THE ARKLETON TRUST

NEW TECHNOLOGY AND RURAL DEVELOPMENT

Report of a seminar held in Scotland, 5-9 October 1986

by Dr. J. M. Bryden and Dr. A. M. Fuller

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PREFACE

The 1986 Arkleton Seminar was held at Tarland, Aberdeenshire, in October. The subject was New Technology and Rural Development, and the Trust was particularly interested in drawing out some lessons from experience in the applications of new technology in rural development and education, and some new ideas on potential applications and the means of involving rural people in the information technology revolution.

The Seminar involved participants from five European countries, North America, India and New Zealand. As is usual for Arkleton Seminars they included academics, practitioners, sceptics and policy makers. During the seminar, Professor John Black gave the Arkleton Lecture on "Reducing Isolation: Telecommunications and Rural Development" and a number of case studies were presented. The level of debate and discussion was very high.

This report is the most visible outcome of the brew. It has been written jointly by Professor A. M. (Tony) Fuller of the University of Guelph, Canada, and Dr. John Bryden, Programme Director of the Arkleton Trust. I hope that it will help those individuals and organisations in and beyond rural areas grappling with the problems and possibilities of new technology to debate the issues involved. The Trust intends to pay further attention to aspects of the new technology for rural communities.

K. J. Alexander
Trustee, Arkleton Trust

THE ARKLETON TRUST uses its resources for the study of new approaches to rural development with emphasis on education and training. It aims to promote dialogue between politicians, administrators and practitioners at all levels on the problems of Europe and the Third World.

The Trust's activities include the holding of high level seminars on specialised subjects of immediate relevance to Europe and/or the Third World and the collection and collation of relevant experience for its publications programme.

The Trust is not a grant making body and it supplements its limited resources in collaboration with other bodies which share its objectives. It is recognised as a charity by the United Kingdom Charity Commissioners.

Further information about the work of the Trust and copies of this report may be obtained from: The Administrator, The Arkleton Trust, Enstone, Oxford OX7 4HH, U.K.

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NEW TECHNOLOGY AND RURAL DEVELOPMENT

Report Outline

1 Introduction and Background. (Main issues of Rural Education and Development emerging from recent research and other Trust activities.)

2 The Relevance of New Technology. (Particular relevance of new information and communications technologies to these issues.)

3 State of the Art. (What new technology and applications are we now talking about? What lessons can be drawn from recent experience: ref. to Annexe of case studies.)

4 Human Resources. (How can we seek to maximise the benefits and minimise the costs: overcoming 'technofear': widening experience and 'hands on' activities in rural areas, etc.)

5 Institutional Issues. (Centralisation and decentralisation: local collaboration and co-operation in providing facilities on a shared basis: provision of basic instruction.)

6 Education, Outreach and Action. (Extending the principles of 'open learning': new forms of advisory service: local economic and social opportunities.)

7 Conclusions.

Annexe 1: Six Case Studies.

BRUETEL (Western Isles)

PIRATE (England)

GRASSROOTS (Canada)

TELEHOUSE (Sweden)

TELEDEV (France)

Annexe 2: Annotated Bibliography (Key Sources)

Annexe 3: Glossary of Terms

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I INTRODUCTION

1.1 Key problems in rural development and education.

Previous work by the Trust has highlighted several key problems in rural development and education, including:–

- low morale in the rural population, especially in disadvantaged groups;
- social and economic disintegration;
- social class divisions emerging because of inward migration, commuter populations, new rural (economic) opportunities in close juxtaposition with the decline in traditional rural sectors;
- external control of economic resources and investment;
- external decision making framework in relation to actions by the State, especially concerning public goods and services;
- imbalanced economic, social and demographic structure often related to decades of economic stagnation and outward migration of younger age groups;
- fragmented efforts and voice, leading to a weak and uncoordinated response to externally-induced changes;
- a dominance of sectoral public policies and a lack of linkages between sectors at the local level which provide the framework for local integrated action;
- separation of educational efforts and initiatives from development activities.

1.2 Recent trends in Europe.

At the same time, a number of recent trends, detected in different forms throughout much of Europe, cut across these problems. They can be summarised as:–

- the declining importance of agriculture as a source of rural income and employment;
- the pressures of agricultural policy which increasingly emphasise limitation of production and the need to control and ultimately reduce national and EEC budgetary commitments. Partly related to these pressures, there is a growing need to place a higher priority on environmental objectives, and on the creation of non-agricultural opportunities in rural areas;
- new sources of rural economic development including the decentralisation of manufacturing industry and employment, growing service sectors, and opportunities from technological changes;

— social changes including a new rural "middle class", the desire of young people to remain in their own communities, the redefining of work and leisure.

1.3 The capacity of rural people to adapt.

Where rural people have found or been given opportunities and appropriate conditions, they have shown their capacity to shape and create genuine rural development. We here define 'development' broadly to include economic, social, cultural and political goals. Some stress is put on the need to discourage 'dependent development' and encourage 'self-reliant development', both because of its economic benefits **and** because of its social and political benefits – the extension of democratic practice and the development of collective responsibility and decision making experience. There are, it is increasingly recognised, neglected human resources, because the systems of organisation considered appropriate for urban society are not necessarily appropriate for rural society. These resources are under utilised in an urban-dominated society this point is not being made politically. Changes must be made in order to release the resources locked up in rural areas. This is more a question of stimulating appropriate **processes** than one of developing programmes and projects.

1.4 Effects of a fragmented rural voice.

The fragmentation of the rural voice referred to earlier has a negative impact on efforts to initiate, promote or encourage more self-reliant rural development, since it **limits the extent of:–**

— learning from the experience of others;
— discovering indigenous trade opportunities;
— provision of mutual support structures – education, services, etc. – and joint political action;
— effective, but independent, communication with central authorities.

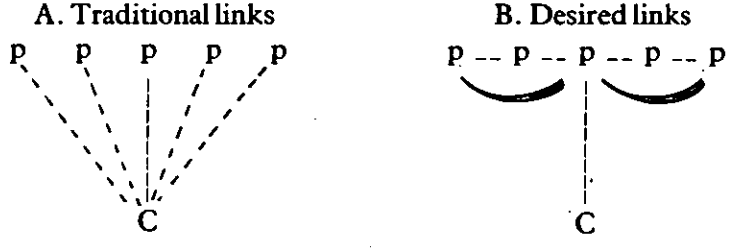
New and existing social class divisons remind us that rural areas are not, if they ever have been, homogenous groups with shared interest and concerns. Interpretations of rural 'development' and the provision of 'education' have to recognise this explicitly. Proposals for action, whether of a voluntary or a public nature, also have to take this into consideration.

1.5 Need for horizontal links between rural people.

A constant theme in the Trust's work since its inception has been the need to improve links BETWEEN rural people and organisations. In the report of the 1979 seminar, *Disadvantaged Rural Europe*, the need for greater rural solidarity and for 'horizontal linkages' was stressed. In the 1980 seminar report, *Can Education Change Rural Fortunes*, the need to identify and strengthen 'Communal linkages and communications with other communities . . . as a basis for the sharing of experience and knowledge' was a major theme. In the report of the 1982 seminar, *Institutional Approaches to Rural Development*, the difficulty of achieving interaction at local levels was discussed in the context of the need for greater integration of approaches and action in rural development. Finally, Ian Scott, in his fellowship report, *The Periphery is the Centre* pointed out, in the context of the West of Ireland, that whilst news spreads fast 'on matters of life and death' between fishing communities, 'There is much less experience of the successful transfer of development approaches that could lead to an improvement in living standards and provide a sustainable future through the activities of community based organisations.' Many of these issues were succinctly raised in the two reports of 'Third World' fellows in 1980 and 1983.[1]

We can represent the problem with a diagram.

Diagram 1



where 'p' represents rural peripheries (areas and groups) and 'C' represents metropolitan centres and centralised institutions.

Traditional links are with the Metropolitan centres, reflected in the old saying 'all roads lead to Rome', or in the reality of the colonial communications systems which led to mail from Trinidad to Barbados being sent via London! Such links are extremely debilitating for peripheries, and hamper their internal development processes.

1. *Rural Decline in the United Kingdom*, and *Development Institutions and Approaches in Three Rural Areas of the United Kingdom*, both published by The Arkleton Trust.

