TOWARDS COMPUTER LITERACY

The BBC Computer Literacy Project 1979-1983

INTRODUCTION

by Aubrey Singer, Managing Director, BBC Television

Broadcasting in all its aspects, Education, Information, Entertainment, is there to innovate, to undertake those projects which not only gratify the audience, but serve to change its consciousness and perception of the world. The Computer Literacy Project is a story of success in such high endeavour.

It is firstly a monument to foresight Those who initiated it saw clearly that the microprocessor would generate a language of its own; that for economic and industrial survival it would be essential for the people to be literate in that language; that as computing technique revolutionised industry, so it would serve to liberate and improve our daily lives.

Secondly it is a monument to imagination and courage. To initiate the building of a new computer, to design television programming acceptable at many levels - schools, teachers, adults from different backgrounds, to publish the back-up literature in a short time-span, needed a number of conceptual leaps that had to be taken without precedent for guidance.

The success of the Computer Literacy Project is manifest. Twenty television programmes have been shown both to adults at home and schools, and seen by millions of people of all ages. An array of books and computer programs have been published, which have sold in hundreds of thousands. Over two hundred thousand British Broadcasting Corporation Microcomputers will soon have found theu way into homes, schools and businesses, and many thousands of people have joined computer classes and clubs.

Britain, thanks to Clive Sinclair, may have the highest density of micros per head of population of any country in the world, but at the same time, thanks largely to the BBC programmes and publications support, and the links with other organisations which we have made, it has the highest rate of computer literacy in the world. Since a good idea is universaL books, programmes and computers are now being used throughout the English speaking world.

So what comes next? Obviously there is in-filling to be done. After all, the computer is a mindless tool with infinite use. Already there is a generation gap. The young are ahead of the

old. The world of computers is rapidly becoming the province of the schoolchild and the young adu lt.

Its literal logic does not come easily to the mind-set of the middle-aged, and yet its cartesian certainties, whilst lending themselves to science, governance and business, do not necessarily allow the compromise necessary in a world of dangerous probabilities. Computer literacy is not enough in itself; it has to be seen as an adjunct to the general literacy required of us all. Perhaps the team and television generally should apply itself to this problem!

Meanwhile the main task is by no means over. As computer software and the means of delivery develop (and no field of endeavour is subject to such rapid growth and change), the communication and encouragement of computer literacy will remain a prime task of public service broadcasting at all levels, in the schools, in continuing education, and in general programming. This booklet tells the story of success i n the beginning, but the real measure of it lies in the achievements of our audience in the years ahead.

Aubrey Singer,   August 1983

1. ORIGINS

The Silicon Factor

Towards the end of the 1970's advances in microprocessor technology were drastically reducing the cost of computing power, and were clearly going to have a big impact in the 80's and 90's. In March 1978 a BBC documentary, by Edward Goldwyn, "Now the Chips are Down", in the series *Horizon*, aroused great public interest by showing very vividly some of the extraordinary new changes which were coming. Early in 1979 the BBC Continuing Education Television Department held a series of discussions on what educational series in this field might usefully be done, and these led to proposals for a series of three major documentaries, The Silicon Factor, on the social impact of the microchip. The project was strongly backed by the BBC's Continuing Education Advisory Council. It was soon clear that broadcasting on this sub1ect involved a number of intriguing and difficult problems. It was a new field, little known to most people. It was based on a new, and to many rather obscure, technology. It was moving forward very fast in many different countries, so that it was particularly difficult to establish an authoritative overview which would hold good for very long.

Fortunately computer awareness was increasingly being recognised in government as extremely important for the future, and many agencies were willing to help and advise the BBC. They included the Department of Industry (DOI), the Department of Education and Science, and the Manpower Services Commission (MSC). The DOI helped with consultancy, and the MSC financed a joint fact-finding trip overseas by two members of the Department, David Allen and Robert Albury, who were to work on Tire Silicon Factor. They talked to industrialists, trades unionists and academics in France, Holland, Germany, Sweden, Norway, Japan and the USA. and their report, which was widely circulated among policy-makers in Britain, reflected a general view that there was an urgent need for greater public

understanding of this new technology . and of its strains- and stresses, as well as its successes.

The computer as a tool

The Silicon Factor was duly transmitted, and the response to the programmes was encouraging. Thus far most attention had been focussed on the impact of the microprocessor as a new social force to which people would need to adjust People had been asking 'How will this affect my job, or my company, or my industry?' But we were now being asked a different set of questions, which were to do with computing. not as an external force to respond to, but as a tool to be used. 'What is a microcomputer? How is it different from a big computer? What is a computer language? What is a computer memory? How can a computer control a machine, or draw pictures, or play games?' Perhaps most important -'How can I control a computer?' These were now very real questions for a great many people, because microcomputers were becoming cheap enough for the 'home computer' to become a reality. These questions became the basis of what was to become the BBC Computer Literacy Project We had earlier been considering a possible series on microelectronics. In November 1979 it was agreed that we should make a ten-part television series for adults, under the provisional title – "Hands on Micros". Resources for ten television programmes, to be broadcast from October 1981, were set aside, a producer was appointed, and we began to make outline plans.

Defining computer literacy

If computers were going to be as important as we believed, some genuine understanding of this new subject would be important for everyone, almost as important perhaps as the capacity to read and write. Early ideas, both here and in America, had concentrated on programming as the main route to computer literacy. However, as our thinking progressed, although we recognised the value of 'hands-on' experience on personal micros, we began to place less emphasis on programming. and more on wider understanding. on relating micros to larger

machines, encouraging people to gain experience with a range of applications programs and high level languages, and relating these to experience m the real world of industry and commerce. Provided these connections could be made, however, modern micros were an excellent way into computing. since they were no different in essence from big machines costing hundreds of thousands of pounds.

They were smaller, and slower, but the principles of their operation and use were very much the same. Our belief was that once people had grasped these principles, at their simplest, they would be able to move further forwa rd into the subject. At this stage we knew that this was a highly important project, but we had little awareness of the scale on which it was lo develop.

Limitaticms

We knew that, in the nature of the medium, the amount of learning that would take place as a result of the television programmes themselves would be limited. The series would be broadcast both to adults at home, and to classes in schools and colleges, and although the institutional audience could be expected to use it systematically, this was unlikely to be the case for home viewers. Even with highly popular and well established programmes it is unusual for a home viewer of a ten-part series to see more than two or three programmes. Each broadcast would have to be designed so as to be effective as a freestanding presentation; this posed problems, since a good deal of technical explanation would be needed, and the capacity of a single twenty-five minute television programme to convey complicated ideas is not great. It is normal for our educational programmes to be accompanied by various supporting materials and links with other means of learning. and these elements would be very important for this project. We would need to plan for books, linked classes and courses, an information service, and possibly for computer hardware and software.

Resources

Within the Continuing Education Television Department we did not have much depth of knowledge about computers and computing, and would need a lot of advice. David Allen, who had produced "The Silicon Factor", was to be Project

Editor, and take responsibility for the editorial co-ordination of the various elements of the new project. This would include editorial responsibility for developing supporting print, which would be published and distributed by BBC Publications. Paul Kriwaczek, an ingenious programme maker, was to be Series Producer, and take direct responsibility for the television series.

Neither had any training in computer science, but both had a scientific background and a strong interest in the subject. We encouraged them to familiarise themselves as swiftly as possible with the world of the micro, and build up their contacts in the field. Both lost no time in getting their hands on machines. We would need a strong production team, and strong support in many areas. We were going to need a good deal of technical help in dealing with equipment. We would need effort from the BBC's Broadcasting Research Department, so as to assess audience needs. For liaison with users in the educational world, we could call on the BBC's Education Officers, and it was likely that we would need at least one full-time Education Officer. He would need to work with Broadcasting Support Services, the follow-up service for putting viewers in touch with local learning opportunities, which the BBC had already established.

Liaison and support

The new series would need to be planned as only one part of an unusually big multi-media project. Sufficient money and manpower and technical facilities to make the television series were assured from the BBC Television Service. BBC books and other published software could largely be sell-financing. But to establish all the supporting provision on the scale that seemed to be required, we needed help. We had already had much advice and support from the Department of Industry in making "The Silicon Factor", and we knew that the development of computer awareness was now seen in Whitehall as a national priority. We put up a case to the Department's Electronic Applications Division, and after some intensive discussion of our plans, we were offered pump-priming funding in four key areas: consultation, piloting and pretesting, educational liaison, and information. The Department was also able to give us a great deal of useful direct advice, and put us in touch with a wide network of contacts in the electronics industry and in the public sector. The timing of our project was fortunate, since the DOI was already planning to make 1982 the 'Year of Information Technology'.

