in my own country I am outlining what happens in many countries.

Schools Television, as its title suggests, broadcasts programmes into the classrooms of schools. In the past year some twenty-seven series have been broadcast. They range from programmes designed to extend the experience of infants to programmes for those about to leave school and enter university. They go into some 23,000 schools (there are incidentally about 38,000 schools in the British Isles). The cost is roughly £1,000,000 per year paid by Licence money (a sum paid by every set owner, £6 for black and white, £11 for colour).

Further Education is a second, yet totally different category. It encompasses vocational guidance, enrichment programmes and liberal arts. Some thirty series were broadcast, including language courses in the last year. Management Accounting, Medicine Today for doctors, Using Broadcasts in Schools for teachers, Making Out a series on modern artists, Men and Materials, a series of science on the materials. The cost per year is about £1,280,000 and again, this money comes out of the Licence fee.

Finally there is a new area, probably the most important social experiment of the time - The Open University. This is in its first year, at the moment broadcasting four foundation courses, but as the pattern repeats and the main courses start, is due to broadcast some nineteen hundred television programmes a year. The capital cost over the first two years was £800,000 - it will rise to £1,000,000. The programme revenue cost for the television part of the operation is approximately £1,000,000 per year. Television and Radio Broadcasts are all fed into a single main system and call for some ten hours work each week from those who enrol. It will take upwards of four years for a student to qualify. The cost of all this does not come from governmental subsidy, it is supported by enrolment fees and a Government subsidy.

This then, Schools, Further Education and Open University absorbs about £4,500,000 each year and occupies about 960 broadcasting hours. Similar educational operations exist in other countries, in Germany, in Italy, in Japan, The Soviet Union and the Socialist Countries. So far as my own country goes this 960 hours of Educational Broadcasting takes place alongside 600 hours of General factual output.

However, since the mass Educationals in targeting their audience limit its size, this Plethora of Pedagogy is not comparable to the mass media. It is essentially educational programming. There is nevertheless a significant difference between the two approaches, that of educationalist and that of educator.

The first difference lies in the size of audience. None of the Educational output referred to commands more than 0.6% of the audience. This is partly a function of time. These programmes tend to go out at off-peak hours, and yet some of the programmes are transmitted at between six and seven in the evening, or at eleven-twenty at night. Since between six and seven, many Technological programme can command approximately 10% of the potential audience (about 5,000,000 people), why the disparity? For it is a disparity which exists no matter what conversion factors are applied. The 960 hours of education will yield one tenth or less of the audience for the 600 hours general programming. It proves the limiting and delineating nature of the approach.

The second difference lies in the budgets for the programmes. Educational television does work on smaller budgets than programmes in general television. Even so, the cost effectiveness is very low. 8,000 pupils in the potential enrolment (at the moment) for those interested in each Open University and Foundation Course television programme. The cost per thousand viewers is, therefore, astronomically high. There are only (at this moment) 32,000 students. Average costs of programming are £1,600,000, which works out at approximately £50 per student per year! Correspondingly the cost of a general programme works out at a fraction of a penny per viewer.

The third, final and crucial difference lies in the method of the selection of subject matter for series and programmes. Schools and Open University programmes are, in the Educationalist sense, defined by soundings among the Educationalists responsible for these areas of teaching, ratified and supported by a structure of Committees and Advisory Councils.

The classical example of this is, of course, Further Education. As might be expected where the goal is something vaguely defined as vocational guidance, the end-product is wide-ranging in its selection, tends to limitation in conception and therefore tends to lack the excitement and enthusiasm which comes from trying to maximise the audience.

In Britain, Further Education works to Advisory Committees. Since the broadcasting hours of television programming are limited by the Ministry of Posts and Telecommunications, the Further Education Advisory Committee has to give its imprimatur to all programmes purporting to be Further Educational. The Association of Chief Education Officers, The Association of Education Committees, Association of Municipal Corporations, Association of Principals of Technical Institutions, Association of Tutors in Adult Education, Association of University Teachers, British Association for the Advancement of Science, Committee of University Colleges and Polytechnics, County Councils Association, Department of Education and Science, Industrial representative, Inner London Education Authority, Minister of Education Northern Ireland, National Advisory Committee on Education for Industry and Commerce, National Federation of Women's Institutes of Adult Education, National Union of Students, National Union of Towns-women's Guilds' Open University, Schools Broadcasting Council for the United Kingdom, Scottish Institute of Adult Education, Trades Union Congress Education Committee, Universities Council for Adult Education, Welsh Joint Education Committee, Workers Educational Association and finally three representatives from the BBC.

This structure has given its imprimatur to the range of programmes I have indicated, ranging from highly specialised vocational guidance through to the visual arts. True these ideas will probably have come up to them from Producers in the first place, but the range of programming the Committee has agreed, including as it does music, philosophy, scientific lecturing and the history of pop could, to a disinterested observer, suggest that something is employing elephants to breed mice!

The world over, Educational Television, where it is under the direct control of an Educational Establishment, suffers from this poverty of aspirations, it is goal oriented, aimed in a limited way at target audiences and syllabus directed. If it may cover much of the ground dealt with by regular peak-hour cultural and public affairs programming, it differs from it in the same manner as the free range chicken differs from the broiler fowl. Now, were it to ride on a free market, were it to shake off the controls and work to a genuine situation of supply and demand, then the inequalities would fast disappear. New technology could do, and indeed should do just this! Video cassettes, with their emphasis on publishing rather than broadcasting will for the first time make the educationalists accurately determine and live by the market. The economics will force them to learn money into proven need, rather than scattering subsidy indiscriminately. The sooner this happens the better, and a heavy burden will be lifted from the broadcasting authorities, for if las Andre Marx's argument that our culture is indeed 'A heritage of the quality of the World' then too much of our limited television time is devoted to forming and maintaining this culture within the circumscribed polarisation of syllabus and the woolly aspirations of committees of teachers, rather than exploring it in a free and open way, designed to grip and will the programmes tell a real story, be invested with dramatic form.
given a beginning, middle and end (though not - as Mr. Luc Godard once observed - necessarily in that order) they will also be designed to give pleasure.

The pleasure principle is well known. It may be as simple as the sensuous beauty of the images seen in some episodes of the programme. Civilisation - as direct as the thrill of intellectual adventure one gains from the insights of a good science programme - as subtle as the conveying of the enthusiastic relationship between a supreme master and his subject, such as Tertullian taming a master class of cellists or Fred Hoyle explaining cosmological theory.

Since no goal is at stake, no exam, no course - nothing except the enjoyment and knowledge for its own sake. The producer and participants, whilst striving for comprehensibility, will not necessarily expect complete understanding. In no way, therefore, has anyone a need to patronise the audience by making assumptions about talking down to lower intellectual levels.

Certainly complete understanding may not be achieved, but the revealing of the relationship of the subject to the programme participant and to the audience's life consciousness and experience is more than sufficient for enjoyment.

Thirdly, in the producer's attitude to the audience, like the good showman he is, he makes sure that he tells a story and by the honourable and natural means used since the dawn of history, seeks to get, grip and hold as many people as possible. He will (as I have said before) aim at those with largest interest in the subject, fully aware it cannot please all of the people, all of the time. (Parenthetically, if he thinks it can only please a few people for part of the time, he won't do the programme).

This form of programming is, as you can see, in varying degree apart from the educational programme. Different in approach - different in execution - different in its attitude to getting and imparting knowledge to an audience. Although the educational is larger than the general output, the cost per viewer is much higher and the audience penetration lower. No wonder then that the educational establishment views these budgets and placings with envy. Naturally, since the general programmes are the ones which fill the role of universal educator envisaged in the title of this article, it is only right to examine their universality. In audience terms alone they are very effective.

The Forsyte Saga, for example, was seen by 26,000,000 people in Britain over three runs. Abroad, the numbers are staggering - an estimated 50,000,000.

The programme Civilisation, has been shown three times in Britain with an average of 5,000,000 viewers per episode. When screened on Channel 4, it averaged about 3,600,000.

The science programme Horizon, the feature programme Bird's Eye View, and the arts programme Review, all command audiences six or seven times as large as their educational counterparts. These audiences by themselves are large enough to excite great envy in any educationalist. But the size of an audience by itself is only a superficial reason - are the programmes making an impact?

We can produce some measurements. The diagrams which accompany this article show audience reaction profiles - they tell their own story.

However, none of these shows anything more than the audiences' preferences. What about wider correlations? More lasting effects?

Here we are on much more difficult ground. Yet book sales may be a clue.

Before we first transmitted The Forsyte Saga, the sales of its central book Man of Property were running at 2,000 copies per year. After the series, the sales rose to 150,000 copies per year.

And in the case of the programme Civilisation, a book based on the series has sold 150,000 copies hard back and 100,000 in a paper back edition, in the United Kingdom. In the United States 200,000 copies of a hard back edition have been sold at a price of 15 dollars per copy!

Recently, we made a two-hour programme on the latest advances in astronomy called The Violent Universe. The book came out on the day of transmission and in ten days we had sold 15,000 copies. Sales now stand at 24,000 copies.

Broader correlations are more difficult to determine. Much of the information, the concepts, the delights and enthusiasm conveyed in this general programming must rub off on the audience. American advertisers have discovered, for that matter, would not spend billions of dollars and millions of pounds on television advertising if their commercials did not result in increased sales. Conversely, some fear that the depiction of violence in television might be responsible for an increase in anti-social aggression, i.e. crimes of violence. There is a correlation that can be made between the growth of television and the increase of such crime. Proof is a different thing altogether. It is the subject of much inconclusive social research, in its way as hard and as tantalising as trying to prove the connections between some viruses and human cancers. All the signs are there, but the proof eludes the researchers.

There would seem to be no way out but to accept, at this moment, albeit intuitively, that television placed as it is, in nearly every living room, must be the most persuasive and socially aggressive medium yet known to mankind. Television must be a force, a universal educator, whether for good or evil must depend on the attitudes reflected in the programming. Our society leans to the belief that the accepting of positive qualities tends to eliminate their opposite. We avoid hate by loving, says Herbert Read. We avoid sadism and masochism by community feeling of action. If negative attitudes are unthinkingly allowed to be used to give vicarious thrills, the public will not respond. The person under suspicion always has more apprehension cast in his direction than the person on trial - whether guilty or not!

This universality and its possible effects have attracted some unwelcome (but perhaps deserved) attention in the direction of television. The role of television as a universal educator, in the sense that we have defined so carefully, is under scrutiny by Governments, politicians and pressure groups, the world over. It is at this moment particularly vulnerable. The small band of people who run news, factual and information programmes for a general
With the increase in the amount of Educational programming (a five-fold increase over ten years), a form of Gresham's Law begins to prevail. The amount of talk and factual programming under the educational banner, goal and syllabus oriented as it is, the sheer amount of facts competing for attention - debases the value of the other. The Educational Establishment can thus be said to operate the protection racket in the communications jungle. At one extreme, it can offer the politicians a cushion against the Networks' Public Affairs programmes (political and informational). At the other extreme, it offers the Networks a worthiness that the Educational Establishment is virtually unassailable, since it also controls the qualifications that ensure advancement in the meritocracy. Having won the race without crossing the start or finish line, the Educationalist makes sure that those who follow will run the course he has designed. But not only is general factual programming threatened from without, this vital part of a libertarian democracy is its own worst enemy. There are two factors that erode its impact. The first is the 'metronome like' quality of television. The steady beat of the half hour and hour long time slot, produce over many programmes, an hypnotic predictability of pace and style which militates against programming effectiveness. Serious programming needs a serious consideration, which in turn needs sufficient time to allow the fresh and unpredictable to occur.