1.6 Benefits of improved Periphery-Periphery Links.

We may summarise the benefits of improved Periphery-Periphery links as follows:–

- — political – the creation of a more unified voice;
- — economic – the creation of a critical mass for the expression of demand for public and private goods and services;
- — improved decision making;
- — improved management;
- — self-reliant development;
- — integration between sectors at local levels.

The hypothesis is that better means of communication between rural groups will enable more sharing of experience, more active democratic participation, more effective management of locally based economic, cultural and political activities, and better use of knowledge based resources. Improved communications also offer the prospect of providing two of the essential features or pre-requisites of 'Outreach' from centres of learning, business and administrative centres, namely:–

- — *an interactive linking among rural groups* **and**
- — *an interactive link between centres and the rural 'periphery'.*

1.7 Improved interactive links with Centres remain important.

The potential of rural areas and special interest groups to form exclusive networks whilst at the same time having rapid communication with centralised information and decision making systems is indeed challenging, especially where horizontal and vertical linkages can all be on the same system, as in computer conferencing type networks. On the one hand, such networks can serve new forms of independence and self-reliance; on the other, they can ensure rapid access to centralised services. As an example, the linking of educational centres to rural areas and rural groups through 'Outreach' is one of the basic functional requirements for sustained rural development. Up until now, most links have been unilinear in that educational centres transmit information and directions to the rural 'learner' or user. The prospect of truly interactive links offers a chance to tackle the well-known problems of access to such services, and their relevance to rural areas and people. It should also enable **better** and **wider** opportunity for all forms of learning. Finally, the central idea of conducting collaborative and participatory research, building data-bases and sharing centralised information sources to enhance the prospects of self-determined development processes could produce a whole series of new approaches to rural education, research and development.

1.8 New technology for rural development and education – some criteria.

What, then, do we look for in 'new' approaches to rural education and development? To put the question another way, more directly related to the subject of the seminar, what **criteria** should we apply to proposals, projects, programmes, policies which seek to apply new technology to rural development and education?

First, where the morale of indigenous people is low, we would look for initiatives which seek to restore that morale – essentially, to create a belief in a local future not as something which is created and bestowed from outside, but as something which is locally rooted, part of a human and environmental historical continuum. The capacity to think globally and act locally is a precondition of 'grass roots development', and that capacity may need to be restored and nourished.

Secondly, for new technology to be the vehicle for such initiatives, the rural communities must first be convinced of its practical relevance to their concerns, needs and objectives, and then must be sufficiently well trained in its use to be able to apply it autonomously to further their concerns and objectives. Such command of relevant technologies is not only vital to the independent growth of communities but is, in itself, an important source of self-confidence and heightened morale!

Thirdly, we have argued the need for decentralisation as part of action – closely related to the above arguments. Local development praxis requires the authority, as well as the capacity, to act – a certain level of control of resources, typically denied by processes of centralistion which have taken place. We would judge new approaches, then, by their capacity to create new opportunities for decentralisation.

Fourthly, integration is the obverse of disintegration, a key to the actual content of decentralised action, and one of the benefits of it.

Fifthly, and closely related to the issue of integration, the recognition that rural is much more than agricultural, and possibly increasingly so. In many areas of Europe, even where farming families remain an important part of the social fabric, more than half of the income of farm families may come from non-agricultural activities, on and off the farm. In some areas – Southern Britain being a prime example – the agricultural population is but a tiny minority of the rural population, the majority earning their income from other activities. New approaches must recognise this fact.

Finally, we must look at the development of micro-level institutions and examine questions dealing with processes of change, and not simply projects and programmes. These process questions will be concerned with the frameworks of local decision making, the control of local hierarchies and the functioning of local democratic processes, with actual forms of integration, with the mediation of relationships with 'external' agencies, communities, economic agents, and so on.

II THE RELEVANCE OF NEW TECHNOLOGY.

2.1 Potential benefits for rural people.

Many of the potential benefits of new technology for rural people derive from the fact that it is effectively shrinking distance. It has been this physical problem of distance, affecting both the cost and feasibility of economic, political, social and cultural activity, and the feelings of isolation and peripherality, that has created many of the problems described in Chapter I. These comprise both objective and subjective conditions, the **reality** of high communications costs under old electro-mechanical technology, the **feeling** of remoteness, isolation from centres of gravity.

2.2 New Communications Technologies.

The new communications technologies, particularly those using the energy efficient micro-chip, offer real cost savings over the older technology. The consequent reduction in what economists sometimes term 'non-material transport costs' will lead to an increase in the use of non-material transport, its partial substitution for material transport, and totally new uses which had not proved feasible or viable under the old technologies. Such general predictions apply to any economic resource whose price falls dramatically. The content of 'non-material' transport is largely 'information' – voice, sound, data, video. The relevant new technology – digital communications, satellite communications, optical fibres, packet and cellular radio, computer interfaces – which are creating vastly expanded capacities and lower costs are developing with astonishing rapidity. Within the past five years almost every household in Northern Europe and North America has, in cost terms, been placed within easy reach of a computer. For a small additional cost equivalent to that of a small colour television set, home computers can be linked to world-wide low cost interactive data transfer facilities. Familiarity with a computer terminal is a skill which practically every school leaver possesses, heralding its future ubiquity.

2.3 New areas of rural opportunity.

What general areas of opportunity do these rapid changes open up? One can distinguish several:–

— production of goods
— production of services, including information services

— exchanges of goods and services (markets)
— democratic participation
— higher education attainment
— cultural exchanges
— intellectual endeavour in general.

2.4 Production of goods and services.

These areas of human endeavour have been and still are conducted, albeit at high cost or considerable inconvenience, in peripheral and rural areas. But they tend to be limited or constrained by physical and cost problems. Thus it is commonly argued that high communications costs have put production in peripheral areas at a cost disadvantage where markets are other than local. Access to knowledge, information, and ideas relevant to production and exchange has also been more difficult, slower and more expensive. Such disadvantages are likely to be exacerbated at a time of rapid change in both techniques and markets.

2.5 Democratic participation.

Participation of the periphery in National organisations, and **vice versa**, has always been limited by the time involved, and costs, of attending meetings which are almost invariably held in National centres of population. Thus it may take a resident of Shetland or of the Western Isles a total of three days to attend a meeting of a Scottish representative body (such as Rural Forum) in Edinburgh. This acts both as a deterrent to participation, and as an inhibition on the exercise of the **principle** of geographical representation within national organisations. Thus the voice of the periphery has been weak and intermittent. It has also lacked cohesion, because the periphery is not internally linked but linked, in a fragmented way, to the centre (as in Diagram 1A above). New techniques of computer conferencing, riding on the back of low cost digital communications, can permit such participation without the costs and inconvenience involved in traditional methods. The possession of information can also **encourage** participation. This could open up real opportunities for the enfranchisement of rural people as well as greater intra-rural linkages, permitting a more cohesive and effective voice in national and international affairs.

2.6 Cultural activities.

In cultural affairs, too, new horizons could open up before us. Many cultural minorities exist, if under varying degrees of threat, in rural peripheries. Linguistic minorities, often scattered nationally and internationally, can remain in closer and more continuous contact and campaigns can be waged in closer contact with parallel groups. For instance, Gaels in the West of Scotland can collaborate with the Gaelic community in English towns, as well as those in Ireland, Wales, Canada, Australia and elsewhere. The opportunities for new – and new forms of – cultural exchange opened up by computer conferencing are very exciting.

2.7 Intellectual endeavour.

Intellectual endeavour has been a very centralising and centralised activity. Universities and Research Centres have almost always been in the larger towns and metropolitan areas. This has been due to the necessity for a critical mass of intellectual 'capital' – research workers for discussion and debate, books for study and reference, and the 'physical hardware' for learning – computers, scientific equipment and so on. The Open University in Scotland has demonstrated that this need not remain so. At the other end of the academic scale, the Western Isles, through BRUETEL, is determined to tackle the problems of intellectual isolation of teachers in very small remote schools, and the lack of choice for pupils, by the full use of modern technology. In a small way too, the Arkleton Trust is another example. The Trust is running a 12 country, five-year, collaborative research programme from its Scottish office in the small Highland village of Nethy Bridge and making extensive use of computer conferencing and data transfer using National and International Packet Switched Networks. Its development of computer conferencing facilities for voluntary cultural and educational groups and other organisations scattered throughout the Scottish Highlands and Islands, through the RURTEL project is another case in point. The maintenance and development of intellectual resources **within** rural society is a crucial element in a viable rural future, and can be encouraged by the imaginative use of new technology.