We also received much useful advice from the Department of Education and Science. Here again, the timing was good, since the Department was i n the process of planning the Microelectronics Education Programme (MEP), a teacher education and curriculum development project, which with its counterpart in Scotland, the Scottish Microelectronics Development Programme (SMDP), was intended to stimulate and guide a big drive for the effective use of computers in British schools. Over the next three years govern ment funding of these projects was to rise to over £15m, and the number of teachers familiar with microcomputers was to increase rapidly. There were also government plans for installing more micros in the schools, and various other publ icly supported initiatives in the field of computing. All this meant that our broadcast-based project cou ld form part of a concerted thrust towards computer literacy in

Britain. We would probably be able to rely on support and help from a great many agencies, providing we could maintain good lines of communication with others working in the field.

2. RESEARCH INTO AUDIENCE NEEDS

Uncertainties about the audience

It was planned to transmit the series late-night on BBC-1 for the general audience, with repeats on Sunday mornings on BBC-1, and on weekday afternoons on BBC-2 for use in schools and colleges. We knew from experience that our audience would include both strongly motivated and more casual viewers, but that if the programmes were well made and the series well constructed and promoted, some could

be expected to watch a good many of the programmes, .and some to use the series as an entry point to the other parts of the pro1ect. However, there were a good many questions in our minds about the audience.

Who would they be? What would be the balance between motivated and more casual viewers? How much would they already know about computing? What would be their attitude to the subject, and how far would this influence their propensity to learn? How far would they be willing or able to accept technical

explanations? If the ne d nd interest of the audience were varied, what should our pnonties be as between one group and another? Once we had a picture of the probable audience, there were various questions of content and presentation that had to be resolved. What should be the balance between theory and example, or between filmed cases and studio demonstrations? What should be the level of technical explanation?

How far should the programmes set out to teach the audience, and how far simply to capture their interest? Should the programmes be didactic and explanatory, or more chatty and exploratory? What sort of presenters should we choose? We clearly needed a study by BBC Broadcasting Research.

Planning the research

In collaboration with the production team a two stage research strategy was proposed. The first was to measure the potential interest of the adult population through a national survey. This was to be achieved by adding extra questions to the BBC's routine national Daily Survey of listening and viewing. C?nucted in the street, this survey was based on a quota sample withm a random selection of local government districts. A total of 4573 interviews was carried out during a three day period in January 1981. All those interviewed were given a description of the proposed series and asked to say how interested they would be in watching it. This enabled the researchers to identify the types of people who were most interested in viewing, and revealed various differences as between men and women, people of different age groups, and people from different class backgrounds. The second study, which was to provide guidance on content, style, and format, was met by inviting selected groups of people to respond to a range of possible production approaches, as shown in an experimental 'pilot' television programme. Four groups of 30 people were recruited in two locations, selected by age, sex, and class, so as to over-represent those sub-groups who had been identified by the national survey as being especially interested in the idea of a series on computing. Before viewing, respondents were asked to fill in a sort questionnaire on their knowledge of computers and their attitudes towards the technology, since these were likely to influence their reactions to the series. They were also given questions on what fhey wanted to see in a television series on computing. The pilot, which was about 40 minutes long, included examples of various production techniques, such as the use

of analogies, the use of humour, alternative styles of presentation, alternative levels of explanation, and the balance been different types of item. It was made clear that the pilot was not a finished programme designed for transmission, but an experimental exercise specially made for this study.

Attitudes towards computers and computing

In April 1981 the results of the research were presented to the project team. They showed that people's general attitudes towards computing were very positive. They felt that the advantages of computers outweighed the disadvantages, that computers were an increasingly important aspect of their lives, which could not be ignored, and that it would be a good thing to know more about how they worked and what they could do. There was a lively interest in computer applications, then and m the future. There was also a certain fear about the impact of the technology, particularly in terms of de-personalisation and the storing of personal details on computer data-banks. There was a good deal of anxiety among the less 'computer literate' about their capacity to come to grips with these ideas; this was strongest among older people-. But the study suggested that despite this a great many people were willmg to make a determined effort to do so.

The potential audience and their needs

We had expected the series to appeal strongly to people who were more technically minded, like the readers of the computer magazines, or to people with an interest in the subject because of their jobs, like businessmen or managers or teachers. The research confirmed this, indicating that interest would be strongest among men. among middle class or skilled working class viewers, among the better educated, and among people under 60. One option would be to aim to satisfy this more committed, knowledgeable audience, rather than trying to appeal to the population at large. The study indicated that these people would want a serious approach, which set out above all to be clear and informative to those who already had an interest in the subject The audience on Sunday mornings would be likely to consist largely of motivated viewers, and the daytime audience in institutions would be largely watching in classrooms for which the needs would probably be similar. However, the national survey had also suggested that there was a general interest

among people at large in the idea of learning about computing and computers, and this was also borne out by the group sessions. These indicated an unexpectedly strong potential interest in the subject among women as welJ as men, among working class viewers as well as middle class viewers, among older age groups as well as younger. The needs of this wider audience were different from the more motivated. They wanted plenty of practical examples, and not too much theory, they were apprehensive about being given too much technical information.

They wanted simple straightforward explanations, they were not afraid of a little humour from time to time. They liked a varied, and non-didactic style of presentation. In particular, they were anxious about their capacity to understand the subject. The approach demanded by the more motivated section of the audience would almost certainly alienate them.

The choice of target audience

After much discussion we decided to go for the wider audience, for three main reasons. First, there was clearly a real desire to learn about the subject among the population at large. Secondly, television is a mass medium. The late-night showings gave us the chance to reach millions of people, who we had a better chance of reaching through television than by any other means. And thirdly, television is good at capturing people's interest, demystifying, and showing practical examples. Its capacity for straight explanation is more limited. Here again, it was well suited to the needs of the wider audience, rather than the committed minority.

Series objectives

We therefore defined the main objective of the television series as to act as a 'gateway' into the subject for the casually interested layman or laywoman. We would aim to introduce some elementary principles of computing in a way that made them accessible to large numbers of people, and to get across a number of key ideas:

- that this was an extremely important subject because of its future influence on everyone's lives

- that it was intrinsically fascinating
- that it was possible for anyone to learn a good deal about it
- that there was no need for anxiety about one's capacity to understand it
- that there were a great many available ways of pursuing one's interest further.

The other elements of the project, book, correspondence course, hands-on experience, computer software, referral network, would be

there to provide further learning opportunities. The research suggested that the more technically minded members of the audience might be left rather unsatisfied, but we made the calculated decision to accept this. U the programmes were well made, with interesting examples, this group would learn something from them, and the other elements of the project offered many opportunities for more advanced study. It would probably be possible for us to make further, more advanced, broadcast series in the field once the initial 'gateway' need had been met.

Production approaches

Our decisions on content and presentation flowed naturally from the decision to go for a wide audience. We would include a large number of practical examples on film. We would make extensive use of illustrations through analogy, and use a good deal of repetition. The programmes would need lo look attractive and varied, and there needed lo be a friendly relaxed style of presentation. Generally the material would have to be chosen so as to appeal deliberately to those sections of the audience which had been identified by the research as being less well motivated. Examples of impressively competent youngsters, which would be likely to increase the anxieties of older viewers, would be carefully avoided.

3. THE MICR)COMPUTER

'Hands-on' possibilities

By 1979/80 microcomputers could be bought for less than £200, and they were getting cheaper. This meant that we could plan to demonstrate principles and

procedures on computers in the television studio, and encourage our audience to explore these for themselves on their own machines. This would also be true for some at least of our audience in schools and colleges. Modem micros had as much power as had only been available on large mainframe computers ten or so years before. They were equipped with languages which were capable of tackling serious computing tasks, they were easy to use, and they could provide a wide range of facilities. Their possibilities for education, for serving both practical uses and entertainment in the home, and for providing cheap data-processing in small businesses, were looking more and more interesting. It would obviously be useful to plan for some 'hands-on' experience as part of our project

'Hands-on' needs

Existing micros varied greatly in their educational potential We wanted our audience to have access to machines which were cheap enough for a lot of people to buy, 'friendly' to use and therefore easy to learn on, with sufficient memory to be able to carry useful programs, equipped with high resolution colour graphics and sound, and above all 'expandable '. At their cheapest the new generation of micros could be used with the TV set as a video display and a conventional cassette recorder for data storage. But it was now possible to add all sorts of facilities which until recently had only been available on much more expensive machines: disc drives for more data storage and faster retrieval, extra chips to provide more languages and facilities like word processing, printers for making copies of the computer's output on paper, extra memory to provide more computing power, external communication to other micros, and so on.

If our television series was to provide an entry point to computing ideas and principles, a microcomputer system with the right characteristics cou ld serve as an entry point to practical computing. If we could bring these two ideas together, we would greatly strengthen the effectiveness of the project.