One of the most recent developments has been the mounting of programming on certain subjects up to two and a half hours in length. Recent co-productions have been devoted to such matters as the recent developments in astronomy - the latest advances in research into the human brain - there have been programmes on the common market or American responsibility in Vietnam. These have been powerful counters to this 'metronome' effect. They have given the general programming a new thrust and have significantly reinforced the view that if the subject matter is sufficiently important, even if very intellecutally demanding, the audience will be appreciative of a chance to come to real grips with an argument.

The second factor - the second enemy within - is Tele-Journalism. The glib and instant opinion vitiates public affairs and factual television, just as surely as 'Journalism is the death of Literature'. Instant politics, instant art, instant science, built to the recipe of 'take journalist, add subject and stir' might be a means of satisfying viewers demands for topicality, but after a while its sheer glibness undermines credibility. Both these pitfalls reinforce one another, but one way of avoiding them points anew direction. It lies in harnessing our television skills with those who have developed expertise, scholarship and style and become authorities in their own field. Lord Clark's view of Civilisation - ideosyncratic though it may have been - had an authority and solidarity to which no instant television, no producer's journalistic essay could aspire. To be an effective universal educator television must shake off some of its own inbred attitudes and have faith in the world outside.

Before ending this section of the general audience programme, the real universal educator, I ought to say that its survival depends on an act of faith. 'I shot an arrow into the air, it fell to earth I know not where', hardly seems a criterion on which to base the most crucial factor of television programming, yet through audience research and other indications we see (in Richard Hoggart's words) that 'the taste of today's audience is potentially more varied than Programme Planners are led to think or often lead themselves to think... They might decide to offer programmes which some people, though as yet not a large majority or even a sizeable minority, already find imaginatively exciting'.

So far, in this exploration of television as universal educator, in order to polarise the argument, I have taken a mildly polemical position in describing the general audience programme versus the educational programme. The world would be poorer without either form. It's a question of balance. Of course, the trouble is that there is simply not enough television time or money to satisfy all demands. In this situation the seductive logic of the educational position is in sharp contrast to the vulnerability of the other. The weakness of the general programming has been most ably defined. Again I quote Richard Hoggart:

'We are told' says the mass media are the greatest organ for enlightenment the world has yet seen...it is true that never in modern history were so many people so often and so much exposed to so many intimations about societies, forms of life, attitudes other than those which obtain in their local societies. This kind of exposure may sometimes be a point of departure for acquiring important intellectual and imaginative qualities: width of judgement and a sense of the variety of possible attitudes. Yet in itself such exposure
does not bring those developments, it is no more than the masses of stone which lie around in a quarry and may build a cathedral. The mass media cannot build a cathedral and their way of showing the stones does not always prompt others to build'.

Hoggart defines well the essential flaw of the disinterested approach. The educationalist builds on just this flaw. He takes as his starting point Lord Brougham's honeyed words, 'Education makes a people easy to lead but difficult to drive, easy to govern, but impossible to enslave'.

This 19th Century liberal view to some extent mirrors Herbert Read's platonistic viewpoint written in 1942 which I quoted earlier. But the sheer quantity of education needed to hold our civilisation together today has produced a change in quality.

The Educationalist has persuaded Governments that we can produce technology to order. The Educationalist has convinced economists that it is not only a national asset to have a pool of qualified people, but even better if they can be kept off the labour market while they qualify. The Educationalist has persuaded the under-developed world that if they want to catch up quickly they should be their first port of call. He has, in fact, become a main pillar of the ruling establishment the world over. Since the committed programme maker must by this very ethos question the ground rules and rock the boat, he finds himself in conflict, more often than not because he points out that the stated aims and ideals of the Educationalist are at variance with his methods of achieving them. The promised Utopia through teaching is nothing but a mirage.

Our world is a haunted place. The preservation of nuclear stalemate in the midst of an expanding population, steeped in inequality and fundamental tensions, is something we have all lived with for some twenty-five years. It is maintained that knowledge is the key to co-existence. Scientific knowledge to maintain the population and the balance of terror and all associated technologies. Medical knowledge to support an overcrowded world. Political knowledge to resist the blandishments of other ideologies. Knowledge of the Humanities (if any time is left over from the study of high priority areas) to expand self-awareness.

With all this knowledge, so the claim goes, will come understanding and with understanding, tolerance and the ability to live together. It is under whose Aegis the knowledge should be disseminated that the argument is about, what should be the balance between goal-oriented and disinterested dissemination? Are the

'Tygers of Wrath wiser than the Horses of Instruction'? The argument appears in other fields of endeavour. In science it is well known. It is the argument between pure (knowledge for its own sake) and applied (goal directed pursuit of answers) research. The pure scientist will argue that knowledge, being linked to discovery, can only increase at random, that the rates of discovery cannot be determined.

The applied scientist, on the other hand, says that although the rate of discovery must be random, it can be speeded up if enough men, material and thought are applied to any particular problem. Since our survival and a host of other things such as industrial profit depend on scientific discovery, the applied point of view has been gaining momentum at the expense of the pure.

Of course, in the end, this is to do with the politics of over-population. The under-developed countries urgently need technicians to give them a higher standard of living, to give them food, to give them medicine. Oh, if only we had just some of your pollution' is the cry that goes up from an Indian faced with an accidental discussion of environmental problems. The developed countries are also in a hurry. They need technicians and highly trained people in all walks of life to maintain their standard of living and the over-complex fabric of their society.

People in a hurry have little time for the niceties. Everything becomes subject to national aspiration. Democracy and freedom of speech earn their lip service only when they serve national ends. Thus India wants television and a satellite to spread it, in order to feed education to the villages. The Soviet Union uses television in the same way as it uses radio and film - as propaganda serving the ends of communism. Capitalist countries use television to advertise goods and stimulate their economies.

The mass media, cinema, radio, paperbacks, newspapers, records and my own medium, television, are the irrigation channels of our society's culture. Fail to maintain them, over-direct them, overload them, and the culture on the one hand withers and dies, on the other hand blossoms with an over-ripe bloom that rots on the bough.

Just as the applied sciences did not throw up the discoveries of an Einstein, Newton, Curie, Fleming, Rutherford, Bohr or Freud, so the great enrichments and excitement of television are unlikely to come from goal oriented programming - be it commercial, propaganda or educational. These new directions, new programme ideas, are much more likely to come from the Impresarios of Fact wheeling and dealing with the ideas and concepts of our age.

In this era, it is becoming too tempting, too seductively easy to sacrifice the free for the controlled, and as part of this process to elide the distinction between the educator and educationalist. Within the definition I have discussed at length, I am happy and proud to be in television if it is a universal educator, but God help those of us who work in it if it should ever become a universal educationalist.

Put it another way, and I make no apologies for repeating Mr Blake.

'The Tygers of Wrath are wiser than the Horses of Instruction', but our society is now ploughing up the forests where the tigers abound.
God created man after his own image, so we are told, and endowed him with the gift of life. We are not told however, that it was the first movement made by man after his arrival on earth. If, for instance, his first reaction after receiving the breath of life was to look at himself in a mirror and say to his creator 'My God, you really have done a good job... Congratulations!' then he must have been human. If, however, he was content simply to bend his body around without any consciousness of his existence, then he was nothing but an animated object like the puppets one sees in animated films.

Imagine if there had been a camera man present on the spot to record on film and sound the creation of man. How much paper, ink, toil and sweat would have been saved if we had in our possession an audio-visual witness to this miracle.

Let us then take prehistoric man as the basis of our discoveries and scientific knowledge. This man can be seen as an individual to the extent that he is discovering his own civilisation, or as an uncivilised being who having destroyed a civilisation is trying to rediscover it. This man discovered the three-dimensional image, that is to say the perception in length, breadth and depth of the forms which surrounded him. This perception was of immediate importance to him since it enabled him to identify a place where he could sleep, where he could drink water, the shape of the animals he had to hunt, etc. Then he discovered light, changes of colour, noises. He learned to understand the meaning of thunder, the noises made by animals, the cries of birds, etc.

He created his universe of knowledge around the weather, around the movements and sounds - to such an extent that an image without a sound or movement frightened him. For example, the living bison was for this man a natural thing, an animal to be hunted, indispensable for his survival. However, a bison sculptured or drawn was an incomprehensible object which mystified him completely.

Before creating images, man collected objects that were common to his surroundings; stone, bones, leaves, etc. Thus he has a means of communication; for example, by showing a bone he could communicate the idea of an animal. He also learned to differentiate the various objects surrounding him and created adjectives to describe these differences: big, bigger, bright, brighter, young, younger, etc.

Pride is a sentiment which stimulates the creative process in a negative direction. Exceptional. One day a man took a stone and with it hit another stone.

By cutting it to a special size he conceived a specific object. From then on, larger or smaller stones were of no interest, only stones were cut by hand were of value. We arrive then at the first man-made object.

A prehistoric man leaves to visit a neighbouring tribe. Having forgotten his hewn stone at home he finds one almost identical at his neighbour's. Unable to explain the slight differences, between this and his own stone and his finger pointing picture of his own in the sand and thus, without knowing it, invents an two-dimensional representation of an image.

All the members of the tribe were delighted to see an abstract image of an object that was not present. The chief of the tribe immediately gave orders that an enclosure be put around his drawing so people walking on it... alas, it rained and the first drawing of the world disappeared!

Prehistoric man made many designs on walls of caves representing in abstract form, life, death, man, human suffering. These drawings were always accompanied by cries, songs and dances. For instance, a man would hammer on the drawing of a bison with a stick in order to stimulate in his audience a desire to hunt.

Imagine the atmosphere in a prehistoric cave, it was dark, smoky, with the shadowy outlines of armed hunters dancing around and beating rhythmically the images of the beast, the cries of the children, the moaning of the sick and aged. Imagine this scene without the sound effect - you are left with only the stark poverty of a drawing in an art album.

Happily, we still have the image of the bison. This has been transformed, stylised, simplified again into signs which formed letters, thus enabling literature to reproduce an image and the atmosphere in which the movement took place. These elements are transmitted to us in the form of words which reflect the style and personality of the author, to which is added the feeling of the artist and the talent of the writer. Besides this personalisation by the writer the description will be modified still further by each reader according to his own knowledge, his own feelings and his own imagination. Therefore, the image as received from the text will be more or less true to the original drawing of the bison which, thank God, we still have as evidence.

This humorous anecdote, which could very well provide the basis for an animated film, expresses the idea that we should always look to the sources of information, eliminating intermediaries and interpretations but taking into account the observations of others in order to form our own opinions. Audio-visual means may try to use this method of acquiring knowledge. Audio-visual, however, should not be interpreted as a method of presenting a reality stripped of all form of abstraction, which is superior as a quality of human intelligence.