2.8 Potential costs of new technology.

These are of course 'potential' advantages or possibilities, albeit with some practical examples of rather recent origin, which we set out to explore in the seminar. We were aware of the potential 'costs' of the new technology, but quickly concluded that these costs were likely to be highest in cases where peripheral regions did **not** participate fully in the development of practical applications. In the past – and perhaps especially with electro-mechanical technology – new technologies have tended (directly by omission, or indirectly through the time lag of their introduction) to **add** to the marginalisation or disintegration of rural areas. It is quite possible that new technologies to-day could lead to similar tendencies if action is not taken. Thus electronic shopping, if dominated as it now is by urban giants, must deprive rural shops of their local markets. Electronic funds transfer, to take another example, must reduce the role of local banks. Databases developed for urban based commercial markets will not serve rural needs. Cultural material dominating the recreational end of videotex services will not meet the needs of cultural minorities in rural areas. The micro-chip may cause some employment losses in traditional industries such as textiles. These are real dangers. At the same time, rural people lack the commercial and political clout to control the development and use of the new technology, even if they wish to do so. Commercial pressures would see that new technology did extend to rural areas.

2.9 The choice before rural people.

In essence, rural people have a choice not of acceptance or rejection of new technology, but of whether they accept only what lands on their plate from 'outside', or if, by developing their own applications in their own interests they can maximise the advantages and minimise the disadvantages. There is no evidence from the experience of remote rural schools that the next generation of rural residents wants to resist the new technology, and growing evidence of a realisation of the importance of coming to grips with it! Unless new technology, and the opportunities that go with it, is 'available' in rural areas, there is a serious danger that the brain drain will accelerate.

III THE STATE OF THE ART.

So far we have discussed, in rather general terms, the potential linkages between rural development, and especially more self-reliant rural development, and new technology. It will be clear that we are examining not **all** new technology, but a rather specific part of it, notably that technology which links the micro-chip with communications technologies. Much of this technology builds upon the micro-chip. We are also concerned with the associated applications technologies, especially information processing, computer conferencing, electronic mail, facsimile, video filming. A large number of these applications are considered as part of the subject of *Informatics*.

3.1 Digital communications.

Many of the applications which were discussed at the seminar utilised the links now possible **between** computers using communications links ranging from the humble telephone line to high speed optical fibre or satellite links – and usually a mixture of these. It is well-known that computers handle information in **digital** form, normally using 'binary' patterns. Computers, being simple creatures, prefer to count using '0' or '1', represented in electrical circuits by 'on' and 'off'! It is also well known that not only 'data' in the form of numbers or text can be expressed in digital form, but also pictures, music and even voice! The **compact disc** is an example of digitally stored music, the **optical disc** or **video disc** (as used in the BBC's Domesday project) have many examples of digitally stored pictures. Many of the older communications technologies used **analogue** transmission, including telephones, could not transmit such a variety of materials, and were relatively expensive. Digital communications can be much faster and, using micro-chip technology, many simultaneous 'messages' can be passed along a single communications route. It is in this area that massive reductions in communications costs are already becoming a reality.

3.2 Some practical applications.

Applications may or may not make full use of these new communications technologies – and in many cases only partial use will be made of them. Thus a user of an electronic mail service may gain access to the service by dialling up a **node** into the Packet Switching Service using an ordinary telephone. Alternatively, he or she may dial a host computer

directly using a normal dial up (analogue) line. In such cases all that the user requires is a **modem**, a computer or **terminal** with **software** (programs) supporting communications which are compatible with the modem and service being used. On the other hand, he or she may have direct access to the packet networks through a private dataline, which will support much higher speeds of data transmission and which will be much cheaper to **use**, although relatively costly to install. Such lines can support several simultaneous users, and are essential for computers which act as **hosts** for database services, electronic mail or computer conferencing.

Hosts are absolutely necessary for database services and computer conferencing where simultaneous access is required by a number of users. However, electronic mail, which is most efficient for communications between two users, can be direct from one user's terminal to another using dial up systems. 'Torchmail' was an early example of such private electronic mail implemented on Torch computers and their BBC upgrades, and this system has been used by the Arkleton Trust for direct communication between the offices in Oxford and Inverness-shire. Such direct systems normally require compatible hardware or software, a severe limitation.

The advantage of **indirect** communications using Packet Switching and/or private databases is that they enable different computers, modems and even software to communicate effectively at differing speeds. Thus the burden of compatibility is largely removed. Compatibility really depends only on the ability to communicate in a standard way – using the American Standard Code for Information Exchange, otherwise known as ASCII, and other more-or-less standard protocols like x-25[2] – for most 'data' services or other (less standard) protocols for Viewdata services such as 'PRESTEL' and 'BRUETEL', and many run by the Banking fraternity.

ASCII is normally used for text and other 'data' transfer – electronic mail, computer conferencing, database and other serious information retrieval and exchange systems. Videotext, by virtue of its capacity to handle graphics and colour, is commonly used for more popular information provision services, especially those aimed at first time users.

2. Such terms are explained in plain language in the Glossary!

3.3 Some practical examples.

Some practical examples may give an idea of existing applications of Information Technology in rural areas. Six of those which were discussed at the seminar are described in greater detail in Appendix A. These cases illustrate the following main types of application:–

1. The local 'database' such as PIRATE;
2. The educational and participatory, such as BRUETEL and TELEHOUSE;
3. Applications mainly providing information ABOUT rural areas, such as TELEDEV, SWISS MINITEL, GRASSROOTS.

Many of the early applications were of the third category – predominately INFORMATION PROVISION from centres outward to peripheries. They were not generally INTERACTIVE, even if some limited messaging (at slow speeds) was possible through electronic 'mailboxes' (usually to order something!). PRESTEL and GRASSROOTS, are examples. The following problems have arisen with such services:–

— Firstly, the fact that there was no mechanism for assessing DEMAND for various categories of service prior to their provision;
— Secondly, they were concerned mainly with commercial information, or commercial returns, and became a service largely for the better off where the benefits (for instance of constant access to the Stock Exchange or the Chicago Futures Markets) were immediate and measureable. Less well off groups, and non-commercial interests and objectives were not generally well served.

Such systems in general had little capacity to encourage greater rural self-reliance and indeed led instead to the greater INCORPORATION of the most powerful rural interests in National and International markets.[3]

3. See the Australian case in Lawrence, G. Coping with Corporations: Farmers and Agribusiness in Australia. Paper for the 13th European Congress for Rural Sociology, Braga April 1986.

Later examples have sought more interaction and participation. BRUETEL is a specifically educational initiative in the Outer Hebrides of Scotland, an area characterised not only by physical remoteness and scattered polulation settlements, but also by bi-lingualism, Gaelic still being widely used. It is locally conceived and run but with financial support from a number of national programmes, many of which had nothing directly to do with Informatics! It provides a service for every school – even those with only two pupils – in the Western Isles and is run from the small village of Brue (Population: 88!).

In other, later, examples 'locally relevant' databases have been created and made available through terminals in such public places as local libraries for searching. PIRATE is an interesting example of this, although no analysis of which groups actually use the service has yet been undertaken.

3.4 Some lessons from experience.

Three main issues arose from our analysis of such information systems:–

1. The danger of systems which are UNEQUAL – first, because they are concerned wholly or mainly with information PROVISION rather than sharing/exchange/interaction, and second, because they serve only certain 'clients' – perhaps only a narrow group of rural users. This danger arises because for many rural needs, information requirements cannot be narrowly specified.

   The whole range of economic, social, cultural and political activities can usually be found in rural areas, each with a variable demand which can frequently only be articulated when particular needs arise. In general, then, an interactive process is required prior to, and even during, the provision of information services to meet such needs.

2. In general, databases (such as bibliographies) have gone through a process of SELECTION. The group considered that such selection was highly dangerous in principle; someone 'up there' is presuming to know either what users will want or should have. By contrast, interactive systems can allow the expression of demand for particular information and its subsequent organisation into a 'locally relevant' database.