The need for a software standard

We wanted to be able to demonstrate computers being used in the studio, which would mean using a certain amount of code. Our consultants advised us to use BASIC (Beginners AU-purpose Symbolic Instruction Code) which despite its critics was the most widely used language on micros. There was, however, no agreed standard for BASIC, and virtually every machine had its own dialect. Whichever one we chose could only be used by part of our audience, yet to provide any coherence to the series, we would have to concentrate largely on one. Ideally we needed a software standard for the project, which could be used in the television programmes, the books we planned, and in any software we produced, and which our viewers could use on their own micros. We were urged to use a well-designed and 'structured' BASIC, which would not only be powerful but encourage good practice in programming; but whatever dialect we used would be bound to be more accessible to some viewers than to others. We also needed a BASIC which had a good deal in common with the dialects currently in use.

The case for a 'BBC' Microcomputer'

We felt it was very important to provide for 'hands-on' experience, but there was no existing machine which had both the hardware facilities we were looking for, and a BASIC which was so good that we could be confident in using it as our standard. This led us to consider the radical step of having a machine specially developed for the project. There were precedents for this. Various previous educational projects had included kits, produced to BBC specifications, and sold by outside manufacturers under licence from the Corporation. There had never been anything as ambitious as a British Broadcasting Corporation Microcomputer, but the special needs and possibilities of this project seemed to support the idea. We began to consider the details of a possible specification, with the help of advice from BBC Engineering, and various outside advisers, mainly from the field of education.

Consultation

In March 1980 we held a consultative meeting on the project with various organisations, including the Department of Industry, the Department of Education and Science, the Scottish Education Department, the Council for Educational Technology (CET), the Manpower Services Commission, the Engineering Industry Training Board, the National Computing Centre, and a number of Education Authorities and colleges. There was vigorous support for the project, and the need for the BBC to mesh in its plans with those of others working in the field was stressed. A description of the proposed 'British Broadcasting Corporation Microcomputer' was circulated. There were various technical comments on the proposed specification, and several advisers stressed the need to make good provision for software support and good servicing arrangements. There was a strong consensus that to provide a Microcomputer, with the characteristics suggested, would greatly enhance the effectiveness of the project, and serve the interests of computer education. From several advisers, there was particular interest in the proposal that the machine should be capable of receiving computer software direct into memory either from a broadcast Teletext signal. or through the telephone line. A broadcast 'telesoftware' capability would make the new machine unique among micros. CET were already providing telesoftware via Viewdata.

Discussion within the BBC

Within the BBC the proposal was examined with much care. It was important to consider whether it would unfairly damage the business of other micro manufacturers . However, we were advised that provided the various parts of the project served the needs of any micro owner, or indeed of people who did not own micros at all it would stimulate general interest in computers and computing and thus benefit the British microcomputer industry as a whole. It was agreed that since the educational arguments for providing the machine seemed to be well supported, and provided this was a new machine with unique characteristics, rather than simply an existing commercial machine in BBC guise, it was acceptable in principle to go ahead. It would be important to ensure that the chosen manufacturer did not make excessive profits or promote the general interests of his company through the link with the BBC. Since the BBC would be publicly associated with the machine, it would be necessary for BBC engineers to be closely involved in monitoring its design and development. We would also need to take a close interest

in arrangements for promoting and distributing it, and for after sales service. On this basis the proposal for a British Broadcasting Corporation Microcomputer was given the go-ahead.

The choice of machine

There was not time to design and build a new microcomputer from scratch, since this would probably have taken at least two years, but we knew that a number of companies were planning new machines. We approached seven British manufacturers who we knew to be capable of producing a suitable micro, with a list of the hardware and software facilities we wanted. This included ease of use, robustness, high-resolution graphics, colour, substantial memory, powerful and well-structured BASIC, expandability to interface with discs, printers, teletext, and Viewdata, and a good capacity for memory expansion. We were also interested in the price, though we were not necessarily looking for the cheapest machine, and in the probable capacity of the chosen manufacturer to meet a tight schedule. Six companies came back with proposals. Detailed discussions took place with each of them, demonstrations were given where possible, and the bids were exhaustively compared. In February 1981 it was decided that the bid from Acom Computers, of Cambridge, was the most attractive, since their machine -of which they had been able to demonstrate a prototype - seemed to offer the best combination of hardware and software. The company were also committed to a design philosophy of high expandability, and they had a particularly strong in-house research and development team. Acorn were contracted by BBC Enterprises Merchandising Department, headed by Roy Williams, to produce the British Broadcasting Corporation Microcomputer System.

Developing the machine

It was agreed that there would be close consultation with BBC engineers during the development of the Microcomputer. David Kitson, the Head of BBC Engineering Designs Department, took responsibility for engineering liaison with Acom. Richard Russell one of his designers, and a microcomputer specialist, worked very closely with the Acorn engineers, and contributed significantly to various details of the design, including the final details of the BASIC. This was to be a very

advanced microcomputer, which had to be produced to a firm deadline, a very ambitious undertaking. Because of the need to ensure that the machines would be ready by the launch of the television series, we postponed the first transmission until January 1982. We also accepted that some of the add-on facilities, like teletext, would not be ready for the launch. It was not easy at this stage to foresee the demand for the machine; a minimum production of 12,000 during the three initial transmissions of the series was agreed, although the company were asked to be ready to increase production if need be.

Two crucial parts of the machine yet to be completed by Acorn's software designers were the BASIC Interpreter, which enables the user to communicate with the central processing unit, and the Operating System, in effect the central nervous system of the microcomputer. Both involved writing thousands of coded instructions, which would eventually be frozen into electronic circuits on microchips. Part of the art of software design is to find elegant ways of configuring the intricate architecture of hundreds of interlocking circuits so as to cram as many facilities as possible into a limited space; but this takes time, and our time was severely limited. Development continued during the summer, with frequent consultations with BBC Engineering Designs Department

Towards production

Early plans were made for volume production, and distribution by cash post No pre-production models could be sent out until the BASIC was finalised in the September and this caused some anxiety on the part of the television production team, who were due to go into the studio in November and needed to plan their demonstrations. There was also pressure to finalise the design from users in the field, and from the BBC Project Editor, who was responsible for producing a guide for users, and a demonstration software package. All the time it was necessary to hold a balance between the need to produce a high-quality microcomputer, and the equally pressing need to hit all the interlocking deadlines and copy dates which had to be met if all the parts of the project were to come together on time. Meanwhile the Model A had been chosen by the Department of Industry as one of two micros

which qualified for 50% government funding for use in secondary schools, and many schools were keenly awaiting their machines. Early reviews of pre-production prototypes had been very favourable, and this, combined with the very high specification of the microcomputer, Jed to unexpectedly heavy orders. Because of this we decided to postpone the late-night transmission of the television series, which was likely to get a big audience, by five weeks, so as to allow as many viewers as possible to obtain their machines. Educational users, and in particular the Regional Centres of the Microelectronics Education Programme, had already been given priority, since many schools and colleges had planned the TV series into their timetables. By Christmas 1981 orders for a round 12,000 machines had already been taken. Much depended on whether the company could meet its production schedule, and build up production quickly in the New Year.

4. BOOKS AND COMPUTER SOFTWARE

The Computer Book

We would only be able to convey a limited amount of detailed information in the television programmes, so it would be important to provide a popular BBC book to help people go further into the subject Many of our potential audience felt anxious about their capacity to understand computing, and would not normally be in the habit of buying 'technical' books. Whatever we produced would need above all to be clearly and attractively written, and well illustrated. The deadlines for production were looming uncomfortably close, since even on the BBC's very tight schedules, it normally took about nine months to design, produce and distribute a new book after the completion of the final copy; this left less than five months to get the book specified and written. Working with Ray Curnow, a computer consultant who had contributed much both to the thinking behind The Silicon Factor, and to the early plans for the Computer Literacy Project, David Allen developed an outline. It would not be a single narrative, but a handbook containing a wide variety of material which could be dipped into, referred to, or read right

through. The book would include chapters on the history of computing, the variety of present-day applications, problem solving, programming, the internal workings of the machine, the practical business of using a micro yourselt and the wider implications of the technology. The authors would be Peter Laurie, editor of one of the leading computer journals, Robin Bradbeer, a lecturer and writer who was also particularly active in the computer club movement, and Peter de Bono, a professional computing consultant with long experience of systems design and problem-solving. Susan Curran, an experienced journalist and editor, was to edit the book, working with David Allen. The copy deadlines were very tight, and perhaps inevitably there were delays in completing drafts and getting through the heavy rewriting needed to make the book consistent in style, and readable by a beginner.

By the Spring it looked as if we could not possibly meet the transmission deadline. However, the series was postponed by three months to allow more time for the development of the microcomputer, and this left just enough time to keep the book on course. We decided simply to call it The Computer Book, matching the series, which was to be called The Computer Programme.