If we show a flower to a group of people, each one will recognise it immediately as being a flower. Further impressions will differ according to the people concerned. One will see the species, the other will notice the composition and another will experience a sense of pleasure or indifference. Imagine that Picasso is among these people; he takes a pencil and paper and draws the flowers, then shows his drawing to the same people. It is not certain that everyone will recognise it as being a flower even though the personal observations regarding its beauty and form, etc., may be the same.

In teaching therefore, one should take into account the information available and show the difference between this information and its interpretation. The information must be presented to the student in order to enrich his wealth of knowledge. For instance, we inform the student that a hand is made up of four fingers and a thumb, then during his own interpretation he can if he wishes represent it as having the form of a broom. Thus, the definition is completely illogical; to inform him that the hand has the shape of a broom and then leave him to discover that it has four fingers and a thumb.

During courses in animated drawing in Bucharest, I presented my students with an example of abstract representation. Let us take for instance a spectator who arrives at the cinema. He sits down in a relaxed position. On studying his attitude we find that the general shape of his body forms obtuse angles. If, during the film, his interest increases, he changes his position and the line of his body forms right angles. If the action reaches a point of suspense, the spectator leans forward and the angles formed by his body become acute, like those of spectators watching a football match or a horse race. As soon as the suspense lessens at a climax, he jumps up, changing the acute angles to make a straight line with his body. Let us look, for example, at the attitude of Rodin's 'thinker' - there are a large number of acute angles which express concentration of thought.

The relaxed position of biblical images is provided by obtuse angles (for example, the picture of Christ preaching). In Egyptian art the right angle is widely used. We can therefore ascertain that relaxation is expressed by obtuse angles, attention by right angles, and explosion by a straight line. Let us now try to associate these angles with sounds. When we find in a subject a dominance of obtuse angles, a slow calm music is indicated. If we look at this music we shall see that the general line connecting each note forms obtuse angles. The right angles correspond to the musical accident, syncopation, such as percussion, which shows as two lines which break into each other. The acute angles can be associated with accelerated sharp notes which pass from the broken line to the straight line.

Using this example, we gave our students exercises in composition in which they had to depict attitudes which corresponded to the angles and music described. The exercises were given simultaneously to two groups of students, one group having studies this method of angles and the other not.

The students of both groups produced almost the same results, the one group working with instruction, the other by intuition.

A student who produces his subject using the knowledge that he has gained is superior to one who produces it through intuition or talent only. An artist who is able to adapt knowledge to existing talent is the master of his skill.

This is one of our methods of teaching the relationship between sound and movement to student designers. We have also studied curved lines as representing the psychic state of an attitude, and studied the expression of forms such as the circle, the square, or the triangle, but this short article does not allow me to detail more than the method of angles described above.

I have pleaded the cause of teaching by audio-visual methods using, and please accept my apologies, used the written form. I am sure that if I could have put this onto the screen with sound, I could have been more effective. If I had had the possibility of seeing my ideas expounded on the screen it would have been like looking into a mirror and I would have been able to gaze at myself and say 'My God, you really have done a good job... Congratulations!'
I count it a very great pleasure and a privilege to be invited to speak at the very beginning of this important international conference. I speak not only because I am a historian keenly concerned professionally in the communications revolution of the 20th Century, a revolution with world-wide implications for ways of seeing and feeling, as well as thinking, but as Vice Chancellor (Rector) of the first and biggest of Britain's cluster of new universities. These universities, like their counterparts, are, of course, only a small part of an even larger and more complex system as a whole.

The remarkable growth of higher education all over the world during the 1960s has been a great example to us all, for it was a period when social, economic, political, religious and academic - of all ages - ancient, middle-aged and young - were under strain in many places. If only a handful of universities had been created during the 1980s, they would have been incremental to the system. There were enough of them, however, in Britain, at least the country I know best, to change the dynamics of the system as a whole.

All my own thinking about education begins with the premise that it must be prepared to innovate, not just to imitate. This does not mean pursuing reality for reality's sake, but being prepared to consider afresh both means and goals. For all the difficulties of the 1960s there was a great desire not only to change the dynamics of the system but to change the system as a whole. For all the difficultly between countries and there were political and historical factors, there was more usually favourable winds often blew not only from the part of the students as well as of their members saw the urgent need to move into a wide variety of jobs for graduates. The number of first-year students dramatically increased: they often took less time to pass at the first of the 1960's which influenced the formu-

interest during the 1960's both in early learning processes in the primary stages of education and at the end of the process, the so-called 'post-experience' courses for adults where the 'experience' factor itself was of cardinal importance in relation to what was being learned and how it was being learned. The effect of early specialisation at school, often premature, specialisation, was studied, and there was growing concern for curricular reform, particularly in mathematics and the natural sciences. Professional education, perhaps the most stubborn kind of education in resistance to change, was also undergoing such medical education the most resistant of all - was itself showing signs of change. As far as engineering was concerned, for example, the widening lines between mechanical, electrical and civil engineering began to seem less formidible as engineering began to be approached in terms of materials, structures, control, design and management. It became a commonplace that engineers of all kinds needed first to have a good understanding of the phenomena and of their application, second a grasp of the relevance and utility of engineering to society, third the ability to organise ideas, to communicate (preferably in more than one language) and to assimilate new ideas, and fourth, the potential to deal with people, particularly in groups.

The social and cultural changes outside schools, polytechnics, universities, research establishments and other agencies of education - the changes related to the logic of the advancement of learning - or to the broader changes within society. Where quantitative expansion was not accompanied by qualitative changes there was often disillusionment and frustration. The expansion of provision could produce disaster if the object is simply turning out more and more people of the same kind. Where the provision of resources was inadequate to finance expansion, at least on the base of earlier standards, there were often breakdowns and disturbances. And there were deeper sources of conflict, political, and social, though they were not always explicit. There was a clash, in many cases a dramatic clash, between the demand for individual self-expression, often extreme, and the effort to plan not only for one single generation of students. Some of the increased flow of graduates were highly critical of the values of their own societies, particularly of the values of industry, and questioned the relationship, an intricate one, between university expansion and research provision and the politics of what they called the system. At the same time, those operating the system itself began to reformulate the educational goals which they thought essential. They began to seek more recruits with identifiable qualities of imagination, inventiveness, quick-wittedness and adaptability. In this context, not only in the academic context there were counter-tendencies to those making for increased specialisation, even though in all countries there were growing demands, not always expressed in the same way, for particular kinds of expertise. It was beginning to be recognised that enormous changes were needed in industrial provision, from the requirements of a new breed of graduates, to allow for their early advancement not at the same time to recognise the fact that they would have to pass at first through what has been described as a 'de-frosting' period. It was also recognised that refresher education and re-tooling education were indispensable at least in industries or occupations requiring rapid and radical technological change or with a close relationship to changing taste or fashion.

It would be foolish to pretend that there was anything like a consensus within the decade in relation either to the changes inside knowledge- management systems or between the educational system and society. But there were crucial factors, in any educational change. The changes related to the logic of the advancement of learning - or to the broader changes within society. Where quantitative expansion was not accompanied by qualitative changes there was often disillusionment and frustration. The expansion of provision can produce disaster if the object is simply turning out more and more people of the same kind. Where the provision of resources was inadequate to finance expansion, at least on the base of earlier standards, there were often breakdowns and disturbances. And there were deeper sources of conflict, political, and social, though they were not always explicit. There was a clash, in many cases a dramatic clash, between the demand for individual self-expression, often extreme, and the effort to plan not only for one single generation of students. Some of the increased flow of graduates were highly critical of the values of their own societies, particularly of the values of industry, and questioned the relationship, an intricate one, between university expansion and research provision and the politics of what they called the system. At the same time, those operating the system itself began to reformulate the educational goals which they thought essential. They began to seek more recruits with identifiable qualities of imagination, inventiveness, quick-wittedness and adaptability. In this context, not only in the academic context there were counter-tendencies to those making for increased specialisation, even though in all countries there were growing demands, not always expressed in the same way, for particular kinds of expertise. It was beginning to be recognised that enormous changes were needed in industrial provision, from the requirements of a new breed of graduates, to allow for their early advancement not at the same time to recognise the fact that they would have to pass at first through what has been described as a "de-frosting" period. It was also recognised that refresher education and re-tooling education were indispensable at least in industries or occupations requiring rapid and radical technological change or with a close relationship to changing taste or fashion.

It would be foolish to pretend that there was anything like a consensus within the decade in relation either to the changes inside knowledge-management systems or between the educational system and society. But there were crucial factors, in any educational change. The changes related to the logic of the advancement of learning - or to the broader changes within society. Where quantitative expansion was not accompanied by qualitative changes there was often disillusionment and frustration. The expansion of provision can produce disaster if the object is simply turning out more and more people of the same kind. Where the provision of resources was inadequate to finance expansion, at least on the base of earlier standards, there were often breakdowns and disturbances. And there were deeper sources of conflict, political, and social, though they were not always explicit. There was a clash, in many cases a dramatic clash, between the demand for individual self-expression, often extreme, and the effort to plan not only for one single generation of students. Some of the increased flow of graduates were highly critical of the values of their own societies, particularly of the values of industry, and questioned the relationship, an intricate one, between university expansion and research provision and the politics of what they called the system. At the same time, those operating the system itself began to reformulate the educational goals which they thought essential. They began to seek more recruits with identifiable qualities of imagination, inventiveness, quick-wittedness and adaptability. In this context, not only in the academic context there were counter-tendencies to those making for increased specialisation, even though in all countries there were growing demands, not always expressed in the same way, for particular kinds of expertise. It was beginning to be recognised that enormous changes were needed in industrial provision, from the requirements of a new breed of graduates, to allow for their early advancement not at the same time to recognise the fact that they would have to pass at first through what has been described as a 'de-frosting' period. It was also recognised that refresher education and re-tooling education were indispensable at least in industries or occupations requiring rapid and radical technological change or with a close relationship to changing taste or fashion.
in many parts of the world was to encourage the asking of questions rather than to supply answers, there was scope for confrontation, to use one of the favourite terms at the end of the decade. It is impossible to generalise adequately about any of these matters, though it became highly fashionable to do so, not least about the so-called generation gap. I like Daniel Bell's summary in 1966: Generation: A logical class term denoting a separation of age groups: once thought to be thin years, then twenty, then ten, more recently five, and most recently six months.

Fortunately there were many people in all societies who in an age of change followed the advice - though they usually did not know it - of the Athenian statesman-poet Solon: 'As I grow old, I keep on teaching myself many new things'.