3. The need to gain mass experience of keyboard and visual display unit or 'vdu' terminal as well as of other 'hardware' of new technology in order to remove 'technofear', prevent the creation of technical power bases, and generate real demand. The obvious first place for this is within the formal education sector, and indeed the expansion of micro-computers into schools is currently very rapid in the industrial countries. However, there are dangers on relying only on the next generation, and older people need this access too.

The Alford Information Technology Centre was an initiative of Grampian Regional Council which the seminar group visited, and which illustrates one approach to the integration of school and community facilities in ways which can tackle this need. On the other hand, with so much of the hardware of new technology now available – and often much underused – in *local* schools, there is a pressing need to make these facilities available to the wider community 'out of hours', and to resist the temptation to centralise and concentrate effort in what could otherwise become a few prestige projects. The folk high school tradition in Sweden and Denmark, for instance, has probably been central to the success of the TELEHOUSE project summarised in Annexe 1, another example of a strategy of seeking to provide broad local experience of, and familiarity with, new technology.

The main lesson can be expressed in general terms. It is to use the pre-existing focus of community gatherings (which may be a school, a village hall, a community centre, a library, or even a sports centre) as the means of introducing local people to new technology and generating local discussion and interest in possible applications. The most appropriate local foci will obviously vary according to social and cultural practice, but a local focus is needed to give expression to what otherwise would remain only latent demands.

In discussing the costs involved in generating such mass experience, it is clear that in Western Europe it is organisation rather than cost which presents the greatest barrier. As has already been stated, a micro-computer is available in practically every school, and therefore practically every community in a growing number of European countries – it is just that it is not 'accessible' to the wider population because of bureaucratic rules and practices. Other means – such as travelling buses – to allow hands on experience are also possible as a means of sharing the costs widely.

Just as group-farming had proved to be a viable means of delivering extension help and capital assistance in Southern Italy, so appropriate organisational structures to spread the costs of new technology would be needed to ensure the objective of widespread participation.

3.5 Bringing Universities to the 'sticks'.

The Open University (OU) in Scotland provides a useful example of how new technology (in some cases, not so new!) is enabling University level education to be brought to rural and remote communities. The Open University is 'open' in at least three senses. First, it is open vis-a-vis the barriers to higher education – there are no entry qualifications – whatever and wherever you are, you can take OU courses. Second, it is open vis-à-vis the curriculum, learner-centred in choice and combination of courses. Third, it is open because it is not a 'building' but a concept. The OU employs written material, visual material (television broadcasting), audio (radio and tape) and telephone conferencing. It is currently engaged in assessing computer conferencing techniques. Recognising that even remote students have to get together from time to time, the OU has developed 'location centres' throughout Scotland where there are computer terminals and loudspeaker phones. The OU provides the only available higher education for many people who want to – or who must – remain in their own villages. Many would hold that the educational standards are as high, if not higher, than in conventional Universities. Moreover, the costs of a degree course are substantially lower, illustrating that with new technology even sophisticated services can be provided at low cost in remote and sparsely populated areas.

3.6 Tourism-related applications of IT.

Many recent applications of Information Technology in rural areas are tourism related. The Mission Technologie Nouvelle (MITEN) – part of the Direction Generale Enseignements et Recherche of the French Ministry of Agriculture – has been involved in the creation of an 'electronic storyboard', a programme or system to link images to text, in the National Park of the Cevennes. The storyboard deals with flora, fauna, architecture, people etc and is for the information of tourists visiting the Park. Local school children and two Park guides were involved in the preparation of this project.[4]

4. MITEN has also developed an interactive text and image system which uses an 'expert system' to interpret the requirements of the user. This last system uses an IBM PC with 640K memory, Hard Disk of 10 MB and a High resolution screen.

It is also understood that, after schools, one of the main markets for the BBC's 'Domesday' videodisc on Contemporary Britain will be local libraries and tourist offices. Again, the market here is often visitors to rural areas, and the direct benefits will be to visitors, for whom the systems are designed, rather than rural residents. Videodiscs are also very expensive to make, and therefore tend to be **centrally** produced.

Many of PRESTEL's most successful applications have also been in the tourism and travel field, especially airline bookings, timetables etc, and there are other private viewdata systems such as Hi-line in the Scottish Highlands, which are computerised reservation services – this last being a rural based service offering agency type services to rural tourism businesses – hotels, guest houses, bed-and-breakfast, self-catering, etc.

In all of these cases, however, the main beneficiaries are tourists and/or travel agencies – people who travel TO sites of recreational or tourism interest rather than people who live in such areas.

3.7 Much information no longer a 'public good'.

This illustrates a point which was reiterated throughout the seminar, namely that much of the new 'information' provided using the new technology was "market-driven", whereas previously much information was regarded as a public good – provided free through libraries, museums, information centres, etc. This market orientation means that priority is given (a) to information that will sell and (b) to markets with large purchasing power. Selection, for instance of what information to include in a database, even of the thesaurus used for searching the database, then takes place based on commercial considerations. It is inevitable that information sources of this kind will serve large, homogenous, wealthy markets invariably found in urban and metropolitan centres.

At this point, a caveat must be entered. It is true that much information will be 'free' – but only in selected **places** – therefore, will be only accessible in reality to those living in such places, again usually urban centres. Economies of scale, very relevant for the development of libraries and other higher educational 'hardware', demanded this. However, new electronic information systems to a very large extent remove the need for central collections of such material. They also open up the possibility of accessing smaller collections, including collections in and about matters of rural concern and interest, to a much wider audience. Such systems also challenge attempts to control the availablity of and access to information.

3.8 Problems of information quality, selection and censorship.

The second problem lies in the public domain. Here the issue is the growing mass of information available and the wide variation in its 'quality'. Although the arguments for selection were persuasive, the dangers of giving this power to individuals (an ultimate consequence of permitting it) were considered to be potentially emormous. **Authority** always seeks to limit access to information. **Democracy** should always seek to remove such limitations. The capacity and low cost of modern storage devices means that material of all types and qualities can be stored and classified. Interactive systems would allow the open review of such material, and critiques could be electronically 'attached' to original texts. Rather than putting resources into selection, resources could be put into checking facts, etc. in such material, encouraging alternative viewpoints and critiques where necessary and other means of encouraging a steady improvement in the standard of material provided.

Rural people should not expect such general services to be immediately relevant to their needs. The plethora of databases and the limitations of thesauri are such that considerable searching may be necessary to find what is relevant to particular rural users. Again in using such services, the user is largely dependent upon another person's conceptions of what they, the users need.

3.9 Do rural people benefit from information?

In using such centrally provided services, the rural user is acting as consumer, not producer. It is to the producers – normally in urban areas – that the benefits of the creative skills associated with the technology, and the economic benefits of production – employment, income – accrue.

It is clear that with such centrally inspired and controlled systems rural people are in danger of paying rather more than their urban counterparts for rather less relevant and useful information services, and of being left behind in the production side of the equation. Yet the same technology, as we shall see, offers rural people new opportunities to develop their own, decentralised, systems.

3.10 Some basic rules for the evaluation of new technology initiatives in rural areas.

Given, then, the overall aims and objectives of rural development and education, what ground rules might one propose for the evaluation of

current or proposed 'new technology' initiatives in such areas?

The following seem to be implicit in the foregoing discussion:–

1. The "market" for information in rural areas prior to the mass introduction of Information Technology, and possibly even after it, is largely unknown; such as it is, it is highly fragmented and imperfect. This is confirmed by previous studies of information delivery in rural areas. [5]
2. A number of **preconditions** are necessary for the establishment of the 'market'. First, attempts to secure wide, eventually mass, experience of – and familiarity with – the tools of the technology. Second, the provision of low cost accessible data network services by telecommunications authorities. Third, the provision of interactive systems at local levels. Fourth, especially important in areas with low population densities and low income levels, cooperation and collaboration in the organisation of the basic infrastructure and hardware, including interactive open systems like computer conferencing facilities.
3. Mass experience and familiarity is no guarantee, however, that initial usage will tap the true potential of the technology for rural development. Initial usage may simply reflect the customary use of traditional information sources, previously accessed by more expensive means- telephone, physical travel, use of consultants etc. In such cases it may simply speed up processes already in existence – dealing in stocks and shares, banking, etc. – rather than alter the basic conditions of rural development.
4. Many of the potentially liberating aspects of technology can only be realised via low cost interactive systems, rather than from the largely uni-directional flows of information gathered for other markets and purposes.
5. Access and utility of Information Technology systems are NOT equal across national space. The hardware – digital networks – comes to rural and peripheral areas last, not first. The costs of telecommunications are nearly always higher for rural and peripheral residents than for urban residents. The relevance and utility of 'national' or 'international' databases is lower for rural users. Finally, there is a general lack of interactive systems in rural areas.