30-Hour Basic

Over the years BBC Education had collaborated on various projects with the National Extension College (NEC), the Cambridge based correspondence college. During 1980 the NEC had decided the time was ripe for an introductory course on BASIC programming for micro owners, to be called 30-Hour Basic. When our computer literacy plans were announced, Richard Freeman, the Director of the NEC, approached us to see if we could bring our projects together. We were not planning to teach BASIC, but we knew that many of our audience would want to learn it, and we agreed to work together. Richard Freeman joined the project team, and agreed to time the production of the NEC course so as to coincide with our transmissions. He agreed to make the course compatible with the BASIC to be used on the British Broadcasting Corporation Microcomputer (British Broadcasting Corporation BASIC), and we undertook to provide NEC with details of the language specification, and help them obtain early machines. The course would also be applicable to other micros, and this coincided with our wish to serve as wide an audience as possible. It was being planned so that it could be used either as

a free-standing text for home study, or as a full correspondence course with tutorial support. The NEC were also developing 'flexi-study' arrangements, through which their students would be able to go into local colleges and use machines to support their studies. Broadcasting Support Services would publicise 30-Hour Basic.

The User Guide

We knew that many people were buying microcomputers with very little idea of the range of things they could be used for, and that the general standard of user manuals was not hjgh. The British Broadcasting Corporation Microcomputer was to be a particularly versatile and advanced machine; there needed to be a first-rate guide with it We wanted the guide to offer a good deal of systematic instruction on how to use the machine. The design of our BASIC made it particularly suitable for writing elegant and efficient programs, using a well structured approach. This needed to be spelt out step by step for the novice.

For more experienced people, who had previously used less advanced machines, we had to explain the various enhancements and extensions of our BASIC in detail, including the powerful commands for handling the high-resolution colour graphics. David Allen took responsibility for editing the user guide, which was to be written by John Coll of Acorn. This had to be produced under great pressure, because of development delays, and the first 25,000 users had to be sent a provisional version, to be replaced later.

The Welcome Pack

We decided to include with each micro a package of demonstration software on cassette, to illustrate the variety of programs that could be run on a micro. Since BBC Publications had no previous experience of publishing computer software we secured the temporary help of a part time software editor from the Department of Industry Research Laboratories, Dr Mel Draper. The programs could not be written until our BASIC had been finalised, so here again we were pressed for time. However, by drawing on software expertise from a number of different sources, and with technical advice from BBC Engineering, we were able to develop a

'Welcome Package' of sixteen programs. This showed how graphics could be created, music played, data-bases created, simulations achieved, names sorted, tests administered, games set and played, and a number of other examples of what a microcomputer could do, using a comparatively small amount of memory.

Applications software

It would be very important for there to be a range of programs on cassette or disc, for British Broadcasting Corporation Microcomputer owners to use. We identified a number of promising categories of software, including programs for use in education (reading, geography, computer studies), programs of practical use in the home (home finance or record-keeping), packages to extend the facilities offered by the machine (word-processing or music), and games. Such programs would have to be either specially written for the our Microcomputer or converted from programs written for other machines. Software development was expensive, because of the skilled time needed for programming; a substantial program m ight cost several thousand pounds to write. Programs had to be carefully checked, since a single small error could render them useless. There had to be tight control of the technical quality of cassettes produced, since here again a single error on the tape could be disastrous. Nothing could be written until machines were available, and if the design was altered after the software was written, the software might have to be altered too. All of this added to the cost of production. The initial market for the software was uncertain, though its longer-term possibilities looked good. BBC Publications set up a software section which worked closely with' the project team to develop a list of ten packages. They also began to build up a knowledge of software writers and users, and consider possible future plans. Guidelines for software writers were drawn up, so as to encourage good standards of programming in our BASIC. We were glad to note that various other software publishers were considering writing programs for use on the British Broadcasting Corporation Microcomputer, and publishing various books on it.

Telesoftware

We were also considering the possibilities of broadcast telesoftware, transmitted by the BBC CEEFAX service. This would be received by those owners of BBC

machines who bought the optional teletext receiver; they would also be able to receive and record the general CEEFAX and ORACLE Teletext services. This was an efficient way of distributing small-scale software, limited by the extent to which people owned receivers, and the availability of low-cost software, but we believed it had much potentiaL particularly in the field of education.

BBC Engineering Research Department and Designs Department were already giving Acorn a good deal of help in the development of the teletext receiver. Receivers were not going to be ready in time for the project launch, but we started to work with the BBC CEEFAX department to identify the technical and other problems that would need to be overcome before a service could be started. These included the coding of the software for transmission, the development of ground rules for handling copyright issues, the sources of good software, the problems that might arise at the receiving end, and the editorial control of a telesofware service. Since the service could not easily charge for its programs, and would need resources to get off the ground, we also contacted a number of possible public sources of funding. There appeared to be enough support for the idea of this new service to make it a reality as soon as the receivers could be developed. It was encouraging to note that a significant number of those who ordered early microcomputers also wanted telesoftware receivers. A good many of these orders were from schools. We also began to consider the longer-term educational possibilities of distributing software and data through the telephone lines, to viewdata terminals linked to the British Broadcasting Corporation Microcomputer.

5.
6. THE LIAISON NETWORK

The need for follow-up

From the beginning the Computer Literacy Project had been seen as a multi-layered learning system through which viewers could follow up their interest in computing to whatever level they wished. The television series might be the

starting point for many thousands of beginners; but we were under no illusions that, even with print support and hardware opportunities, BBC materials could meet the needs of all the newly motivated people who would want to delve more deeply into the subject. Unlike the Open University, with its network of regional student support staff, the BBC has no field force of tutors to provide direct local help and guidance. Over the years, through its small team of Education Officers, the BBC has been developing links with a range of educational agencies. Notable examples of these collaborative networks have been those associated with the BBC projects on adult literacy and English as a second language, where face-to-face follow-up tuition was particularly important. In the case of computer literacy this meant putting viewers in touch with colleges, adult centres, clubs, information services, and other organizations with the skills and facilities required to meet the wide variety of needs for computer education.

Local response

Roberts Salkeld, the BBC Continuing Education Officer in Leeds, was responsible for educational liaison for the project. In March/ April 1981 he called a series of regional meetings to introduce our plans to potential collaborators. It soon became abundantly clear that for the educational world, this project was, to say the least, timely. The regional introductory meetings produced a bigger response than any previous BBC educational initiative. Several thousand local education authority staff college and university lecturers, school teachers, and computer club organisers, crowded into sessions at which BBC staff outlined the project, showed extracts from the pilot television programme and described the proposed referral network. There was lively discussion of all aspects of the project, including the degree of detailed teaching to be included in the TV programmes, BBC Publications software plans, and the practicalities of providing local 'hands--on' experience. Inevitably much attention was focussed on the plans for the development of a BBC Microcomputer, and Acorn staff were closely questioned. The overwhelming atmosphere at all the meetings -from Exeter to Aberdeen - was enthusiastic, and despite the economic difficulties being experienced by most schools and colleges there was a keen desire to be actively involved. This was simply a foretaste of the reaction to the project over the coming months. As news of our plans was reported in the educational and computing press, the level of

postal and telephone enquiries mounted. Within a few weeks - well in advance of any major public launch - over fifteen thousand enquiries had been dealt with by the rapidly expanded, but still over-stretched, BBC liaison team in Leeds.

Setting up the network

It was clearly necessary to centralise the provision of information about the project, and in particular the flow of information about local contacts, and we were fortunate to be able to negotiate a firm commitment from BSS {Broadcasting Support Services), and its sister organisations, 'Network' in Scotland, and the Educational Guidance Service for Adults in Northern Ireland. BSS had grown out of the referral service developed for the Adult Literacy Project, for which it put viewers needing or offering help, in touch with local classes. This literacy service was initially established by the BBC in 1975, in collaboration with various other interested organisations. Shortly afterwards BSS became an independent educational charity, offering follow-up services to viewers and listeners across a range of broadcasts in the broad field of social concern. To provide ad equate follow-up for the Computer Literacy Project was going to be a big and expensive operation, but with the aid of funds from the BBC, the National Extension College, Acom Computers, and the Department of Industry, it was possible to make plans for a postal enquiry service to meet the heavy demand for information that we expected. After the introductory meetings, the organisations represented were invited to register as referral points; about 800 agencies, ranging from adult centres to universities and computer clubs (out of an eventual total of over 1000 local centres), had registered within a month. Many questions remained about the kinds of demands the project would make on local support agencies. The formative research had revealed wide variations in expertise, expectation, and need, on the part of potential viewers. Some enquirers would be complete beginners, others would be looking for courses in programming and other more sophisticated or specialist aspects of computing. Many would be attracted to local centres so as to explore for themselves the new BBC Microcomputer. The level of instruction needed would vary greatly. Most of the early contacts were within the formal sector of education; these could cater for many of the enquiries, but a range of other types of referral points were also sought in order to meet the need for more informal advice in such areas as business. In identifying these referral points, BSS

obtained help from a number of organisations well established in the field The British Computer Society (BCS), with its 150 branches, provided a valuable dimension of computer professionalism. BSS were also able to secure the co-operation of the Amateur Computer Club (ACC), the national co-ordinating body for some 200 clubs and user groups. Links were also established with the National Computing Centre, and its microcomputer division, the Microsystems Centre. Both proved extremely helpfuL as did the Department of Industry Microprocessor Applications Project. A range of specialist agencies were also contacted, including for example, the Construction Industry Computing Association, the Building Services Research and Information Association, and the Distributive Industry Training Board. To assist with enquiries from or on behalf of disabled people, bodies such as the Group for Technology and Disability were contacted.