I have concentrated so far on the experience of the 1960's since in certain respects I believe that this experience was different from what had gone before and what is now happening. Before I turn to the conclusion to the 1970's, I would like to relate more directly what I have been saying about educational change to the continuing communications revolution which contributed to the identity of the decade and gave it much of its enhanced sense of immediacy and ferment. I want to make four points, all of which are directly related to the question of educational goals:

1 In most parts of the world the new communications technology, a transitional technology, was associated more with the conveying of information, the tactics of persuasion and the provision of entertainment than with education, Not surprisingly some of the methods of learning and teaching in schools and universities began to look increasingly outdated;

2 What was not taught formally or even informally in educational establishments but was communicated throughout the different media of communication was itself educative, if not educational, in that it shaped attitudes, not least to time, place and techniques. We know relatively little, despite a considerable research effort, about the implications of all this, including television, for successive cohorts of schoolchildren, but we do know that in some countries at least, one of the manifestations of the new communications set-up was a narrowing of the gulf in habits and tastes between those engaged in higher education and those outside;

3 A number of very specific kinds of opportunity emerged in relation to this development in the use of technology. First, the moves towards what is often called, in my view singularly, 'mass education' left the way open for technological innovation. Given shortages, both of teachers and physical resources, including in some cases the right kind of space, there was scope for employing new techniques through, for example, open university provision. There were many universities and other institutions where the employments and developments in the area were being pushed ahead. In Britain, for instance, a number of universities were designated as high activity centres where experiments would be carried out and their results communicated to other people. The fact that there was some concern expressed during the decade that the advance of educational technology would put teachers out of work, was effectively countered by such prominent writers on education as Sir Eric Ashby, who placed the secrets of the decade in long-term perspective. Sir Eric, in a different way, rightly pointed out that the invention of printing; and (fourth) the development in the 1960's of new 'technologies' which would transform the whole process of education. Seeking to exert some fears, Sir Eric went on to argue that as five centuries of the printed book had diminished the lecture, the seminar and the tutorial, so the new means of education would liberate teachers and enable them to concentrate on what they could do best, rather than reduce their role. In most fields of knowledge - even in science and technology - the intuitive value judgement, the leap of the imagination, the processing of data by analogy rather than by deduction, are characteristics of the best kind of education. We know no way to elicit these except through dialogue between teacher and pupil.

The precious qualities transmitted from teacher to pupil are not facts and theories, but attitudes of mind and styles of thinking. I have quoted Ashby's words uttered in 1966 in some length because powerful as they were, they never quite converted the sceptical. There were reasons why all the educational opportunities of the decade were not taken, and one was a physical gulf between the main body of teachers and the enthusiastic minority prepared to try out new things. A second, of course, was a reluctance of administrators and planners to invest scarce resources in developments which had an obvious element of risk about whatever gains it was predicted in the long term. But though the way was open for technological innovation, it was often approached charitably rather than wholeheartedly.

4 Whatever the anxieties and the lags (some of them from the supply side rather than from the side of the consumer), we have continued a growing sense, as I cited at the beginning of this address that educational objectives had to be stated in a new language, as immense new possibilities were being opened up. I can do no better than refer to an article written by one of the Deputy-Directors General of UNESCO at the end of the decade and the beginning of a new decade in 1970: 'An Open University' he puts it at the start of the International Education Year, 'provides a radical change in the overall concept of education'. In a certain sense, of course, lifelong education is no novelty. There have been men who, driven by a thirst for knowledge and enlightenment, have achieved intellectual and moral progress throughout their lives. What is new is the recognition that this ought to be the time of all people and not of an elite, of the entire society and not of a segment. Education, under this concept, is not something which begins at the age of five or six and continues until the tribal rites of examinations and diplomas conclude secondary school, or university life, but a continuous process which lasts as long as life itself. Education is not the gateway to society. It is in the centre of society. Education is not a preparation for life, it is part of life. For life-long education it is obviously impossible to continue with the traditional systems. The whole field of education must be re-examined and re-orientated both in its contents and methods. This kind of approach pointed to a new conception after school, even a new design of a school; it also pointed in the decade when so much was made of the generation gap, to universities becoming over the years more of multi-age institutions. It also going back to the very first educational revolution to which Ashby referred, suggested that these could be a new place for the home. It was not merely in Britain, where the desire about the foundation of an Open university gave way to its practical planning, that this last suggestion began to take root and lead to new thoughts.

I have identified four aspects of change during the 1960's. I want in conclusion to look ahead. Much of this conference will be concerned with techniques, in the other, with questions of research and development, above all with questions of design. I would like to concentrate on goals and the ways of achieving them. Educational expansion will, I believe, continue although not every country will choose the Californian model of balance the nation and choose to pour money into educating a bigger and bigger sector of the age group in years 17-20, either in universities or in after institutions of higher education. There will be a more research into individual and group motivation. Given the provision of educational facilities, how will they be efficiently employed? Allowing people to develop their skills and to pursue their changing interests at different ages will turn attention to the relationship between self-education and institutional education, in a more profound way, I believe than has been the case since the 18th Century. The changing balance between work and leisure will turn the spotlight on these range of questions. So too, will the continuing and growing need to balance the needs of individuals and organisations.

It is within this setting that the new resources of educational technology will be considered. Their most effective use will depend not only on the capacity of the innovators and those sponsoring innovation to persuade educational planners themselves a new trend - to take them up, but on an interchange of ideas and experience. Between innovators and sponsors on the one hand and those engaged directly in what may be called educational work, situated in the other.

The operational side of development is as important during this decade as the planning side. There will also be a growing need for more of a meeting of minds between those who are working on the academic frontiers - developing new insights into their own subjects or moving over into adjacent subjects, individually and in teams - and those who are providing the means of educating larger groups of people. In the field of educational technology, whatever may be the case elsewhere, the medium is not the message. What is said, what is seen, what is felt, counts.
Visual communication and education

Henry R Cassirer

To make the case for visual communication seems almost like running in through open doors. Are we not bombarded daily by television and films, by posters and photographs, by road symbols and advertisements? But in the world of education, the visual still has to find its full place and significance.

Based on the scholastic tradition, grounded in the rules of logic, structured around the printed and written word, education struggles to reconcile its own past with the needs of the present and the future. The visual is now largely accepted as illustration, as enrichment and amplification of verbal instruction and expression. But it is more than an aid, it is a language in its own right, which may be reinforced, explained and more clearly defined by the word, but which stands on its own as a means of conceptualisation, expression and communication. This calls for a new attitude, not only by educators in and out of school, but also by the designers and producers of visual media. Since education prepares the youth of today for the communication society of tomorrow, education in the critical assessment of communication media, and creative expression through them, is essential not only for the citizen but equally for the producer of media who cannot be too far ahead of his public if he wishes to be understood and accepted.

I permit me to begin with my own personal experiences. When I joined UNESCO, I set up the first television news department at the Columbia Broadcasting System in New York, during the last war and creative years at the end of World War II. We had no precedent to go by, no rules, no guidelines. It was news and as yet no mass audience. The task was to translate into the audio-visual medium of TV the verbal reports received over the news ticker. Our visual tools were as yet very restricted news photos, some film shot locally, the human personality and graphics. In an effort to step forward from radio news into the television medium, our emphasis was from the start and, perhaps even excessively, on the visual. I say 'excessively', because at first we had the notion that the spoken word, the announcer and interviewed personality, were not really telegenic. It was only after some time that the human face established itself as a primary medium of visual communication. To see the speaker, to feel his emotions, to observe his hands and gestures, to respond to his smile or frown with his own, to share his personal experience which deepens the impact of the words he speaks. Television revealed itself as a powerful and frequently cruel search-light on the personality of politician and enter­timer, scientist and citizen.

The first lesson was that visual communication, far from being contrary or divorced from verbal communication, is an essential complement.

The second awareness to which we arrived is that the visual was not illustration or secondary to the verbal, but in some cases it was the only medium, passed across the screen to the viewer's comprehension only if the visual was understood and absorbed. The role of verbal trained script writers to pack the commentary full with information against more or less relevant visual images falls flat in the process of communication. Many tests showed that the verbal is heard and understood only after the visual has been absorbed; in other words, the visual document can stand on its own with very few verbal explanations but the verbal information is still-born if it goes counter to the visual impact.

The third and in many ways most disconcerting discovery concerned the relationship of pictures and words. Insufficiently, much of the information which must be given in a news programme is not visual per se. Abstract ideas and the relationship of political forces, military movements and economic decisions become visual only when translated into the graphic medium, from maps to graphs, from animated charts to symbolic forms. But here we encountered major obstacles which continue to be the cause for the relative paucity of graphic communication in most television programmes. First of all, it is difficult to symbolise visually, and in a very short time, the maze of lengthy verbal reports that are so essential without losing oneself in excessive detail which cannot be seen or heard but absorbed by the audience during the short time it is shown. The lack of training in the field of translating verbally conceived concepts into visual symbols prevents the television journalist from expressing himself in graphic medium. Secondly, it was not easy to devise methods of graphic visualisation which made it possible to present the graphics of political quality within a few hours. Thirdly, and this is the major problem, comprehension and acceptance by the audience for the graphic language was - and is largely still today - so underdeveloped that producers for the public at large resist inclusion of graphics in popular programmes.

I have gone back to these early experiences because they highlight the importance of visual education to the visual communicator.

Education is concerned with visual communication not only as a tool of instruction but as a field of training and creative expression through them, so that the media play a crucial role in the educational process. Visual expression and modern media of communication are expensive. If they are mere gadgets, if education may proceed almost as well without them, and if they are cast into a traditional pattern of instruction in which their innovative power is curtailed, they are not likely to be truly accepted and widely used. How to design educational structures and methods so that the media play an essential role is one of the first conditions for the use of modern communication. The planning of education, and of communication, so that it may be innovative in methods, content and structure is a primary concern of UNESCO.

To enable the media to play their role in the innovation of education, both in formal education and for the adult population at large, requires a new look at Hardware development. Here it is necessary to find the optimum combination between tools, the cost, simplicity of operation, and maintenance or general sturdiness. Educators, especially in the developing countries, are reluctant to serve as guinea pigs for hardware operators and to involve themselves in major investments which may only be of short duration and require major recurring budgets. Standardisation of equipment, decentralisation of its production, maintenance and therefore, so that many countries may dispose of them within their own resources, as well as flexibility in use are among the criteria which call for close scrutiny of what the market has to offer. Here again, the planning of education and communication plays a major role to assure that investments serve the greatest possible number over the longest period of time, at the lowest possible cost, and with the greatest educational effectiveness.

The restructuring of education is opening up entirely new perspectives for the production of hardware developments in turn are pacemakers in the reorientation of education. For instance, it is now far more feasible to produce and utilise materials at the local level, to make them flexible to the point where they can respond immediately to the individual needs of teacher and student. On the other hand, the introduction of satellite communication, cable networks and the many forms of distribution, once restricted programmes open up perspectives for large-scale operations which herald both economics and threats to cultural autonomy. UNESCO is studying the relative advantages and limitations of such wide distribution networks, especially through satellite communications, as a guide to producers as well as educational administrators.

The use of visual communication in instruction is, however, only one of the roles which concern us here, and I shall not dwell on them too long. I would rather stress another aspect which is of particular interest though it is, perhaps, of greater fundamental significance; visual communication as a modern language. I am convinced that there is no educational subject which could not benefit from the challenge of translation from verbal concepts into visual forms. In history, the social sciences, geography and the arts, as well as the sciences, there are innumerable opportunities to express in visual, especially in graphic form, what is normally taught as verbal logical concepts. The task is not easy, not so much because visual expression in itself is difficult - anyone can visualise an image even if he cannot draw it - but because visualisation presupposes an understanding of the essentials. A cartoon is effective when it expresses a single idea and conveys it largely through its visual content; it is an instructive when it reveals the basic trend rather than confuses through a multiplicity of information. The need for simplification which is inherent in the visual may be a pitfall for shallowness; more generally it is a challenge for comprehension in depth which cannot be easily mastered. There is an old argument whether Latin or Mathematics are more meaningful in training of a logical mind. I would suggest that translation into visualisation is on a par with both of them, and that a generation trained in this manner would be able to master more effectively not only the modern language of visual communication but get an understanding of natural as well as social phenomena.