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5. See, for example, British Library Research and Development Department: 'Information and the Small Manufacturing Firm' and Bryden, J 'Public Policies on Services to Rural Industry': OECD Discussion Paper 1983. The Arkleton Trust, 1985.

3.11 Computer Conferencing.

Computer conferencing is a technique which appeared to the group to have considerable relevance to rural people and organisations of all types. This technique, developed first in a military environment in Sweden and in the 'Emergency Preparedness Office' in the USA was later picked up by academe. It is entirely interactive in design and practice. Lower cost means of digital communications have been a crucial element in encouraging computer conferencing as 'a means of bridging time and distance to facilitate interpersonal, human communication in a fashion which has heretofore been impossible.'[6] Computer conferencing has been developed in the academic, in the administrative, in educational and in commercial spheres. The University of Guelph in Canada played an important part through its development of the CoSy computer conferencing system, which uses the UNIX operating system. This system has been adapted by The Arkleton Trust for its RURTEL project in the Highlands and Islands.[7] This project offers conferencing facilities at low cost to voluntary, educational and representative groups scattered throughout Scotland, as well as for its own research Group in Europe. Other than the Trust's own research group, the first user-group was the Association of Community Enterprises (Ace-Hi) in the Highlands and Islands which has members throughout the region from the Shetland Isles, Orkney and the Western Isles to Argyll and other parts of the mainland. Ace-Hi's management committee members live in the North of Shetland, Port of Ness on the Isle of Lewis, Laggen Bridge in Inverness-shire, and other equally far flung rural locations. They recognise the potential advantages of computer conferencing for their work, and the new scope for their activities which it can provide.[8]

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6 Black (1986)

7. This project has been supported by the Highlands and Islands Development Board, Torch Computers Ltd, and British Telecom's Aberdeen and North of Scotland Area

8 See Clarke, Iain and Bryden, John. 'What is Rurtel' in Highlands and Islands Community Enterprise. Issue 4, May 1987

The Swedish COM system has been further developed as EUROCOM, now used by the EEC, and other commercial systems are available as well. As John Black points out, computer conferencing 'presents the opportunity for however many people have the need or desire to communicate about a particular subject (or many subjects) to do so without being either physically present in the same location (as in a conventional meeting) or even available at the same time (as in a telephone conference call or a video tele-conference). Through the use of data access links . . ., a computer to act as "host" for the discussion and only a very simple terminal device, all those who wish (or need) to participate in such a discussion may do so, each at their own convenience, on their own time schedule and *from their own choice of location*. The computer conferencing software keeps track of all the interactions in the discussion and creates what is, in effect, an open ended data base of the contributions by the participants. When each person signs on to the system they are presented with the new material that has been added to the various discussions of which they are a participant and they may then in turn comment on these messages, add new thoughts or begin a whole new aspect of the discussion. In the process this "data base" becomes an instant transcript of this "virtual meeting" which is taking place electronically.' Of course new techniques of human interaction and communication are needed to manage this new and powerful medium, which should have many applications in rural areas.[9]

9. see also Brochet (1986)

IV HUMAN RESPONSES

The human response to any new technology is unpredictable. In the case of the new telecommunications technology, however, the opportunities for individual and collective social benefit are such that rural people seem likely to respond positively to the challenges involved. Indeed where appropriate opportunities and support have been developed in rural areas the examples discussed at the seminar show that the volume and spread of participation has been very encouraging. Much depends upon the human response in rural areas being sufficiently positive at an EARLY stage in the development of the technology in order for rural areas to be in the forefront of the innovation and to gain some of the extra benefits from it. This would place rural people and rural interests in a pro-active role rather than in a responsive or residual position, as has so often been the case in the past. Being in the forefront of the new technology will enable rural groups to participate in the development of the technology, to help shape and design some of the applications, rather than to be passive witnesses to it. The potential human response, in rural areas, is therefore of critical importance in assessing the impact of new technologies on rural development.

Many rural areas, particularly those with sparse and scattered populations, face the situation that the potential response for change rests with a few, perhaps even one 'leaders'. Rural leaders who accept the challenge of new technology will need sympathetic but pragmatic support from those with technical skills. This, in turn, means that the technicians will need an awareness of – and a sensitivity to – urban-rural differences and the particular goals and constraints of rural society.

4.1 Resistance to Change.

It would not be at all surprising were the human response to new technologies cautious, especially in areas where, traditionally, local populations have been consistently the last beneficiaries of new external developments. Fear of technology, 'technofear', is common among people in general. It is known to increase with age and is believed to decrease with access to formal education. Many forms of 'technofear' are rooted in the resistance to change that may result in previous (negative) experiences with technologies, especially those which are generated and controlled from outside. In rural societies, these often result from the introduction and control of technologies by external agencies and the 'marginalising' effects of late adoption. Reliance on tried and trusted ways can usually prevail over the adoption of new techniques, the benefits of which may have not been fully demonstrated.

Trying new things takes time, energy, initiative and usually involves a real cost. New techniques can intimidate the cautious because 'the learning process' may expose them to hitherto unknown or unsuspected personal inadequacies.[10] Learning can be rewarding, but it is also a risk.

4.2 Computers and 'technofear'.

'Technofear' is potentially a serious problem in the case of the new technologies because these are mainly based on **computers**. Among many adults there is still a great sense of mystery and alienation towards the computer. It is seen as a threatening technology because it brings about rapid change and bestows advantages, in the main, on other people. There is the belief, based on early experience with computer programming, that computers are hard to understand and use. Computers are also perceived to be anti-human in that they seem to represent immense 'electronic brains', capable of 'artificial intelligence' and therefore of replacing human contact. These early images of computer technology still prevail among many older adults who, in the main, are the chief decision makers and 'change agents' in society, particularly rural society.

Collectively, ignorance, fear, lack of acquaintance and traditional values are some of the elements which, together with negative previous experiences, combine to form the often justifiable scepticism and human resistances that frequently prevail in society. Not all technologies have had this effect, however, and it is a matter of evaluating the new technologies to identify and promote those that may have a beneficial impact in rural areas.

4.3 Overcoming Resistance to Change.

The seminar agreed that overcoming 'technofear' and promoting a positive human response in rural areas was a critical factor in realising the link between the new technologies and rural development. There are several characteristics of the new technology that would provide an ameliorating effect on the potential 'resistances' of the human response. The chief among these is the size/scale related features of the technology itself. The advent and success of the micro-computer, its low cost and its user-friendly applications have all made usage by rural people in remote areas a practical possibility. The personal computer is an equalising technology in that, when combined with telecommunications technology, it is both distance reducing and

10 This theme is discussed by Brod (1984) in his book on Technostress

ubiquitous to urban and rural environments. When adapted to software programs for information generation and sharing of information, then remote users have all the advantages of access that pertain to other users, although the communications costs may still discriminate against them. The essential feature is that personal computers are small, low cost, 'friendly' and, given the essential communications infrastructure (namely phone lines of adequate quality and access to data communications networks), can be used to make links with other computers and information systems in both central and remote places.

In addition to its low cost and small size it is also location free. People do not need to go to large centres in order to access computer networks, information systems or any of the other standard uses of micro-computer systems.

The fact that many rural homes, businesses and institutions already have small and personal computers makes the 'new technology' less intimidating, mysterious and alien to others in the community. Such facilities are already a common or normal part of the rural milieu and as such provide the essential element of a successful diffusion of innovations in that there are increasing opportunities for the 'demonstration' effect to take place.