The network in Scotland

ln Scotland the development of the BBC project and its referral service coincided with the launch of a new Open Leaming project centred on the Scottish Council for Educational Technology. 'Network', BSS's counterpart in Scotland, made close links with the Open Learning Project, with the Scottish Community Education Microelectronics Project, and with the Scottish Microelectronics Development Programme. This meant that the development of the Computer Literacy Referral Service in Scotland could be closely integrated with the briefing of local referral centre staff and the general spread of information about the project. Thus although the London address of BSS was used as the first point of reference, viewers in Scotland had access to their own network of services and local facilities.

Organising the referral information

Information on local facilities was arranged in ten categories: informal advice, beginners' courses, advanced courses, computer clubs, BCS branches, Acorn dealers, BBC Microcomputer user-groups, business consultancy services, courses for small business users, and in-service courses for teachers. Roger Hitt, of BSS, oversaw the development of a computer database, through which a large volume of enquiries could be handled efficiently and kept up to date. All referral points were

coded by geographical area and by the nature of the service provided. The coding structure was three tiered, with each search moving out from a resource centre to cover a wider area. This avoided giving enquirers near the centre a print-out of largely irrelevant information. For specialist resources which might be scarce in an area, the third tier of the search covered a whole region, eg the South West; this meant that where resources existed within reasonable travelling distance, details could be printed out and given to the enquirer. Ten different subject categories were established, so as to match the needs of enquirers with available resources. In addition to its referral work, BSS was to act as a central information point on the BBC project, distributing information, on request, on the Microcomputer, books, software, and correspondence courses. Five fact-sheets were specially written, giving details of national clubs, careers in computing, computer uses in business, computer uses in education, and an introductory booklist. Regular newsletters were to be sent out to referral points.

Tutor briefing

Out in the field there was some anxiety on the part of tutors and organisers preparing for the launch of the project, and the task of tutor briefing became a big priority for the Autumn of 1981. Fortunately we were able to take advantage of the extensive teacher training networks being established by MEP in England and Wales, and SMDP i n Scotland. The initial meeting of MEP Regional Directors held in Cambridge in November 1981 included a full review of the BBC Project, familiarisation with the Micro, and the planning of seminars and courses for referral centre staff. These were to be run in Regional Information Centres and at the Scottish Microelectronics Education Development Centre. By the time of the project launch in January 1982, any tutor or organiser within the computer referral network had had an opportunity for a thorough briefing on the content of the BBC materials, and an introduction to the Microcomputer.

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6. THE FIRST TELEVISION SERIES

The schedule

The conclusions of the formative research were presented to the production team in April 1981, about nine months before the first transmission of the series. The series was to consist of roughly half specially shot film, and half of material recorded in the electronic studio. The film would be shot during the summer and edited in the early autumn, the weekly studio sessions were due to run from early November to early February 1982. This meant that the strategic decisions on content and format needed to be taken quickly so that filming could start There would be little room for second thoughts. A week's filming. a week's editing. and a day in the electronic studio were available for each programme. Paul Kriwaczek, the producer, had been working on the project full-time since September 1980. He was joined by one director, Matt Boney, in November, and a second, Frank Ash, in March 1981. The researcher, Catherine Robins, joined the team in April 1981. Her first job would be to find film stories.

Series content

There had been much debate about the main explanatory thrust of the series. One school of thought had argued that it was particularly important for the programmes to give advice on the practica l details of learning to use a micro. But we had concluded that if the series was to have any sustained educational value, it had to be a way into the real world of computing. through an explanation of computing principles. This would need to be achieved by a combination of studio demonstration on micros, explanation of principles by analogy, and illustration on film of real-life examples of practical applications. Not only micros, but mini computers and mainframes would be shown.

Because we needed to go for a wide audience, we would always need to err on the side of simplicity, and use a good deal of repetition; each programme would only aim to get across three or four key points. But since the audience would also include some people who already knew a good deal about computing, we would ensure that the series reflected the most advanced thinking and the newest ideas. We had our eye mainly on the uninstructed layman, but we hoped that even experienced computer professionals would learn something from the programmes.

Probably the most familiar application area was data processing. but there were many others. We felt it was very important to include examples of all the main ways in which computers were being used, including modelling and simulation, graphics, sound, artificial intelligence, control and communications. We knew that people would probably dip in and out of the series, with most viewers seeing perhaps two or three programmes, and possibly coming back to see some of the repeats if their curiosity had been sufficiently engaged. Each programme would have to be more or less free-standing. although there would be an underlying structure, so that if a viewer watched the whole series he would find that the whole was greater than the sum of the parts. This suggested a thematic approach, with each programme looking at a particular area of application. An outline plan was developed in consultation with a team of outside advisers, who included both computer professionals, and people like teachers and writers who were used to the problems of getting this subject across to the layman.

Presentation

We needed to make the programmes very accessible and friendly in style, and above all to dispel the idea that computing was an obscure specialist subject, which could only be grasped by people with a knowledge of maths or a scientific training. There had to be a lot of explanation, but a didactic style would almost certainly not work. This led Paul Kriwaczek to decide to use a dialogue, between an expert and a layman, as the basis of the presentation. As the layman we chose Chris Serie, who had been a great success in the pilot programme which had been used for pre-testing. He was well known and liked by large numbers of people through his role in That's Life, the highly popular consumer programme. As the expert we chose Ian McNaught-Davis, a senior executive in a software company, and a thoroughgoing computer professional. He was also well-known as a rock climber, and had some experience of television. He had a pleasant unpretentious style, and a happy knack of explaining complex issues in terms anyone could understand. Both presenters, together with Gill NevilL an experienced science correspondent, took their share in presenting the film stories which were shot during the summer. Meanwhile Paul Kriwaczek worked on detailed script outlines for the studio sessions.

Script development

The programmes had to show that computing was an accessible subject, that people who were interested could discover for themselves, rather than a threatening body of knowledge. In order to get the narrative line dear, and ensure that each section of the programme meshed into the next, Paul Kriwaczek wrote, and rewrote a number of times, word by word drafts of all ten programmes. Each was subjected to criticism by the production team and by our advisers, both on academic grounds, and as a piece of explanation. Then, a day or two before the recording sessions in the electronic studio, the two presenters worked their way through the dialogue sections in a rehearsal room, until they had got the main narrative line clear in their minds. Chris Serle's role, often an unrewarding one, was to ask the questions that we thought the audience would want to have asked, to challenge any jargon used, and generally to clarify the story line. He also took his share of exposition, though to preserve his status as a non expert, we could not allow him too much authority. This was sometimes difficult, because he learned fast as the series progressed. Ian McNaught-Davis did most of the explanation, with occasional help from other expert witnesses. The aim was to achieve a sense of spontaneity and casualness in the studio. This is one of the most difficult arts in television, which is produced in a highly artificial environment, subject to draconian pressures of time, and set about with technical equipment.

The use of the BBC Microcomputer

We were planning to use a number of different microcomputers in the series, but we would be able to use the British Broadcasting Corporation Microcomputer for most of the studio demonstrations. This would make it easier for us to achieve consistency of style, so that each demonstration flowed naturally into the next. BBC BASIC gave us a software standard, so that the BASIC commands in the television programmes could also be consistent.

There was also the practical advantage that in the bulk of the programmes we would be able to use the same set of equipment, rather than setting up from scratch

each time. We wanted, however, to avoid making the series specific to the BBC Micro, so all the time we planned to indicate, as far as possible, where practice differed for different machines. Since we were dealing with principles and procedures that were common to most micros, this did not present big problems.

We secured the assistance of a full-time engineer to prepare the equipment for the studio sessions. One of his first jobs was to help design and build an interface for using the computer as a synchronous source to the studio. This meant that we could use the computer as a direct input to the programme, rather than having to point a camera at the screen. This gave us an exceptionally crisp clean picture, which was very valuable, since we were planning to use a good deal of text, which had to be readable. We were also planning to use graphics generated by the Micro for illustrations, for which it was well suited because of the high resolution of the colour graphics.