Translation into the visual does not imply the artistic ability to execute the rough design. On the other hand, opportunities for visual expression are themselves most valuable as they give the opportunity to see a picture with the help of a photographic 8mm camera, the drawing board and video tape.
recorders are today becoming so widely accessible that it is quite feasible to give assignments and tests in the medium of modern media of expression, just as it was required to give answers in written or verbal form. Even if none of the technological tools are available, the mere drawing of images or graphs and the collage of photographs and visual symbols can be a valuable learning experience. It is in this way that the media audience of the future is prepared to take the media into its own hands. Those who place their hands on the media of communication will largely control their own youth for this task? Or, to put it from another point of view; is not youth more interested and concerned with expression through the media than with expression and testing through the written word?

Education for expression through the media is intimately linked with education for the critical analysis of the media. We include in education criticism of literature and music. We also include art, but curiously we stop at Art, criticism of Art comes to contemporary expression, not only of Art in its sophisticated form, but of graphic art, advertising, radio or film or television media. Nor do we normally include in education the analysis of the media of mass-communication, their social function as well as forms of presentation. The field is by no means barren, however, for the first time is gaining the ever more important field of study in schools and universities, intimately linked with other concerns of contemporary society. UNESCO has sponsored seminars and study courses on education and working with media in the promotion of media criticism and expression as a way to enhance the media literacy of the mass public of tomorrow. Evidently, the designer has a role to play with respect to all these activities and fields of concern.

Educators will never be able to incorporate visual communication and expression into education - and here I am not speaking of the specific field of art education - unless they themselves are prepared to think the language and ready to accept it as a working basis. There is need, therefore, for designers to work closely with educators in their training, for instance in teacher training programmes, and in the elaboration of teaching methods and examinations. You may know better than we do at UNESCO anywhere in the world, designers have made a systematic effort to define the place of visual communication in education, and to translate such definition into teaching methods. My impression is that efforts have been rather spotty, with gifted teachers in biology or geography, history or the sciences using the visual as illustration and assignment. But what I have in mind goes much further than this - what is necessary is a new awareness of the needs and potential for the incorporation of the visual language into education and its practical application in many different subject areas.

Closely related to this is another field which has already received much attention by both media specialists and enthusiastic educators; this is education in media appreciation, criticism and expression. In the Scandinavian countries and the United Kingdom, to take an example, an audio-visual centre was set up in Africa and other countries of Eastern Europe, as well as in the United States and Canada - to cite only some examples - media criticism, the study of mass-communication, film courses and screen education in the larger sense, have found their place in the curriculum of both secondary schools and universities. One of the most complete programmes for mass-communication education has been elaborated for the Finnish Comprehensive School. I am not aware, however, that designers have been particularly involved in such efforts. Yet there seems little doubt that they have a clear stake in promoting such education. If they elaborate their own specific contribution, UNESCO might be the vehicle for putting them into touch with related efforts elsewhere.

A second field of activity where designers have an obvious role to play is in the preparation of instructional materials for modern media. In television programmes, books and other printed materials, slides and posters are widely used. But do they speak the same language? Are they using the media for what they may give best? Education in visual appreciation is not a separate subject but an integral part of the use of media. Good quality presentations create a desire among young people for good quality productions elsewhere. Unfortunately educational budgets and educational priorities in media organizations are such that the best artists are rarely used in productions for young children or by adult students. High quality visual expression is not just a matter of artistic talent but of clear thinking. If there is a need for such clarity, it is in education. By improving the design of educational materials of every kind, designers may make a precious contribution, not just to the presentation, but to the comprehension and quality of educational materials. It is in their very own interest, as a profession, if not as individuals, to give their clients the best possible value for their own acceptance by the public depends on the taste and preparation given to young people today.

A major obstacle to the integration of visual communication into education is...
Margaret Benyon with one of her holograms
Laser holography as a new medium for visual communication
Margaret Benyon and Jonathan Benthall

This article has been based on a paper prepared by Margaret Benyon for the VisCom #1 Congress. Use has also been made of some extracts from an introductory note by Jonathan Benthall for a recent exhibition of Miss Benyon’s work.

A hologram is a three-dimensional photograph. The viewer looks through what appears to be an almost clear piece of glass, as if through a window, to see on the other side a scene which appears to be exactly as it was in the original instance, with all the parallax parameters, except that it has no mass, and one can pass one’s hand through it. By movement of the head it is possible to see round and behind objects, as far as the size of the plate will allow. It is the photographic recording of all the details of the scene, coming from an object or scene, and it is only realisable through the use of laser light. Because the information is all over the plate, if it is broken into pieces each piece will reconstruct the whole image.

Holography can be regarded as a method of lensless photography by means of which three-dimensional images can be reconstructed. The holographic process is divided into two stages. To make a hologram of an object, a laser beam is split into two, and both beams are spread out by a lens. One beam (the reference beam) falls straight onto the holographic plate; the other (the object beam) falls onto the object and the light is scattered on to the plate. The holographic plate is coated with an emulsion which is photosensitive, and records the interference pattern from the two beams falling onto it. The plate is processed like an ordinary photographic film. To view the hologram, the plate is illuminated with a spread laser beam directed at the plate at the same angle and distance from the plate as the original reference beam. The light is diffracted to produce a three-dimensional image of the same size as the original object. The interference pattern in the emulsion directs the reconstructing beam to travel on as in the first instance, and to the eye there is no difference.

Holography, which Margaret Benyon uses as an art medium, is probably a more radical development than photography. Photography depended primarily on new chemical techniques, but its optical properties had been familiar since the Renaissance.

The theoretical concepts of holography were stated by Dennis Gabor in 1947, though they would have been intelligible to nineteenth century physicists. Practical implementation was made possible later by the development of the laser - a source of light all of whose waves are coherent, or in step. Laser holography was first achieved by Leith and Upatnieks in 1963. Holographic techniques have since been developed which do not require lasers.

Although holography still has no major industrial applications its future applications are thought to be numerous; they include special testing and analysis, information processing and storage, and three-dimensional movies, television, X-rays and microscopy.

Jonathan Benthall has argued that the importance of holography as a medium is a by-product of a far more fundamental principle, that of interference patterning. He points out that his view finds support in a speculative, as yet unpublished paper Quantum theory as an indication of a new order in physics, by David Bohm, Professor of Theoretical Physics at Birkbeck College, London. Professor Bohm believes that the optical lens was a key factor in the development of modern scientific thought, since it brought into sharp relief the approximate one-to-one correspondence between points in an object and points in its image. This strengthened man’s awareness of the relationships between parts of an object, and encouraged the enormous extension of analysis and synthesis as a method of enquiry.

But now, according to Bohm, “relativity and quantum theory imply undivided wholeness, in which analysis into distinct and well-defined parts is no longer relevant.” The laser hologram is a technique which can give an immediate perceptual insight into what can be meant by undivided wholeness in science, as the lens did for the notion of analysis of a system into parts. This is because there is no one-to-one relationship between parts of the illuminated object and parts of the image of this object on the holographic plate. ‘Rather, the interference pattern in each region... of the plate is relevant to the whole of the interference pattern on the plate’. But the interference patterns are not only on the plate, whose function is merely to make a relatively permanent “written record” of the interference pattern of the light that is present in each region of space. Bohm goes on to argue that holography suggests the germ of a new notion of physical order as a total order contained or implied in each region of space and time. His arguments are of great interest, since it is often complained that one of the reasons why science has become so esoteric is that since Einstein there have been no easily understood visual models of physics.

It is true that an effort of imagination is needed, when one looks at a hologram, to grasp what is happening in time and space before one’s eyes. A similar effort would have been needed in the 1840’s to guess some of the implications of daguerrotypes and calotypes.

Margaret Benyon’s major interest in holography is with “phenomena that are peculiar to the holographic medium”. She has experimented with
Photograph above shows a double-exposure hologram. By exposing the plate to two different set-ups it is possible to achieve the appearance of 'weightlessness'. The glass appears to hang in space above the fruit, and the orange seems to float through the bottle of milk.

Photograph at top of facing page shows a detail from a hologram in which there appears a 'non-hologram' of a hand. Anything that moves more than a fraction of a wavelength of light (about 1/10,000mm) will not record. The hand in the hologram has not recorded, and appears paradoxically as a solid 'hole' or three-dimensional silhouette.

multi-exposure holograms, heat trails and other effects. In a recent paper she sets out some of the limitations and potentials of the holographic process.

Factors which can present problems in the practice of holography are concerned with size, coherence and stability requirements, expense, and the need for a particular light source for viewing.

The size and coherence limitations are linked in that the distance over which the coherence of the laser can be relied on is short. For instance, the helium-neon laser commonly used in holography has a coherence length of approximately 30cms, and the length of the reference beam and the object beam must not differ by more than this by the time they reach the plate, which means that objects are restricted to sizes not over 30cms. Recently, however, coherence extenders have been added to lasers to increase coherence to lengths of several metres. Stability problems arise from the fact that one is recording an interference pattern of light waves, and if the object moves more than a fraction of a light wave (about 1/10,000th mm) the hologram is ruined. These stability problems can be overcome by 'flash' holography involving the use of pulsed lasers.

An American company has produced holograms of live human scenes fitting into an area 8 ft tall, 10 ft wide and 10 ft deep, by using a pulsed laser developed by themselves.

The expense involves mainly the cost of equipment, such as the laser. The price of lasers is expected to drop during the next five years. There has been a steady decline in the price of laser since 1967, RCA plans to produce lasers in large quantities and at low prices. They propose a cost of 70 dollars each for a 1mW laser on sales exceeding 2000. A 1mW laser would be sufficient to make and illuminate a 9x12cm hologram. An 8mW laser would provide approximately the power required to make an 8x10in hologram. This kind of laser would, at present, cost about £700.

With the additional expense of optical equipment, it would cost a little under £1,000 to establish a basic holographic studio/ workshop. For a commercial enterprise, lasers larger than 8mW would be necessary.

The special light sources for viewing are monochromatic, in the case of transmission holograms. Optimum viewing conditions for this type of hologram are by means of laser, and in a darkened environment, but a mercury arc lamp with a narrow band filter can provide an image comparable with a laser reconstruction, and is less expensive. In fact, any compact white-light source is suitable, provided that an absorption filter with a bandwidth of 300A is available,
as for reconstruction, spatial coherence is required only over the area subtended by the eye at the holographic plane. A brighter hologram can be obtained by bleaching the plate, thus improving the optical efficiency by 50%. Unbleached, or amplitude holograms have an efficiency of about 6%. A low efficiency 8x10in hologram can be reconstructed in daylight with a standard mercury arc source. Many of the materials giving high reconstruction efficiencies are not yet commercially available, though this will change. It might be possible to record a hologram on sensitive material, and then copy it onto one with a high diffraction efficiency. An inexpensive light source is the sodium lamp, the yellow light used in street lighting. This provides a reasonable reconstruction but with a loss of detail, because there are two yellow lines of light close together, which provides slightly different reconstructions.