4.4 The role of peer group interaction and demonstration.

It is well understood in education and training that demonstration has a powerful role to play in helping to diffuse an innovation. In community development this is particularly important when demonstrated by and among peers, at a level which relates to the potential user. The seminar group was less enthusiastic about the value of the concentrated 'technology centre' type of demonstration which tends to feed the public's fear of the new technology by overpowering them with a quantity of machines and expensive facilities. This lesson may be drawn from the experimental farm experience in agricultural extension, where it has been shown that the highly controlled conditions of the experimental farm are often so different from 'real' farm conditions that few potential adopters see the relevance to their own situation. Not only does no transfer of technology occur, but often a negative transfer (a resistance) is developed. The value of the new technology in rural society is that with lots of mini-systems in place, rural users can learn from each other and in so doing demonstrate to others the benefits of adoption or at least of participation. The advent of the personal computer has 'normalised' the computer into a small

scale, domestic phenomenon which over time will have an important demonstration effect on individuals and groups at the community level.

It was felt that since new technologies were already well diffused, demonstrations and sharing should be further encouraged among ordinary people and groups, in ordinary circumstances and places, such that others would see the relevance of the technology to their own needs and abilities. The seminar was very much in favour of the peer group demonstration effect, or *participatory learning*.

Recognising and promoting the positive aspects of a 'local' scale of technology deals with only part of the problem of resistance in human response. 'Technofear' is a personal feeling that prevails to some extent among most people whether rural or urban. It might be argued in fact that the independent and self-reliant nature of many individuals in rural society would enable them more readily to adopt new technologies than their urban counterparts. This would be especially true if the technology were of a mechanical nature, akin to many farm operations for example. Dexterity with digital systems and small electronic equipment will also appeal however to rural dwellers other than farm operators, such as women, retired professionals and those involved with small businesses and voluntary or community organisations. Certainly it will be a part of the skills acquirement of rural youth in the years to come.

4.5 Need and desire to use technology essential.

It was determined at the seminar that a major element in overcoming 'technofear' and in taking advantage of the new technologies was the requirement of having the NEED AND DESIRE to use the system. This was felt to be particularly true of the new communications technology such as video-tex(t) and teleconferencing. Interactive systems embedded in the new communications technology enable greater frequency of interaction between people and are of special significance for communication among members of networks (interest groups, professional associations, unions, etc.). Since in many cases we are talking of new FORMS of communication, and new USERS of communications tools, these needs and desires may not be self-evident to the potential users, and the role of pilot schemes nature seems likely to be important.

4.6 Does machine messaging reduce human contact?

An initial fear about new communications technology is that it will reduce human contact by introducing more machine messaging. Early

indicators suggest, however, that the same level of human contact continues as before, but that the overall amount and frequency of interaction is increased by improved messaging. Whilst physical contact may, in some circumstances, be reduced, other types of human contact are enhanced. Much of this takes place in the interval between face to face meetings. Effectiveness of contact is enhanced while the element of human contact, a very necessary feature in any decision-making or learning process, continues. It is thought that the quality of the human contact is much improved given the amount of interaction through computer messaging or information sharing that has gone on in the interval between face to face meetings. It is also claimed that computer conferencing, which is essentially interactive, becomes personalised over time such that new forms of positive 'contact' are being developed, often among people who have never met. This has been likened to the 'camaraderie' that can develop among shortwave radio hams and Citizens Band users.

4.7 Vested interests and new technology.

Another element of human response is 'vested interest', the power structures in any community that are able to exert a definite influence and control on the introduction of a new technology. Vested interests exist at all levels in society and are usually representative of (or allied to) existing systems of provision. In general, there may be two kinds of response from vested interests: the negative and the co-optive. If an existing system of power is threatened by a new technology, then it will tend to resist the innovation, usually by raising the fears that are inherent towards something 'new'. Loyalties and roles in rural society are usually well defined and can be mobilised to 'resist' something from the outside if the opinion leaders so decide. Resistance by human vested interests may be particularly strong when the traditional ways of making decisions and doing business, with all the attendant perquisites and benefits are threatened by a new system supported by a technology. A common and legitimate fear held by many is that new technologies will reduce the number of jobs available in small community systems. In effect, new technologies rarely reduce jobs, but may require different attitudes and new skills on behalf of those who operate the new technologies. This, in fact, is what often threatens the existing work force.

The existing power-structure will be influential and capable of encouraging either resistance to change or enthusiasm for its acceptance. Whatever the motive or nature of the reaction, vested interests, at all

levels, will have a role to play in the adoption of new technologies in rural areas.

In discussing these aspects of the human response to new technologies, the seminar concluded that two general themes were worthy of note and further debate. These were: the community approach to grasping the opportunities of new technologies, and the pervasive role of education.

4.8 Grasping the Opportunities.

The seminar participants felt strongly that rural communities, of all types and sizes, could benefit enormously from low cost, easy to use forms of telecommunication technology. This would apply to physical communities, rural settlements, as well as to 'communities of interest', spread across large distances in rural areas. The former refers to country towns, villages and hamlets and the latter to formal and informal associations of people with common concerns and interests, e.g., small farmers, rural planners, health providers and women's associations, etc.

4.9 Conditions for adoption of new technologies.

In order for rural communities to grasp the opportunities afforded by the new technologies of:–

(a) being linked together,
(b) being linked to decision-making centres,
(c) being linked to sources of information,
(d) being linked to sources of learning,

there are a set of 'conditions' that would encourage early and successful adoption.

4.10 Need and desire for 'improvement' essential.

The primary conditions are those of a recognized NEED and DESIRE on behalf of community members to improve their situation in some way (e.g. increase their knowledge and self-determination) by using computer based information and communication linkages. At the outset only a small group or collection of individuals need be interested.

These should be:–

(a) community power brokers – legitimisers,
(b) a technical "buff" – to resolve early technical problems,
(b) community animateur,

All these qualities may exist in one individual, but are best rep-

resented by a group within the community (or community of interest). A community group can learn about the technology, by experiment and from demonstration by others, and by being linked to centres where information, advice and support can be obtained. Expectations at first should be modest and a spirit of experimentation will probably achieve the best results.

What is essential is that individuals and communities have a clear need to develop information, see the need to communicate with other 'communities' and can deal with central places for purposes of learning, making decisions, acquiring information and transmitting decisions.

In many ways these conditions are representative of the community development model which promotes community self-determination, involvement and responsibility.

4.11 Adequacy and cost of the communications infrastructure.

It is important to recognise that for successful community participation in the benefits of new communications technology other conditions need also to be present. An essential pre-condition is the existence of communications infrastructure. Without an operating and reliable telephone system with clean lines, regional nodes (PAD's) and a non-discriminating operating policy, the rural community effort will be greatly handicapped. It is in this connection that institutional support may be necessary to introduce the technologies and to make them available on an equal basis to the community users (organisations and the public) at large. It goes without saying that the *cost* of such facilities will also be critical – access at local call rates for data communications should be the aim in *every* rural area, no matter how remote.

4.12 Access to facilities in schools.

Introducing micro-computer facilities for communities through the local schools is a good idea IF the schools are accessible to the public. This second point relates to the need for a permissive and supportive local institutional environment, especially at the introductory and trial stage of technology.

4.13 Education a key element.

Underpinning all of these pre-conditions for successful adoption of new technologies at the local rural and regional scale is the element of EDUCATION. This applies to both formal and informal education, to

adult education, distance learning, technical skills training, self-learning and to community education generally. All such elements of the educational support network are conducive to the short-term and long-term adoption of new technologies, appropriate for rural areas. The benefits of hands-on experience (self-learning), the peer group demonstration effect, information, technical support and advice, communications and linkage, and various types of learning and training all fall under the broad umbrella of education. The tripos of communication, information and learning are in essence the core of the innovation and adoption process and will need to be considered in greater detail.

V INSTITUTIONAL ISSUES

Institutions provide the framework for collective actions on the one hand and the collective framework for individual actions on the other. We may distinguish between macro-institutions – the State, the Market and their related social institutions – government, property, the law – and micro-institutions – local government, voluntary organisations, local interest groups, precise lower level markets and property relations, and the like.