The studio recordings

We had one studio day, of about eight working hours, to rehearse and record each programme. The film sequences were already made, so there remained about twelve minutes of new material to record In refining and developing the script outlines Paul Kriwaczek had found ways of explaining and illustrating the programme themes, but it was never easy to realise the results he wanted within the time available. The greatest practical difficulties arose because we were using so much computing equipment, which had to work properly in front of the cameras, so as to display through the screen the precise points we wanted to make. The television studio turned out to be a highly uncomfortable environment for a computer, hot, crowded, and full of disturbing electrical fields. New, and therefore rather temperamental machines, had to be moved into position, switched on, and made to work quickly and well. Pre-production models equipped with BBC BASIC could not be made available before September, so there was little time for preparation. Some of the machines we were using tended to suffer from the small faults which are inevitable during the development of new equipment, and as a result we could not avoid losing a good deal of time during the early studio sessions. Many of the demonstrations were based on specially designed computer programs, written by a professional programmer, Jan Trackman, who during the twelve weeks of the studio sessions worked two or three days a week on the

project. To achieve the greatest possible clarity, it was often necessary for these to be modified, or sometimes re-written, on the studio day. All these technical considerations made it particularly difficult to maintain the relaxed spontaneous atmosphere we were aiming for. Despite the pressure that this placed on the presenters, the series was successfully recorded and completed, at the cost of one extra studio day, and fairly heavy use of post-production video-tape editing.

7. THE LAUNCH OF THE PROJECT

Communications

In the Autumn of l981 the various parts of the project, TV programmes, books, software, hardware, courses, and information systems, were aU under development. It was particularly important to maintain good lines of communication, and we held monthly meetings of the project team. These included the television production team, BBC Publications, BBC Enterprises, BBC Engineering, BBC Broadcasting Research, BBC Education Officers, Broadcasting Support Services, and the National Extension College. Weekly progress meetings with Acorn were held, and a regular newsletter was sent out by BSS to the thousand or so referral points. Roberts Salkeld acted as a co-ordinating link with the many briefing meetings for tutors which were being held by MEP and by Acom. BSS were in the process of refining their referral database, and were responding to a fast increasing demand for information about the project. By November enquiries were coming in at around 350 a day, and 32,000 had already been dealt with. Many of these were concerned with the British Broadcasting Corporation Microcomputer, which had been demonstrated at various exhibitions, and extensively reviewed in the technical press. Acom were planning to have 3000 Micros ready by January 1982.

Technical hold-ups

Acorn was on course for its January target, until in the first week in December, production hit an unexpected snag. For the BBC Micro to reach the high performance required, many of its com ponents had to perform right up to the limits of their specification. It included one very advanced circuit, which controlled the high definition screen display, and had to function within very narrow limits. Samples had been made and tested, and had performed well. Then, when the chip was produced in volume, there was an unexpected and unacceptable failure rate. Through a statistical freak the sampling had failed to reveal a small but crucial design weakness. There had to be a redesign, which might take weeks or longer. As a result, when the television transmissions for schools began in January, only a few hundred had received their Micros. Meanwhile demand went on rising, as did the level of enquiries.

The Project launch

The project had attracted a good deal of attention in the press during 1981, much of it rather speculative. This interest was confirmed at our launch in January 1982, when we presented all the different elements of the project, including the first television programme, The Computer Book, 30-Hour Basic, and an array of sixteen British Broadcasting Corporation Microcomputers, all in working order, and displaying the Welcome software pack in full colour. Over fifty journalists came to the launch, and although we were questioned closely on the various delays, there was also appreciation for the many-sided nature of the project. The publicity arising from the launch, and the transmissions of the series, greatly increased the level of enquiries. BSS were soon answering over 2000 letters a week. Both The Computer Book and 30- Hour Basic quickly sold out their first print-runs and found themselves in the best-seller lists. About a quarter of a million viewers were watching each transmission on Sunday mornings and Monday afternoons, and the late-night broadcasts attracted nearly a million people. The research predictions about the level of public interest in computers and computing were being amply borne out in practice.

The general audience response

We had been keen to make as thorough an assessment as possible of the response to the programmes, as a basis for our next computer literacy series. With the aid of a grant from the Department of Industry, we commissioned a series of studies by BBC Broadcasting Research.

These showed that seven million viewers watched at least part of The Computer Programme during one of the three transmissions of the series during the first half of 1982. Although amongst the audience there was a slight over-representation of men, in comparison to the total UK population, and a slight bias towards people under 55, the analysis of the audience showed a remarkably even distribution across sex, age and socio-economic groupings. Half were over 35, a quarter over 45, and over 45% were women. The audience was, in fact, closely representative of the population as a whole. As the formative research had predicted, most of the audience had little or no previous knowledge of computing.

The programmes had evidently been pitched at about the right level since overall audience reactions were very favourable. There was a virtually unanimous feeling that this was a very important area, and strong support for the BBC's initiative. Some 80% of those surveyed felt that the programmes provided a good introduction to the subject and explained the basic principles very clearly. Comparatively few felt the series was too elementary for them, and only 15% felt it was difficult to understand.

More specialised responses

In addition to the survey of the audience as a whole, the researchers also studied the reactions of people who already owned a microcomputer. Among this group most agreed that the programmes were 'a good introduction to computing'. Not surprisingly most felt the programmes were too elementary for them, though this did not seem to affect their enjoyment of the series. Some 78% of those surveyed watched all ten programmes. But, as with many of the viewers contacted via the referral network. there was a clear demand from this group for more specialised television materiaL in particular programmes about how to use a microcomputer, and how to write programs in advanced programming languages. Jn common with many of the less experienced general audience, there was demand from this group

for more programmes dealing with the practical applications of microcomputers in the home, and in business and industry.

Response to the books

The research also covered other elements of the project For a period in 1982 The Computer Book had sold at a level more usually associated with popular best-selling novels. By the late summer over 60,000 copies had been sold, and through big purchases by educational institutions the readership may have been very much greater. ln general reactions to the book were favourable; it was 'easy to read', and 'free of jargon'. There was, however, some criticism that it was over-general and rather simphstic. Here was an instance where the level of the BBC package of materials could not match all differing needs of users. The most popular chapters of the book were those dealing with the practical side of owning a microcomputer and the elements of programming. This indicates that those buying the book may have been further along the road to computer literacy than the interested layman for whom it was designed. However, the continuing high demand for the book, and its extensive use in schools and colleges, suggest that it may still be doing a useful job for beginners of all ages.

There was also heavy demand for the NEC's self-study course, 30-Hour Basic, which sold over 100,000 copies in the first nine months of 1982. More than two thousand schools and colleges had used the course, many of these incorporating it rnto their provision to students referred by BSS. Also notable was the very low initial drop-out rate among people who enrolled with NEC for correspondence tuition on 30-Hour Basic. Only 2.6% of students failed to complete at least one assignment This was the lowest drop-out rate on current NEC courses, and seemed to suggest that a significant number of users wish to learn to program their micros, rather than simply using ready-made software.

The institutional response

At a series of meetings held in the late Spring of 1982, after the first transmissions of The Computer Programme, tutors and organisers of local referral centres were invited to report on their experiences, and on the response of their students to the BBC materials. A study of the use of the series in schools and colleges was also carried out by the School Broadcasting Council. This showed that a great many colleges and secondary schools had begun to build computer appreciation into their normal courses. By early 1982 a large number of secondary schools were providing computer familiarisation courses for all pupils, whilst many Further Education Colleges were beginning to offer similar courses to all their vocational students. A common thread in this highly diverse provision was the use of educational materials from the BBC project. Virtually every college of further education in the United Kingdom recorded all ten of The Computer Programme, bought multiple copies of The Computer Book, and used these materials with several different student groups. Similarly, a very high proportion of colleges and adult centres drew on the 30-Hour Basic course. Some 200 institutions became registered NEC 'Flexi-study' centres, offering a combination of the course and hands-on experience of the British Broadcasting Corporation Microcomputer. Meanwhile, among secondary schools, The Computer Programme was more widely used than any other television series in 1982. Some 39% recorded the programmes for use with many different groups of pupils. The overall impression from the feedback meetings was that for the beginner, the layman or laywoman taking the first tentative steps in computing. The Compt1ter Programme, with its very elementary content, and relaxed straightforward style, provided a near ideal starting point. Itwas interesting that, as we had hoped, the series was also well received by students who already knew something of the basics, but who could draw on the programmes to reinforce their knowledge, and help clarify fundamental concepts.

Although the series was designed primarily for the adult viewer, at was used m many schools, both to introduce younger pupils to computers, and as revision material for pupils taking General Certificate of Education Computer Studies at Ordinary Level and Advanced Level.

Reservations

Perhaps inevitably, there were reports of some dissatisfaction with the pace of the television series among adults attending classes and courses. Designed for the independent home viewer, the series progressed thrugh the basic concepts more slowly than many students attending local computer appreciation classes. Despite this, adult students welcomed the practical examples of computer applications shown in the programmes. There had also been the expectation among some users, reporting back through the referral centres, that the television series would provide more direct instruction in prog ramming and in the practicalities of using micros. The fact that the series had not set out to teach programming had caused some disappointment. This response reinforces the principle that the effective use of such a series in an institutional setting probably demands the provision of a good deal of curricular material, so that the broadcasts become part of an instructional package.