It is possible to make a hologram which can be reconstructed in ordinary white light by putting the reference beam and the object beam on opposite sides of the plate in the recording stage. This has the effect of recording the interference fringes in the thickness of the emulsion, hence the designation 'volume' hologram. The hologram can be viewed in sunlight, or with a torch, the emulsion selecting only the wave-lengths from the colours in the white light to reconstruct the image. White-light reflection film holograms have been produced on a large scale in the United States.

Full colour holography involves a similar process to white-light holography, in that each wavelength of colour is recorded in the depth of the emulsion, so like white-light holography, it also suffers from a lack of suitable material. There is cross-talk between the colours, and the colours change due to emulsion shrinkage. Large scale displays of colour holograms may be hindered by the lack of a blue laser with sufficiently high output.

An American company has produced holograms for educational purposes. They describe a hologram designed to teach children about height and width. The image is made up of several blue blocks, one of which is the same size as the actual block that has been given to a child. The other block images are either too tall or too short. The child is asked to fit the real block into the image which he thinks is the same size. If he fits the real block into an image that is too high, the top of the image remains blue. This idea for a holographic template lends itself to assembly-line inspection techniques for industry. In biological research, holograms can be taken of micro-organisms. They contain the entire visible depth of the specimen and can then be viewed under a microscope. Specimens can be studied which do not last long enough for usual microscopic analysis. This can be of obvious benefit to educational problems, as can be holograms of three-dimensional models, such as molecular structures. Holograms of three-dimensional models might one day provide space-saving, convenient and inexpensive substitutes for actual models. The National Committee for Audio-Visual Aids considers that three-dimensional maps would be welcomed by geography teachers who at present use expensive terrain models. The Department of Cartography at the Royal College of Art, London, is investigating the possibility of hologram maps in conjunction with Imperial College, London.

The advantage of being able to move across the front of a small display to obtain different views of the same scene would be partially lost with a large stationary audience and a large projection screen, which is one of the problems in the development of holographic motion pictures. The other problems are the development of a camera, and the increase in power required in a pulsed laser system, both of which make the method unattractive for scenes of the size of a large garden and upwards. Holographic stills cameras are likely to precede holographic movie cameras. Holographic cameras at present in use are little more than a small laboratory set-up with a cover, allowing holograms to be taken of objects not more than a few inches in size. The hologram camera is too complex and expensive at this moment and is likely to find a limited market in specialist industrial and photographic organizations. Large scale motion picture holography is likely in the next twenty or thirty years, rather than in the next decade, but small screen three-dimensional motion pictures have been demonstrated, and may represent the first step.

Three-dimensional real-time television is also presented with many technical difficulties, the most prominent of which are the low resolution of present camera and display devices, and also the formidable bandwidth required.

But as Jonathan Bentall has pointed out, the bald prospect for holography is unexciting, even nostalgic if one recalls the brief boom in 3-D movies during the early 1950's. But if holography is as radically a new medium as is suggested, it will develop not only in ways that are predictable, but also in new and unpredictable ways. It will, over the years, influence our art, our everyday perception, our language, our reality.
This sequence of experiments was carried out by using a specially designed device. Essentially this consisted of a pair of drums, each rotating about a vertical axis, around them being positioned a black belt 50cm wide and with a perimeter of 2.4m.

Objects to be viewed were positioned on this belt and when the device was set in motion, these could be seen through a small aperture as moving from right to left. This was to allow for the fact that the various subjects taking part in the tests were drawn from cultural groups who normally read from left to right.

In the experiments, objects under observation consisted solely of numerals in various combinations. These were arranged on a white background on a black background and having a luminous contrast of about 97%. The numerals were illuminated by a 150W bulb (Philips Astra lux) from a distance of 2.4m. To obtain a better distribution of results, the brightness was varied.

The numerals were viewed at varying speeds of horizontal motion and with varying viewing angles. The width of the aperture in which the symbols appeared could be set so as to give a viewing angle that varied from 0° to 8°.

If all the numerals have to be read, one after each other, they cannot follow each other at a rate that exceeds two exposures per second. This is due to the duration of impression which has some influence on this shortening of reaction time. Experiments carried out have shown that when the anticipation time was from 0.25 to 0.75 seconds, the precision of the answer was better. But when the anticipation time was progressively increased, no improvement was noted.

The reading of symbols takes place at a glance. Symbols that we see often are read faster than others. This is why, when investigating the legibility of symbols in horizontal motion, I made use of numerals in a random order. In my investigations I used, to begin with, a constant thickness design of numerals (Univers 65) which had good legibility in static conditions. When I began to increase the space (or gaps) between the individual figures, I obtained improved legibility, but when investigating the legibility of symbols in horizontal motion, I made use of numerals in a random order. In my investigations I used, to begin with, a constant thickness design of numerals (Univers 65) which had good legibility in static conditions. When I began to increase the space (or gaps) between the individual figures, I obtained improved legibility, but when investigating the legibility of symbols in horizontal motion, I made use of numerals in a random order. In my investigations I used, to begin with, a constant thickness design of numerals (Univers 65) which had good legibility in static conditions. When I began to increase the space (or gaps) between the individual figures, I obtained improved legibility, but when investigating the legibility of symbols in horizontal motion, I made use of numerals in a random order.

I have made efforts to take advantage of these trails and to design symbols which would have features similar to those of static symbols. In general it was sufficient to break up the horizontal lines in some places in order to reduce their brightness in relation to the vertical elements.

Photographic sequence 2-4

I have also experimented with symbols constructed of vertical units only. As can be seen from the left hand photograph, the symbols in the second, third and fourth rows have height-to-width ratios of 1:1, 1:2 and 1:3 respectively. When the symbol in row four (height-to-width 1:3) was observed at a speed of 2.80m/sec. and with a viewing angle of 1° it was identified as a square. If, now, if the process of perception takes place according to the previously stated rules, then the discussed square will have an inner field. Although the human eye is often compared to a photographic camera and the retina to a photographic film, the receptors can only focus the image which is being signalled into the brain, along the optic nerve. This causes some delay which probably accounts for some of the intermediate images that we see.

Alphanumeric symbols are built up from vertical, horizontal and diagonal elements, as well as of circles and parts of circles. When a symbol is seen in motion some of these elements (acting as stimuli) are summed-up and thus the brightness of the horizontal unit. Any sign which is produced in the brain by single stimuli joined up, when in motion, at the time of visual perception, is called a summed-up sign. The legibility of a sign depends upon its speed of movement and upon its height-to-width ratio. The greater the speed, the wider the sign.

Photographic sequence 2-6

The previous stimulus-impression has followed each other at a rate that exceeded two exposures per second. A symbol having a height-to-width ratio of 1:10 ought to be identified on the screen at a viewing angle of 4° and at a speed of about 7.50m/sec. (see figure 1) The legibility of successive numerals was investigated at a speed of 4.80 m/sec. Figures "9", "8", "7" and "6" were correctly read by the observers.

Photographic sequence 2-11

A figure "9" of the summed-up type was constructed in five versions, each having different height-to-width ratios. From the top row to the bottom row these were 1:8, 1:7, 1:6, 1:5, and 1:4. This group of signs were exposed simultaneously at a speed of 7.50m/sec, and the observers were asked to select the best read from the point of view of so-called 'visual comfort'. The figure "9" in the top row and in the next below were the most frequently mentioned. In other words, those having a height-to-width ratio of 1:5 and 1:6 respectively.
The graph shows the influence of the speed of motion upon the change of width of the summed-up sign. The plotted values are arithmetic means of the results obtained by five observers. The width of the sign in degrees is given in the axis of the abscissa. The sign was observed with a viewing angle of 4°.

Remarks:

The normal viewing angle = 30-60° from the visual axis. The limit of symbol recognition = 5-30° from the visual axis. The visual working area = 5-10° from the visual axis. The area of accurate visibility is contained in the viewing angle = 1°.

Figure 1

The graph shows the legibility of the summed-up sign in horizontal movement. The size of the sign with a viewing angle of 4° and a speed of 2.8m/sec. (the complete width of the sign being 20cms.) Factors involved in increasing or decreasing legibility are, among others, the arrangement of elements covering the objective disposition of stimuli, as well as the ability of the observer to discern a definite form in the structure. But apart from these factors there is still one further important point - that of previous learning.

So, in order to obtain more conclusive results, I introduced rotation in the exposure of the various signs. Observers were shown the signs according to the following order: 2, 9, 4, 7, 5, then 9, 4, 7, 5, 2 and so on.

When testing (in horizontal motion), the legibility of signs designed for use in static viewing (such as Univers 65), I found that they gave results which were the inverse of the summed-up signs. Their legibility increased as the viewing angle became longer and longer.

Figure 2

The graph shows the legibility of symbols designed for static viewing with a viewing angle of 0.5° and with a speed of 2.80m/sec. A four-numeral figure was exposed in motion at a speed of 2.80m/sec. The exposures were begun with the aperture giving only a viewing angle of 1°. Then the size of the opening was gradually increased - one degree each time - until the legibility had increased to 100%. When the viewing angles were small, the observer was able to identify the first and last signs, and some of the intermediate ones. The last sign in each row was the one which each observer saw best.

A visual image with a short exposure time has to be anticipated by some kind of internal signal that allows the eye mechanism to be set in motion - the viewer can then produce an eye movement similar to, or the same as, the moving sign.

Figure 3
Conclusions
Symbols were designed that could be successfully read in horizontal motion. They consisted of single dots and could be identified when moving at much greater speeds than was possible with signs designed for static use—an average of about 80% greater speeds.

Their reading is conditioned by the following factors:

1. The size of the viewing angle in which the symbol appears (from 2% to 12%)
2. The exposure time of the symbol (from 0.02 to 0.1 sec.)
3. The height-to-width ratio of the symbol (e.g., symbols with a height-to-width ratio of 1:6 and 1:7 seen at speeds of 2.80 m/sec. belonged to the best perceived signs in a viewing angle from 2% to 6%)
4. Taking into consideration the thickness change of the symbol elements in order to produce — after summing-up — a mono-element sign.
5. The adequate proportion of the symbol in relation to the viewing angle (about 2:1).
6. The frequency of the appearance of the symbol (a maximum of two exposures per second).
7. Suitable luminescence contrast (to avoid dazzle).
9. Designation of the direction and displacement of the symbol (from right to left).
10. The correct construction of the symbols (important with regard to the summing-up effect).
11. Designation of the size ratio of the individual dots to the height of the symbol (about 7:1).

In the past months I've received a number of threatening communications (printed ones, that is), whose message is that I am required to address you on a very broad range of topics that fall within the publishing and communications worlds. But what frightened me most was the suggestion, within the list of topics, that the book might be on its way out — a victim of the rising tide of TV, audio-visual, videotape, and graphic materials utilised today in the communications industry.

As you know, publishing is an amateur, haphazard, traditionally hidebound and highly fragmented endeavour which has resisted being labelled an industry. Publishers are staunchly individualistic entrepreneurs who all have the best and worst characteristics of cavalry colonels and club members. No single publisher can hope to speak for the group. My first move, then, to answer the question about the future of the book within the wider context of other communications devices was I have interrogate the computer. 'What is the future of the book?' I typed on the console. 'What makes you think it has a future — and why do you want to know?' replied the machine. 'I have to discuss it at a meeting and my mother always advised me to address the question directly,' was my reply. 'Why do you hate your father?' responded the machine. At this point I began to doubt whether publishers could form effective alliances with computers and signed off.