5.1 Macro-Institutions.

The relationships between rural people and macro-institutions in modern industrial society have already been briefly described in Chapter I. They are summarised as an imbalance of power-dependency or powerless-ness from the rural viewpoint. Such imbalances, in turn, are aggravated by trends towards **centralism** – or the concentration of higher order economic social, cultural and political decision making processes in central, metropolitan places – and towards **hierarchy** – the ordering of decision-making procedures in top-down, hierarchal ways – trends which are related partly to notions of the political organisation of the State, partly to notions of social control, partly to economic efficiency and planning 'imperatives'. The prime example of the centralised hierarchical economy is the war economy, but all industrialised (and non-industrialised) countries have moved strongly in this direction over the past century and more.

It is relevant to point out that these processes have, until now, been hastened by developments in communications rather than hampered by them. Thus the business of colonial administration was far freer of central control from London, Paris or wherever before the age of the marine engine, the telex machine or radio and the aeroplane.

The fact that such technology could have (and in some cases subsequently has) strengthened communications within peripheries and enable greater **resistance** to external rule did not prevent it being used, in the first instance, as a tool of those whose interests ran in a contrary direction. One cannot, as others have pointed out, separate technology from its institutional context.

5.2 Centralisation challenged by new technology.

To the extent, however, that centralisation and hierarchy were brought about, or emerged by market forces, on the grounds of **efficiency**, the presumption that decentralised and participatory forms of organisations are inherently inefficient is challenged by new technology. And if the theory is challenged in academic and administrative quarters, the practice will increasingly be challenged by the growing experience of an ever widening group of people in using the new technology. As amply evidenced by the seminar participants and the cases known to them, there is now an increasing wealth of practical experience of collaboration between remotely located individuals and groups, of remote management, of remote access to archival, library and other forms of 'data'. The lessons of this experience not only show that such things are feasible, but also that, thanks to the rapidly reducing real cost of telecommunications and computer hardware, they are becoming economically sensible solutions to a host of organisational problems. However, experience is beginning to reveal many other advantages – from the ability to involve wider groups of individuals in parochial decision making, to the capacity to involve individuals whose handicaps prevent them from participating fully in traditional organisational forms and systems.

Such arguments will not of course remove opposition to decentralisation and participation in organisations – the vested interests are frequently entrenched – but they will strengthen the arguments for alternative modes and empower the people promoting such alternatives.

5.3 Improved links with Centres as well as Peripheries important.

In Chapter I, the distinction was made between periphery-periphery (p-p) links and periphery-centre (p-C) links. The p-C links are, and will remain, essential for rural development. Much information, and much expertise, does reside in central places.

The cost reduction in, and physical (quality) improvement of such links will yield the following advantages to rural people and groups:–

1. better and cheaper *access* to such information and expertise;
2. fuller participation in regional, national and international decision-making and other processes;
3. the ability to market, on equal terms, services of a wide variety to urban-based populations.

Such advantages should not be underestimated, although it was the belief of the seminar participants that the real revolution made possible by the new technology was related to p-p links, and especially to the combination of p-p and p-C links. Certainly, improved p-C links will give rural people a stronger *voice* in regional and national affairs, but without improved p-p links it seems doomed to remain fragmented and weak.

It is the combination of improved and cheaper p-C *and* p-p links which offers the prospect of radically changed basic conditions for development in peripheral rural areas and communities. Not only can the rural voice become more coherent and united, but the means of making this voice more effective in regional, national and international fora can be provided. Not only can markets be accessed more easily, but new markets are opened up..

5.4 Action required at Institutional levels.

This prospect is the first and most important argument for action to ensure that it becomes a reality. But action by whom?

Existing macro-institutions, within which most Telecommunications authorities would be included because even if not directly State-run, they are commonly heavily regulated by the State, and are not, under normal political circumstances very interested in, or concerned about, peripheral rural areas. In Great Britain, for example, new telecommunications infrastructure will, according to a recent report sponsored by OFTEL[11] and the Highlands and Islands Development Board, come last to the regions like the Highlands and Islands[12]. This is not very surprising; telecommunications are responsive to market demand even when run by State monopolies, and even more so when, as in the British case, run by State-regulated duopolies. Market demand is naturally heaviest in and between metropolitan centres – and it is for such links, in the British case, that competition has been greatest, prices have been falling most rapidly, and higher quality services, especially data services, have been introduced.

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11 'Office of Telecommunications', Atlantic House, Holburn Viaduct, London EC1N 2HQ. OFTEL is the regulatory body for telecommunications in Britain

12 EOSYS, Report on Telecommunications in the Highlands and Islands of Scotland, September 1986.

5.5 The fight for better communications services.

The lesson from such experience is that rural people are going to have to fight, and fight hard, to obtain the benefits of the higher quality and lower cost services which are now feasible. This fight can itself be made easier by making fuller use of existing technologies to stimulate p-p and p-C institutional circuits.

Rural people can also take steps to stimulate market demand for new telecommunications services through collective action at local, micro-institutional, levels. Each rural user may, especially in the initial stages, have a minimal demand for data services, for example, but collectively a threshold may be reached. Initiatives of this kind are quite common in most rural areas – the collective T.V. aerial in mountain communities being one example.[13] Such collective action by local groups should be more specifically supported through the strategies and programmes of macro-institutions.

5.6 The importance of collective action at local levels.

To take the example of data services again, collective action might be able to provide an access to low cost data services by providing a community PAD – effectively a mini-Packet Switching Exchange – the cost of which might be below £10,000 and falling rapidly. A satellite link – through the provision of a dish and linking equipment – might be another. Critical mass should be aimed for, and collective action at local levels is the means of achieving it.

Such micro-institutional action might take several forms, and should be coherent in terms of existing institutional structures. The precise forms will, and should, vary widely according to these structures. Facilities might be provided at a local telephone exchange, at a post office, at a library, a school or a business centre. Where there is a direct interface with actual and potential users, the precise location will be crucial, particularly in the early stages. The rural community, as has already been pointed out, is not homogenous. Location in a school, even if the purely bureaucratic problems of community access can be solved, would inhibit a portion of the population. A library might do likewise. Almost any location might inhibit some portion of the population. Thus one is seeking on the one hand a clear identification of target groups, and, on the other, locations which are so far as possible familiar and 'comfortable' for as wide a group as possible.

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13 Now grant-aided by the Development Commission in England, the Mid-Wales Development Board, and the Highlands and Islands Development Board

5.7 Conclusions.

What can macro-institutions do? Adopt policies, methods and approaches to facilitiate rural access and participation, to assist local action, to encourage equal access across national space.

What can micro-institutions do? Mobilise (a) for participation (b) for equality of provision (c) for lower costs (d) for encouragement and financial carrots for collective, local, action and (e) for using the new technology for all these purposes.

New institutional forms will undoubtedly emerge – they will be what people make them. For rural people to ensure that they reflect their needs and objectives, they must get *involved* with the new technology.

VI EDUCATION

It is often assumed that 'education' will, or should, accomplish many of the desired goals of rural development. In many instances it has been seen as a panacea, where it becomes an end in itself, rather than a means to an end. Often in the development field, in the absence of a clear understanding of what to do next, education is seen as a universal good, a worthy activity that can do no harm, while more detailed planning takes place. Because of this unfortunate 'cure-all' image of education, the seminar group stressed very strongly their conviction that, in the case of new technology and rural development, education, interpreted liberally to include both formal and non-formal methods, has an essential and formative role to play.

In this Chapter, education will be considered from both long term and short term perspectives in relation to helping prepare rural populations to take advantage of new communications technologies. Emphasis overall will be on the short term, informal applications of community education. Although an entire 'learning system' needs to be formulated, it is at the local level that the most important developments are expected to take place and which will have the greatest positive effects for rural areas.

6.1 The Long Term Effects of Education.

There is little doubt that the long term effects of formal education can have lasting benefits for society in terms of producing a computer literate generation in the years to come. In general, the serious approach that has been taken to include computer education and training in secondary and adult education has been impressive. No less impressive has been the ease with which young people have been able to comprehend and utilise basic computer functions. Whether the benefits are realised, and the skills turned to good effect, depends on social, cultural, economic and political change – how socially democratic or geographically pervasive such opportunities are has yet to be demonstrated. It is therefore most important that the broader aspects of education at all levels are not ignored in the headlong rush into computor skills.

In the areas of curriculum development, teacher training and the provision of hardware, many of the national schools' systems have to this point made steady progress, although the provision of hardware has tended to take priority over training and applications in many instances.