8. THE SECOND YEAR

Progress of the BBC Microcomputer

During the early months of 1982, public interest in Britain m computers and computing was growing fast Personal micros and books on computing were selling in large numbers, the number of computing magazines on the bookstalls was increasing, as was their readership. Demand for all the elements of the BBC project was exceeding our expectations. All this augured well for the success of the government's campaign for Information Technology Year, but it created some immediate problems for us. It was easy to print more copies of The Computer Book and 30-Hour Basic, but meeting the soaring demand for the Microcomputer was a lot more complicated The problem circuit had been successfulJy redesigned, but this had delayed the production schedule by about six weeks. Testing problems in the assembly plants, where every machine had to be subjected to a series of complex

routine tests at each stage of production, were causing some delays. Certain microchips and other parts for the machines had to be bought from suppliers in overseas countries, in a highly competitive world market, where demand for microcomputer components was rising unexpectedly steeply. It was not easy to step up orders for components at short notice, without incurring punishing

increases in costs. All these operations had to be financed by the company, which had no government subsidies. Production of the British Broadcasting Corporation Micro was 1000 in January, 2500 in February, and 5000 in March. Meanwhile demand for it went on rising, despite a price increase of £64, which the BBC had agreed in January. By the end of April the order backlog exceeded 20,000. Successful efforts were being made to increase production faster, but it was not, at this stage, possible to make very accurate predictions of future output or delivery dates.

Meanwhile the level of enquiries from the large numbers of people whose interest had been aroused by the television series went on rising. Broadcasting Support Services and the BBC made special dispositions to meet the heavy load of correspondence, and Acorn took steps to extend and streamline their information systems. In mid-1982 the pressures on Acorn were intense. The tremendous success of our machine made it necessary for them to expand virtually every aspect of their operations. Production needed to be increased, quality control systems and after-sales service developed, and distribution arrangements built up, to meet a level of business which for them was unprecedented . The company's turnover in]979/80 had be less than a million pounds. In 1982 it might well exceed twenty mill10. At the same time the research and development of the various extensions to the system, like second processors and teletext receivers, had to be kept up. This programme alone posed many complex problems, since the Acorn designers were seeking to push microprocessor technology to its limits. All this meant that the company had to increase its staff and build up its management systems under unremitting pressures, heightened by the publicity associated with a BBC project. Extra sub-contractors were found to help increase production, and the distribution system was overhauled and extended. By mid-October the back-log had nearly disappeared, and a new customer could obtain a British Broadcasting Corporation Micro within a few weeks. The more expensive Model B was proving more popular than the Model A, and many people now wanted to buy machines with disc mterfaces, which cost over £450. Here again there were some delays, because of a world shortage of a particular circuit. In October 1982.it was announced that the Department of Industry scheme for funding microcomputers in schools was to be extended to primary schools. The Model B with disc facilities was one of three systems nominated for government support. By Christmas over 67,000 BBC Micros had been delivered, though there were still delays in providing add-ons.

The company were now finding that more and more people wanted to buy direct from local dealers. This meant that Acorn had to strengthen their dealer network, but it also took some pressure off the mail-order system.

Software development

BBC Publications had continued to develop software packages, cons1stmg o cassettes and booklets, to run on the BBC system. This was a complicated and expensive undertaking, not easy to plan. Software cassettes were cheaper than books to produce, but more exens1ve to write. Programs had to be painstakingly checked and validated before they could be produced in volume, so as to be robust enough to be used by people with no previous experience of computers, who might well press the wrong keys or ignore instructions. There were delays, since it was clearly preferable to check and recheck everything that the BBC was to publish, rather that rushing packages out before they had been properly 'de-bugged'.

A full-time software Editor was appointed in April 1982, and in August the first ten BBC packages were finally published . They included packs on music graphics, games, and home finance, and two packs based on the programs written by Ian Trackman for demonstrations in The Computer Programme. In developing this list BBC Publications had established links with various outside organisations, like the Consumers' Association, and the Microelectronics Education Programme, so as to bring together specialists in particular subject areas, with software writers. We were getting interested in the possibilities of software for use in schools, where there was growing demand and little good material. We began to make contact with centres of excellence in educational software, and generate ideas for packages to support the school curriculum. We also planned packages to support the second computer literacy television series, which was due to begin transmission in January 1983.

Telesoftware

One of the unique features of the BBC Microcomputer was its capacity to receive broadcast 'telesoftware', computer programs or data transmitted by Teletext. This

was a swift and economical way of distributing small-scale software, since telesoftware could be received direct into the memory of people's microcomputers. We believed it had potential both for home users, for whom it could offer a software club of the air, or a software updating service, and for schools and colleges. There had already been an educational telesoftware experiment linked to a research project run by Brighton Polytechnic, in collaboration with the BBC and the IBA; Brighton were now keen to base a further project on our machine. The development of the teletext receiver had been delayed by technical problems, but during 1982 the BBC began to make detailed plans for a telesoftware service. Unless there are elaborate arrangements for encrypting (ie scrambling) the broadcast signals and charging the user for decoding them, telesoftware has to be provided free. However, to the BBC, telesoftware seemed a natural extension of the CEEFAX service, and the possibilities of using telesoftwarc as a means of informing users about published software packages looked promising. There was also a good deal of interest in the Department of Education and Science, and in the Department of Industry, in the possibilities of this new technological development. Meanwhile the BBC Engineering Research Department continued to advise Acorn on the development of the receiver. We also looked into the other needs of the service, including possible sources of software, and how it could be coded for transmission.

Making the Most of the Micro

During the production of The Computer Programme it was agreed by the Continuing Education Advisory Council that there was a continuing need for more broadcasting to support computer literacy over the next few years. The first follow-up series was to be produced by David Allen, the Project Editor, for transmission in January 1983. The Computer Programme had provided a general introduction to computing. especially for those with no previous knowledge or experience. The second series, to be called Making the Most of the Micro, would be aimed more at owners of machines, or those about to take a serious plunge into the world of personal computing. It would include much more detailed explanation of the uses of microcomputers. We knew there was a good deal of controversy over the value of teaching programming; but it was generally agreed that 'hands-on' experience was a good route to computer literacy, provided that the

details of programming were seen as the last stage in a process of problem-solving. Like the first series, Making thee Most of the Micro would show different machines being used for many different purposes, and would use the BBC Micro to explore basic principles. It would be concerned rather more with explanation to the com mitted, and rather less with capturing the interest of the unmotivated . It was to include in greater depth, much that was included in the first series- text handling. graphics, data-bases, controL communications. The series was to be presented by Ian McNaught-Davis, this time supported by Ian Trackman and John Coll.

The production of the second series

Like The Computer Programme, the second series combined real-life film with studio demonstrations, and used many of the same techniques. We took advantage of the experience gained last time round, and of the fact that the Micro was now proven, and more readily available. Most of the graphic illustrations for the new series were to be generated by the microcomputer. We provided for a full time studio engineer to work on the programmes throughout the studio run, and for software writing backup from the outset By this time a great many of the technical staff involved in the programmes were familiar with the project, and with the Micro. The studio sessions went comparatively smoothly, and little time was lost. The first transmissions of the new series went out according to plan in January 1983, after a launch at the National Microelectronics Centre at Tower Hill, in London. Although this series was more demanding than The Computer Programme, the response was even greater.

Audience response to Making the Most of the Micro

The regular late-night audiences on BBC-1 for the new series approached two million, and the Sunday morning audiences, of 750,000, were three times as big as before. The number of people reached by one or other of the programmes was around eight million. Clearly Making the Most of the M icro had appealed to the very large numbers of people in Britain who had become interested in the use of microcomputers in the course of 1982. Once again, with the help of the Department of Industry, we were able to commission a major study of the audience response by BBC Broadcasting Research. This showed that interest in the series

had been highest among owners of microcomputers. About half a million people in Britain had bought them during 1982, and two thirds of micro-owners had seen some part of our first or second series. Users of other micros had responded as positively as users of the BBC system However it was striking that the audience for the second series was by no means a specialist one, since it was closely representative of the population at large. Equal numbers of men and women viewed the series, 40% of the audience were over 45, and 66% (exactly representative of the general population) were from social classes C2 or D/ E. 89% of our viewers had found the programmes interesting or enjoyable.

General conclusions

The response to the second television series confirmed that by early 1983 very large numbers of people in Britain, from every sort of background, had a positive desire to learn more about computing. This was also borne out by the take-up of our other materials. Sales of The Computer Book reached over 80,000 by the summer of 1983, over 120,000 copies of 30-Hour Basic and 150,000 Microcomputers had been sold, and a total of nearly 200,000 people had contacted Broadcasting Support Services. BBC Publications sold over 40,000 of its software packages within a year, confirming that the purchase of computer hardware e tends to stimulate a lively demand for software. The research revealed that 96% of computer buyers (as against 50% of our audience) were men. Two thirds of computer users had bought them with some educational purpose in mind.