To remark, then, on some key considerations and trends.

One phrase in the programme notes caught my eye. That phrase is 'The aristocracy of the printed word'. I would like to comment on this before I discuss whether or not this aristocracy has ended. As I see things, the printed word, whether recorded on film, tape or paper, is the foundation on which every other form of communication rests. Let me provide a few examples. Every step of my journey here, every stage of my involvement with the conference, was accomplished through the printed word. I will not deny for a moment that travel films, illustrated brochures, and graphic representations of many kinds had a powerful effect on the development of my conception of the building, its architectural plan, the exhibition on which every other form of communicating ideas. It requires no support system. I have had this availability proved to me a dozen times in the week preceding this conference. Time restrictions have prevented me from seeing films, accidents of location have prevented my watching TV, voltage differences have prevented me from running filmstrips or projecting slides in my hotel room. But every customise halt, every lunch-time break, every airport wait, has enabled me to read. And the reading that I have done has reinforced in me my awareness of the significant advantage of a book. Its content, its presentation of intangibles that film, TV and graphics cannot easily present. Consider the Holocaust, a topic in which this conference is being held. I am glad to have seen quality photographs of the building, its architectural details and its contents. But these cannot bring me an understanding of the philosophical tenets that underlay Hapsburg rule of Hapsburg collapse. The physical battlefields can be brilliantly presented by maps, photographs and other audio-visual aids. But can the varying states of mind of Austrians, Serbs, Poles and other fiercely nationalistic imperial citizens be captured and, presumably without ever putting the words into print, we could play the tapes wherever and whenever we wish if the equipment is available. This availability question is a key one for the future, especially in terms of the more sophisticated developments which are going to leave books far behind in the scheme of things. I refer now to the computerised data banks which can be queried and, then will display via a cathode-ray tube on a screen, a hard copy which can be queried and then displayed via a cathode-ray tube on a screen, a hard copy, a microfiche, a roll film or as a ultra microfiche — postcard size...
film cards containing as many as 3,200 pages each. Micrographics - we are assured - will eventually be held in two or three bookcases and, by the use of the household telephone, be dialed on to our familiar and universal friend - the TV screen. What price then the printed book? But a word of caution. Judging by the present state of telephone services in many major cities, any additional service utilising telephone cables and equipment will be a long time in becoming widely available. Capital costs have soared, data transmissions are hogging existing trunk lines, and ever-increasing numbers of would-be subscribers are crying out for basic services. New York, as you may know, is turning down the Pictophone service - in which you see on a TV screen the person you are talking to. It is frustrating enough to get out of voice-to-face, but are we prepared to be told regularly that our faces have been temporarily disconnected?

So far, I have made a traditional state of the future of books and printed materials, and suggested caution as to the practicality of some of the more optimistic projections made for the electronic revolution. This is a new position for me. I hope that it is not seen as a complete reversal from a long-time effort to help visualise the curriculum. For in many ways, to imagine is to visualise, and to see can mean to understand. What I am struggling for in my own mind is perspective. Let us not abandon the book just because we live in an electronic age.

William V Shannon in a New York Times piece on the 8th of July, 1971, commented on the accelerating inhuman pace of technology invading every domain of life:

'Television replaced books and radio as the dominant cultural force. It is often criticised for its violence and banality. But television's most subtle debilitating influence is that it makes audiences passive and accustomed to expect instant gratifications. There is not the investment of mental effort and of time which a serious book or a good newspaper requires.'

What William Shannon has wisely observed and written, I believe to be true and pertinent to our topic. Perhaps, however, we grow by continually becoming disgusted with ourselves. Civil rights legislation took much too long for enactment in America, for instance, once the public saw on TV how the rights of others were being abused.

As a student of cinema I have long admired the work of masters of film makers, abroad and in North America, the work of D W Griffith, Ernest Lubitsch, Charlie Chaplin, John Ford, Orson Welles, Louis de Rochemont, Norman McLaren, Saul Bass and Mike Nichols, among others. These highly individualistic talents extended cinematic dimensions, often by going against the system. Kubrick's 'dream factory' is collapsing today, probably because it saw itself primarily as a business to be run on an assembly line in its own restricted studios. Young independent film makers the world over, often with limited means, are beginning to use the camera and sound recorder as other artists use the pencil, brush, paint and clay. It is significant, I think, that in 1971 cinematic art finally made its way into the Louvre. And at an entrance fee of six francs it is quite a bargain.

It is often said that the printed book is in trouble, too long in production, despised by the young, and publishers are being bought up by, or being merged with electronic concerns. Even so, new publishers enter the field - and survive!

Overall, the outlook for the printed word on paper, tape and film is still very attractive; the number of scientific and industrial journals is doubling about every fifteen years. The US government alone is the source of over 100,000 major reports and more than 450,000 books, articles, papers and other printed items per year. Now these are not works of fiction, poetry, or trade books, but they indicate the ability of the printed word to transmit vital knowledge to interested persons. They answer a need to know. This information could, of course, be stored in a data bank, and probably it is. Perhaps we are asking ourselves about the future of literature when we ask about the future of publishing. It can be argued that people do not choose to read fiction because they are required to read so much fact for business purposes. In the context of this last remark, some other observations might be in order. They were made by Robert Bernstein, speaking to a recent meeting of American publishers:

'Books are emerging more and more as the movers of our society, as the information source of most integrity, as the only ideas moving slowly enough and solidly enough so you can get hold of them'.

I think that the recent episode concerning the Vietnam secret history bears this out. And a final thought. Whenever I talk about books, my mind slips into an awareness of just three of them - The Bible, The Torah and The Koran - in themselves repositories of a very large part of the dynamo and the mirror of civilization.

Now I would like to comment upon the current state of the "learning industry" and, subsequently discuss how and why the media industry can cooperate to fulfill these markets.

Audio-visual aids and equipment

This was, of course, the explosive growth industry, in which ground floor entrepreneurs were to have made their fortunes. But just as traditional publishing has refused to fade away on schedule, so has the audio-visual industry refused to grow on schedule. Audio-visual aids got their first big boost during World War 11 and the need to train large numbers of troops in a variety of straightforward tasks and skills. The success of the undertaking was such that the audio-visual approach and the materials that were developed were heralded as the new wave of the future - the advance that would revolutionise educational methodology and change the school beyond recognition. Early growth was encouraging, about 1,000,000 dollars spent by United States schools in 1945. But by 1969 total sales were only 135,000,000 dollars and they have been levelling off ever since. Sales of audio-visual equipment only represent a fifth of the textbook sales volume.

What are the reasons? Many have been offered, among them:

Projector sales (16mm) has remained static for some five years. Sales that do little more than supply units for the 750,000 or so projectors currently in use in American schools.

The high cost of prints (even though bought with government funding).

The ordering, accounting and scheduling problems met when renting libraries are used.

In the case of 8mm films, spoken of as the paperbacks of the film world, lack of standardisation of projectors, cartridges, and sound systems have proved a major deterrent.

A valuable point of view has been expressed by Marion Patterson, a leading photographer, artist, designer, concerned with the use of visually-oriented materials in education. She says, 'There are at least two areas of concern to the photographer looking at education. One is the overwhelming reliance of educators upon the written word, and the second, is the most uniformly poor quality of those visual materials which are to be found in our schools. I do not believe that insufficient budgets necessitate the purchase of second-rate materials, or that materials of professional quality and contemporary design are incurred too expensive for our children'.

A necessary statement and an interesting application of Gresham's Law. I am almost tempted to add that the right picture can be worth a thousand words. It is New York City children - now in the throes of a new and valuable passion to write poetry -

have made us realise that the right poem can be worth a thousand pictures.

Educational television

Here, as an American, I have to hang my head in shame. A simple comparison of the British and American approaches to television as an educational tool, leaves my country far behind. Fortunately, we can and do import the BBC programmes for adults. In the United Kingdom, 10% of all television programming is undertaken for children. Either no commercials are shown (BBC TV), or not more than 8 minutes per hour (Commercial TV). Early afternoon programming is aimed at the under fives, late afternoon programming at the five to nine year age group. Other programmes cater, but less regularly, for the nine to twelve year age group. Once over twelve, a child has to do his own picking and choosing of the programmes and the commercial. American television suffers badly by comparison. No prime time programmes for children, a high percentage of time devoted to cartoons, and sixteen minutes of advertising per hour. Miss Monica Sim - Head of Children's Programming for the BBC, stated that TV should stimulate individual thought and action and should respect the child's intelligence through realistic treatment of childhood and the outside world. Until recently it would have been hard to find any comment for American children's television, other than it amused them and kept them quiet. Though I pass from this topic, I will have a few further comments to make, especially as to the possible (and hoped for) future of the medium. One aspect of this hoped for future is dual-audio, whereby the child viewer can tune into separate channels: one for the discursive commentary on the regular TV programme (Batman, I Love Lucy, Gunsmoke) its characters, their actions, reactions, and the situations they have to handle. This concept, which does not demand massively expensive hardware, could convert the child from being a passive viewer into an active participant.

Computer assisted instruction

This is a development that was much heralded but has scarcely lived up to the promises and projections made on its behalf. The high costs of equipment, installation, teacher-training, and maintenance, together with the bewildering variety of programmes now ready, being tested, or soon to appear, suggest that too much emphasis has been given to promotion and too little to support services. If we say, and it is often said by educators, that it is too early to say what the real promise of computer assisted instruction is, then are we not admitting too hastily
approach? In addition, to what extent has the teaching profession equipped itself to utilise entirely new methods of making information available, teaching students how to use it, and creating a learning environment? A recent speaker noted, whilst discussing textbook changes, that curriculum development and teaching techniques are, and generally have been, far behind the needs of the student and of society as a whole. Educators talk glibly about innovations in both curriculum and techniques of teaching but, the speaker added, the pathetic thing was that most of the profession had done little but talk, while resisting change as only those involved in higher education can... Now, if these remarks were aimed largely at the unwillingness to accept innovations in printed materials, much how more appropriate are they in terms of unwillingness to accept advances in computer assisted instruction. However, since GAI offers enormous opportunity for personal and private interaction between student and learning material, as well as for self-pacing, we owe this field very careful consideration, followed by in-depth support.

Video-record possibilities

Here we reach even stickier ground. Few of us could enumerate all of the new devices that are now available, let alone intelligently appraise their marketability, educational usefulness and, to return to my basic topic, their effect on the vitality of the printed word. I have done a certain amount of groundwork on the video-record, tape, disc and cassette phenomenon and can report over fourteen different systems, some of which are as follows:

Electronic Video Recorder (EVR) using film to capture audio and visual signals for playback.

RCA is offering Selectavision, using low-energy lasers and vinyl ribbon to capture audio and visual signals for playback.

Ampex, Avco, Sony and Panasonic are individually offering Cartridge Videotape Recording, probably giving recording and playback capabilities.

West Germany is offering Cartridge Film for Television, using Super-8mm film scanned electronically during playback.

Telefunken has recently announced a Video Disc development that will allow for colour playback.

Obviously a bewildering variety of possibilities exist in terms of the equipment available, their techniques in the make in the transfer of information and the processes of learning. Single frame usage, cueing, reversing, and slow-motion usage, increase the range of possibilities in the learning situation. Yet when the total range of peripherals as well as the necessary basic components is considered, in terms of cost, available materials, and flexible instructional packages, each educator is going to have a lot of thinking to do. Increasingly, the gap in the present between what we require and what we can do will have to be clearly stated and validated through testing provided. Obviously, learning materials will be purchased in large quantities.

Having discussed in general terms four of the contenders that are thought to threaten the aristocracy of the printed word, I will close my remarks by discussing the future media mix. So far I have spoken in terms of competition, what might outstrip what; where the rewards are and where the disappointments might lie in this exploding world of media. It is significant, but also distressing, that my topic was couched in those terms. Far more important for all of us is the capacity to put narrow commercial concerns aside and ask ourselves what media should do in the society of the future, and how they can best meet those requirements. Cooperation, not competition, is our true topic.

As I see it, the most important use of media of any kind is the facilitation and furtherance of education - if only because the youth of any generation must be equipped to become useful citizens in a world of increasing complexity. If this is achieved, then the use of the media in specialised education projects becomes a viable activity. So on a locally what we are faced with is not which medium can dominate the classroom, community or world scale, but what sort of mix is most appropriate. This we can only determine if we decide on a module by module unit of instruction and on a topic by topic basis what can best be learned through the use of one or more of the several available media.

Just as philosophical abstractions may prove incontrovertible to fristrip treatment, first-aid techniques or the use of a lathe can be dramatically taught through film. Just as in in-plant instruction, the skills that we need to be best achieved through audio-visually oriented instructional techniques, the senior executive, plane-bound to the future of education we owe it to those about to be educated to select for them the best means of giving them in and, since interaction can be basic to such media, of securing the most effective means of utilising feedback. And education has, at the upper levels, to do much more than simply utilise feedback. Feed-forward has also to be sought and the external world adjusted, just as we adjust educational materials as a result of feedback. U Thant suggested to the UN that the advanced economies of the world can have the kind and scale of resources that they choose. In fact, we are the designers of the world’s future, to an unprecedented degree. Obviously, the more we feel the hope in determining and responding to our own educational experiences, the better we will be able to play meaningful participatory roles in the design of our lives and the physical, economic, and aesthetic contexts in which we live them.

As my final remark, let me say this. I have spoken in what may be a highly fragmentary manner, touching upon many bases lightly, skipping from present problems to future possibilities. But this approach, partly caused by the size of my topic is, perhaps, an accurate reflection in the state of the media; more fragmented, more promising than ever before. But of one thing I feel quite certain: Education will become both more intensive and longer in its time span, as the century advances. The media of instruction will undoubtedly become more varied and the mix more flexible. The process will become universal, until whatever is seen in this world will also be engaged in continuing education. The most popular image of this process is the one in which there is a TV screen in one corner, a manipulative device in the other, a computer terminal readily available and printed materials on the table. In fact, partnership among the media sources to provide the means and materials of education is vital in securing a peaceful future for the world. In this connection, I want to mention a proven success and an ongoing hope. The Network for Continuing Medical Education is a free service linking some 500 medical schools and hospitals in the USA and Canada with the best in televised medical education. Videotapes in any format, red, plus supplementary texts and printed TV guides, are provided through the mails. A success in itself it will, I hope, prove to be the forerunner of a General Network of Continuing Education which, in time, could be a worldwide resource utilising the technology and the content of all the media. Let us neither promote or demote the particular medium of our immediate concern, but move towards a greater degree of cooperation and a greater distribution to the future wellbeing of the world’s peoples.
The Austrian President, Franz Jonas, delivering an address of welcome to the delegates attending the VisCom 71 Congress held in the Hofburg Congress Centre, Vienna. Photograph by Foto Schikola.

Some views on VisCom 71

Lord Snow

I believe that VisCom 71 has something to give to an issue which I have been talking about at least and, I hope, thinking about for quite a long time. And I've just been thinking a little bit more. I believe that there are two essential ways of knowledge in the whole of human experience. One is traditional - it isn't cumulative, it doesn't add automatically to itself. You have to start from the beginning. And the other is scientific, in which, in fact, you're building on an edifice where one piece of work is incorporated in another, where the whole thing grows like a living organism. No-one, for instance, will ever read a paper of Newton in order to do physics, it is part of the edifice. This is quite different from the other way of knowledge where you have to read a play of Shakespeare if you're going to understand Shakespeare.

And these two methods are both important, both have to learn from the other. But they are essentially different, and the more one thinks of them, the non-incorporative and the incorporating, the more you realise this is a concept which we have to get across in the process of education. And here, I believe, visual communication has something very active to do, which it can do, perhaps, in some ways better than any other means.

One method, in the present jargon we call synchronic; one is diachronic, and moves through time - that is why scientists believe in progress. All this I believe can at least be helped to be got across by the aids of visual communication.

Sir Alfred Ayer

I think your congress is very important because it seems to me that the possibilities of visual education are only just beginning to be developed. I see it as being of the greatest utility in the field of primary education. It's true of the vast majority of children that their thinking is concrete, rather than abstract. And for concrete thinking, visual imagery is of primary importance. This is obvious in the case of the sciences. If you want to introduce children to biology, to natural history, clearly visual presentation is paramount. I think the same is true in physics, even in mathematics. I think that mathematics which is a great stumbling block for many children would be much easier if you have proper visual aids - even in the illustration of abstract theorems and, of course, quite clearly in the application of mathematics. This extends also, obviously to art but also to history; even to literature. Browning asked, "Did you once see Shelley plain?" This is no longer possible, but you could now see Auden plain, and many other literary figures. And seeing these people, combined indeed with hearing them talk, will make an enormous difference to one's understanding and appreciation of literature. It is, of course, very important that this shouldn't be passive - you want the teacher to associate this visual education with discussion and so on. But the combination of the two, seems to me to be able to produce an advanced education hitherto unparalleled.

And this is not merely true of primary education. I think it could extend even to the universities. A great deal of university lecturing now is very mechanical, people having to give lectures. If you can get a few lectures given by experts, widely diffused by these visual means, and then discussed in classes, you have a great advance at all levels.

Asa Briggs

I hope that ICOGRADA will think carefully about what it will do between this conference and the next one, because quite clearly we cannot really hope to pursue the learning process once every three years for four days. The forms of verbal and visual communication across the different countries are things that ICOGRADA is very much concerned with, and this continuous activity is essential.

There are some questions which have been raised at this conference, for example, the way in which visual understanding is essential to the understanding of certain kinds of things. There are some issues of this sort which I hope can be pursued in depth between now and the next conference, with whatever working groups, or in whatever place, ICOGRADA will feel to be right for these activities to go on.

When we talk about any of the questions with which we have been concerned during the last four days, we are in the front line as far as thinking and feeling are concerned. Front lines are always exciting, but they are never comfortable places to be in. I hope that the mood of this conference is such that it will assimilate the various kinds of things that we have learned, not to be dominated in a specialised way with any single part of it, but to look at it as a whole, to let it all, to some extent, come together. I believe that the media have got to come together - treating them separately is nonsense. Their interpenetration is the essential thing.
Audio-visual hardware

Philips TELL Project

At the exhibition which accompanied the VisCom 71 congress, Philips showed the results that they have achieved so far in their development of the TELL (Teacher-aiding Electronic Learning Links) Project.

The TELL communication system allows the teacher to transmit videotaped material to monitors on the pupil's desk from a central rostrum with a battery of controls, not unlike that of a motor car dashboard. The system allows for the splitting up of a class into different groups according to the number of cassette docks in the teaching rostrum. The teacher can also make use of a built-in camera which will transmit his own comments or observations together with a screen image into the pupil's monitor. He can also transmit materials from textbooks on his desk, or his own writings or drawings.

The teacher will also have at his disposal a direct two-way audio and visual link with each of his pupil's desks for the purpose of questions and answers. An associated computer follows the progress of the learner, deciding whether the answer is right before the student is allowed to proceed to the next step. This, it is claimed, will have psychological advantages for the shy or timid pupil, since his or her answers are seen only by the teacher and registered by the computer. The main advantage, however, would seem to be that the teacher is free to leave his desk and move among his pupils, assisting and guiding them individually.

The pupil can make use of a simple keyboard in front of him. As pre-programmed and individualised learning units come to him through earphones, the student can interact with the screened images being demonstrated. By means of a lever or joystick, the pupil can move a light point as an answering device when called from the teacher's desk.

Philips state that they have tried to focus their attention on the immediate future, rather than produce some kind of experimental fantasy. They have studied existing school systems with a view to finding ways of using currently available technology to help improve the efficiency of both teaching and learning.

Ampex Instavideo System

Ampex have introduced a new generation of miniature videotape recorders and players featuring automatic cartridge loading and designed both for the use of serious closed circuit television and home recording and playback markets.

The new Ampex Instavideo videotape recorder/player system includes a miniature videotape recorder, a hand held camera and a cartridge using half-inch-wide video tape. It is claimed to be the smallest cartridge-loading video recorder or player system to date. Pictures may be played back for viewing on a standard television set. The manufacturers state that initially, the entire system (less monitor) will be priced at under 1,500 US dollars. Tape cartridges giving up to one hour's recording will cost under 13 US dollars.

The system may be operated by batteries or household current, in colour or black and white.
We make fine papers.
Their names are probably on the tip of your tongue.
Hi-Fidelity Art, Challenge Art, Eden Grove Bond.
Trident, Blade Extra.
Dozens of them.

But we would like to bet you can't put a name to us.

Which is a pity because if you can tell your printer who makes Hi-Fidelity for example, you've a far better chance of your job looking the way you want it to.

With our name at the tip of your tongue—as well as those of our papers—you have access to our expert advice on paper and how it prints.

We'll never be a household name.
But we'd settle for a flicker of recognition from the right quarter now and then.

Whenever you specify a good paper for a good job for instance.

CULTER GUARD BRIDGE Holdings Ltd.
London: Salisbury Square House, Salisbury Square, EC4Y 8AP. Midlands: 4 Castle Street, Warwick
North: 130 Wensley Road, Harlescott, Wrexham, Clwyd, SY3 5JD. Scotland: Guard Bridge, Fife.

CULTER GUARD BRIDGE
Papermakers.
The International Council of Graphic Design Associations was founded in London in April 1963. Its headquarters are in Amsterdam. ICOGRA is an association of independent Member Associations. Membership is open to societies of professional graphic designers and organisations concerned with the training of designers and/or the raising of graphic design standards. Member associations are elected at the biennial General Assembly, which elects also the Executive Board, determines policy and overall activities and agrees financial arrangements.

The aims of ICOGRA are:

1. to raise internationally the standards of graphic design and professional practice by all practicable means.
2. to collect and exchange information on professional, educational and technical matters.
3. to improve graphic design training and to assist the interchange between countries of graphic designers, teachers and students.
4. to organise exhibitions, international assemblies, congresses and symposia and publish documentation on graphic design and visual communications technology, including a News Bulletin.
5. to act as an international forum for co-operation and exchange of views between designers, organisations representing professionals from allied and other fields and those of commerce and industry.
6. to encourage the better use of graphic design and visual communication as a means to improve understanding between people everywhere.