9. CONCLUSIONS

The BBC's contribution

The Computer Literacy Project has drawn on many different parts of the BBC. The television series alone required heavy production and technical resources. BBC Publications produced a range of books, and developed a computer software unit specially for the project. BBC Enterprises, the Corporation's commercial wing, and Engineering Designs Department, were closely involved in relations with Acorn. Engineering Research Department contributed technical advice. Field liaison was

handled by the BBC's Continuing Education Officers, and pretesting and evaluation by the Broadcasting Research Department. For the development of telesoftware, which was an extension of the BBC's CEEFAX unit, expertise from a number of different departments was needed. For follow-up information services we drew on Broadcasting Support Services, the independently funded unit estalished in 1975 by the BBC. This was an unusually large allocation of diverse resources to a single project, which would have been impossible without the BBC's long-standing commitment to education.

The role of the television series

The project, taken as a whole, has made a considerable impact on the public consciousness, and on computer education in Britain. It was, of course, timely in setting out to satisfy the curiosity of large numbers of people about computing, just at the moment when that curiosity was awakening and intensifying. If 1982 had been a year of unprecedented public interest in computing, we could claim to have fuelled and stimulated that interest, as well as doing something to satisfy it. But comparatively little learning would have taken place simply as a result of the television programmes, since their content was very limited. They could seize people's attention, explain a little, and perhaps cause people to feel differently about computers and computing. They could reach out to millions of people in their homes, capture their interest, and point them towards ways of learning more, if they wished.

The 'learning network'

!he television programmes were the most public part of the project, As important, were the other elements, books, software, correspondence courses, microcomputer, referral links, and so on, which we had spent two years or so assembling so that they would all be ready at the time of the series launch. The BBC only provided a part of all this. The project team had spent a great deal of time and effort maintaining close links with a whole range of outside organisations, the Departments of Education and Science, and Industry, the Microelectronics Education Programme, the Scottish Microelectronics Development Programme, the Council for Educational Technology, the National Extension College, local

education authorities, and many others. By early 1982, when the first series was broadcast, a great many schools, colleges, and adult centres, had already developed courses on computer education, for groups ranging from the complete beginner to committed computer enthusiasts, or more experienced or specialised students. The BBC contribution was to stimulate general interest in computing, help promote such courses, and provide them with an integrated range of learning materials. Through BBC Education's long tradition of links with outside organisations, we were well placed to be a central point for a network of collaborating agencies. Now that this network has been established, we have a good base for developing further collaboration in the computing field. Because of these relationships the BBC was also in a good position to obtain grants, under various government programmes, to help finance important non-broadcast parts of the project, including consultation and research, additional education officer effort, resources for piloting and evaluation, and software development., and so on Without this help, which came largely from the Department of Industry, the project could not have been nearly as effective.

Public response

Public response to every part of the project exceeded expectations. Nearly a sixth of the adult population saw one or other of the programmes in the first series. A year later, the second series was even more popular Sales of books and software, and referral enquiries, ran into hundreds of thousands. Sales of the British Broadcasting Corporation Microcomputer were expected to approach 250,000 by the Spring of 1984. Despite the early research findings, we had expected a lot of public resistance to the idea of actually learning about computing. However, the anxiety that many people clearly felt about their capacity to understand the subject did not seem to have deterred the audience from making very heavy use of virtually everything we offered.

Some of our more specialist advisers had argued that computing would always be a minority interest, and that if people bought micros, most of them wou ld either be used mainly for playing games, or lie unused after the initial enthusiasm. This view has certainly not been borne out by events. The number of micros per head in Britain, like the number of video-recorders, exceeds that in any other country. The heavy demand for 30-Hoi"Basic and the level of enrolments for computing classes,

suggest that a great many people who buy microcomputers are seriously interested in learning how to use them. Modem micros bring immense computing power within the hands of ordinary people, and all the signs are that this is widely recognised and welcomed. There continues to be a strong demand for books on computing. for serious software, for the computing magazines, and for membership of computer clubs and user groups. All this has given us the confidence to establish an ongoing 'strand' of programming in the computing field within the BBC Continuing Education Television Department, to plan to repeat the two computer literacy series, and to plan other series.

Overseas interest

Overseas there has been much interest in the BBC project Members of the project team have spoken about it at conferences in North America, in Western Europe, in South-East Asia, and in Latin America Through BBC Enterprises the television programmes have been networked on the PBS network in the United States, in Australia and New Zealand, and in many other countries in Asia and Europe. Cassettes of the TV programmes, and BBC books and computer software, have been sold all over the world, for use in education and elsewhere. There are signs that the British Broadcasting Corporation Microcomputer could well repeat its British success in overseas markets. The belief that computer literacy is important is clearly a world-wide phenomenon, and the combination of broadcasts, print, and computer hardware and software, for computer education, has attracted interest in many different countries.

The BBC Microcomputer

The BBC Micro has made a big contribution to the effectiveness of the project, and to the spread of serious personal computing. It has also gone some way to setting hardware and software standards for middle range micros. The machine is now established as the most widely used micro in British schools and universities, and has been highly popular among home users. The decision to go for an expandable micro, well equipped with connections to other devices, seems to have been well vindicated by users.

It is significant that the more powerful Model B has proved more popular than the Model A. Demand for disc drives and other add-ons, like word-processing or data-handling facilities, has also exceeded expectations. There is evidence that new add-ons, like the 'BBC Buy', a device for demonstrating control applications of computers, are likely to find wide use, as will such facilities as telesoftware and electronic mail. All this suggests that an increasing number of computer users in Britain see their machines as serious working tools. New developments in communications, like cable, and direct broadcasting by satellite, will multiply and diversify the number of channels of communication into people's homes over the next few years. Expandable micros like the BBC machine have the potential to become the central unit in the home information terminal or office terminal of the future. This is likely to include not only facilities for receiving and recording broadcast signals, but the capacity for receiving and manipulating data, and for interacting with central sources of information. This will give the individual user ready access, largely freed from time constraints, to virtually unlimited information and entertainment. Our experience suggests that as computer literacy develops users will be increasingly keen to explore interactive media services.

Software development

We had realised from the outset that BBC Publications neither could, nor should, provide comprehensive software support for the Micro. The chief aim has been to provide a range of packages to complement our broadcasting provision on computer literacy. Producer& in the BBC educational departments are now increasingly aware of possibilities of computer software packages linked to their radio or television see on a variety of subjects, including languages, science, geography, statistics, and computer studies. Producers are also experimenting with links between broadcast radio or television, and data or programs transmitted via telesoftware. As the use of the machine has spread, other publishers and software houses have continued to produce software for it, as has MEP, which is committed to the development of good software for use in schools. There have also been moves to translate programs written for other machines into BBC BASIC Though there is no agreed standard, our BASIC 1s now the most widely used BASIC d dialect in British schools, where its extensions and structures make it particularly useful for teaching purposes.

A modern micro is, in a sense, simply an instrument for software development or software application, rather as a piano is an instrument for a composer or a performer. The cost of hardware is falling rapidly, and, as with music, the main resources needed to generate software are human ones, intelligence, skill, imagination. The new generation of micros are so powerful that it may be many years before their potential has been fully explored. In the USA the proportion of money spent on software, as compared with hardware, is rising. There are signs that this is beginning to happen in Britain also.

Building on computer literacy

The effective exploitation of microprocessor technology in Britain will ultimately depend on the creativity and imagination that is brought to bear on the problems and possibilities of computer applications, and hence on the capacity of the subject to attract the best minds and the liveliest talents. Our failures over the past few years to compete in world markets for industrial goods have probably been at least partly due to the shortage of good scientists and engineers, through a failure to attract more young people to science-based subjects. The 'computer anxiety' revealed in the BBC research certainly owed something to a general sense of alienation from scientific or technical ideas. But the response to this project bodes well for the future. Computer anxiety seems to be a transitory feeling, which readily gives way to computer enthusiasm. The demand for BBC programmes and other materials is only one of many indications of a strong surge of public interest in this new subject. Computer literacy is spreading rapid ly in Britain, and with the help of various government programmes it should soon become

the norm in British schools. When, early in 1983 the Computer Literacy Project team began to plan a national software competition for schools, with the help of MEP and SMDP, the main problem we faced was the prospect of having entries from hundreds, if not thousands of schools. The BBC has been able to make a contribution to the spread of computer literacy and computer awareness in Britain, through the unique possibilities for public education of a national broadcasting system. It has only been able to do so because we have been responding to a real underlying public demand. Behind the success of this project there is a strong

public awareness of the new industrial revolution created by the microprocessor, a very positive public attitude to the future possibilities that this is opening up and a desire among large numbers of people, to use the technology for themselves.

John Radcliffe

Executive Producer, The BBC Computer Literacy Project, August 1983

(written with Roberts Salkeld, BBC Education Officer, Continuing Education)

(http://www.naec.org.uk/organisations/bbc-computer-literacy-project/towards-computer-literacy-the-bbc-computer-literacy-project-1979-1983)