It is encouraging to note that these long term national policy developments have not, apparently, discriminated against rural learners. On the whole, there appear to be as many computer learning facilities in most rural schools as there are in city schools. In fact, on a per capita (pupil) basis, the provision of hardware may be proportionately higher in many rural areas. This, in one sense, demonstrates the decentralising capacity of the new technology. As the opportunities for young people to learn about computer applications are becoming abundant, much will depend on overcoming the 'technofear' of teachers, administrators and parents. There is little doubt that future young adults will be well acquainted with the technology and its applications and there is no reason to doubt that this experience will be any less diffuse in rural areas.

6.2 Some examples of educational applications.

Several examples illustrate the serious attitude to educational applications of the new technology at both the regional and the national level: BRUETEL, the DOMESDAY PROJECT and the OPEN UNIVERSITY.

6.3 BRUETEL

The BRUETEL system illustrates the local level of provision of micro-computers in a remote region and the level of sophistication already reached by linking them together to form an educational data base and network. All the secondary and all the primary schools in the Western Isles have micro-computers in them. In addition they can be – and in many cases are – linked by modems via the telephone system to a local data base at Brue, which itself is linked in the same interactive way to major data bases in central Scotland and beyond (see Annexe 1). The system provides access to major information sources, including the Times Educational Network (UK), while at the same time 'normalising' the use of micro-computers as terminals in a local information network. Although, at this time, it is used mainly by teachers, the presence of micros and the capacity for linkage will enable future pupils to experience the extensive information and knowledge systems that exist elsewhere. At the same time, a data base is being built at Brue that reflects the educational needs of the Western Isles.

6.4 Domesday Project.

The Domesday Project illustrates another way of influencing the public education process, but stimulated at the national level rather than at the local or regional level. This involves the videodisk and player and it is the expectation of the project that over 300 schools will have this equipment by 1987. The Domesday Project is a massive national undertaking that has strong support from many local educational authorities, as well as the private sector. The eventual locus of the learning, however, is the school itself where it will be an extension of the BBC sponsored national computer literacy programme. Again, the effort to affect the level of knowledge and to raise the public interest in new technologies is based on an introductory experience through the schools and school children. Primarily it is through the next generations of young people that the technology is expected to become an integral part of the formal education process.

6.5 The Open University

A third example is the case of the Open University (OU) which is actively engaged in employing media technologies in order to extend higher educational opportunities to people in remote rural areas. The problem of the remote learner has long been understood to revolve around the negative effects of social and physical isolation in the learning process. At present the OU has developed radio, television and the often cumbersome telephone (voice) conferencing as tools of remote learning, and in Scotland there has been the development of local centres to allow remotely placed students to come together. The advent of the micro-computer and the prospects for interactive links between tutors and students via telephone linked micros will further improve the effectiveness and efficiency of distance education. In this instance there are four basic areas for development: the physical hardware to ensure that remote area linkage is effective, the organisational and management changes to develop more frequent interactive links between pupil and tutor, educational software that will ensure a stimulating environment for the independent learner, and the basic ability on behalf of Open University students to access and use micro-computers. In the latter case, there is a long term pay-off as more and more students learn about the use of computers in school. In the case of appropriate software, it is a matter of lecturers and educational planners preparing higher education learning materials for computer software: a short term need.

6.6 Grasping the opportunities.

All three examples demonstrate the high levels of investment already being made in continuing the development of new technology with the educational infrastructure at all levels. Decisions have already been made to invest in the future by providing the formal educational system with the means to use the new technology for its own needs and to incorporate the use of micro-computers into the regular teaching programme. The effects have been manifold: computer literate students are already entering the university, innovations, such as the Domesday Project, have been completed, and, above all, the rural user, whether pupil, teacher or information provider, has not been excluded from its development. If the national governmental institutions have invested in formal education, in the long term, on the basis of a trickle down effect, then in the short term it will be up to rural communities themselves to 'grasp the opportunities' provided by the new technologies by adopting both formal and informal approaches to their own current education and development needs.

6.7 Informal – Short Term Approaches.

Before reviewing the many ways that rural communities can, by educational means, grasp some of the rural development opportunities provided by the new technology, it is appropriate to list the cautionary lessons that Phil Coombs felt had emerged from previous experiences with the application of new technology such as radio, television, and video-tape to education. These lessons stem from a long experience in the educational development world where attempts to increase the effectiveness, impact and pace of learning by use of educational technology has often had indifferent results.

6.8 Coomb's Laws.

The seminar participants dubbed these lessons as 'Coomb's Laws', and they may be summarised as follows [14]:–

1. Don't start with a technology and then look for a problem to solve.
2. Beware of enthusiastic promoters wedded to a particular technology.

14. See also Coombs and Ahmed (1974) and Coombs(ed) (1980)

3. Beware of technological "fashions".
4. Don't allow technical hardware to become more important than the human 'software'.
5. Be realistic about real costs from the start.
6. Do not superimpose new educational technology on existing systems.
7. Do not assume that what works well in one place will work equally well in other places and therefore needs only to be replicated.

6.9 Role of Community Education.

The application of education to the needs of rural communities, however defined (see Chapter I), must be seen in its broadest sense. If the technical skills and familiarities that derive from computer usage are being generated in rural youth as individuals through formal and semi-formal education, then the additional needs of communities, as settlements, or as interest groups, will be served by non-formal types of education. In the main, these may be referred to as community education activities.

There are a great variety of community education activities ranging from the use of media (T.V., radio, the press) to special educational programmes involving literacy, lifelong learning (adult education) and community development. Attempts to 'infect' mass groups of people with new knowledge, skills or beliefs have notoriously failed and it is well known that learning, experimenting and sharing knowledge on a group or community basis is best done on a small scale and among peers. If personal learning is tailored for the individual, then community education must be geared for small groups and based on well identified needs of the 'community'. It is at the community scale that computer applications become a means to an end – the end itself must serve the needs of the community or the interests of a group. Universal understanding of computers becomes less critical at the community level as long as one or two people have the capacity and as long as the others understand the problem and how computer applications might help.

Computer assisted community education in this sense implies:–

— learning from other groups – acquiring useful information
— increasing solidarity
— communicating more frequently and effectively
— discourse, dialogue and decision-making with officials and colleagues in the external environment.

6.10 Importance of Participatory learning.

If the critical lesson from Coombs' list can be overcome by applying new communications technology to community needs, then other 'cautions' can be accommodated in a similar fashion. In terms of community education, for example, one of the best information dissemination and learning methods would be the community-to-community demonstration. Scattered groups and remote communities will find more credible the demonstration of the utility of the new technology by groups and communities similar to their own. The value of this peer group demonstration effect has already been mentioned (p. 34) and it is particularly important for initiating, informally, the community learning process. Not only can groups that see others effectively using micros seek applications for themselves (and cultivate the 'desire'), but can, because of the nature of the technology, keep in touch and continue to learn from the demonstration group. The prospects for shared learning, co-operative ventures and sponsored demonstrations are substantial.

In terms of supporting such initiatives, there would be a need to offer assistance to established groups willing to demonstrate their applications (travel grants) and perhaps to help group or community leaders with effective demonstration techniques (information booklets, videos, workshops, etc.). Supporting the initiation of networks, co-operative relations, trial linkages and information data bases might be roles that central agencies could perform without major cost or direct intervention. Community-to-community demonstrations have much to offer as an effective informal education process. A remaining 'lesson' that needs consideration is the problem of "superimposing new educational technology on existing systems". Clearly in community education the more local groups and agencies adopt the technology and adapt it for their own needs, the less of a superimposition takes place. The identity of the Chamber of Commerce, the Local Economic Development Board, the Women's Institutes, the farmers' producer groups and the planning commissions, etc. can remain intact while their effectiveness in communication, accessing of data, and sharing information among members increases. Grafting the new technology onto existing organisations to help them affect their programs, is what is recommended rather than imposing new offices and centres, which are both expensive and alien to the local community development process.

6.11 Appropriate sites for community learning.

In this respect the question of location or sites for introducing the technology and promoting group trials is of relevance. Community halls, church rooms, schools and other public buildings such as the library can be thought of as potentially suitable for identifying the technology with physical communities and signalling their community-wide access. Such initiatives might also bring about more effective community use of public buildings such as schools which have long lost their roles as community centres. Another model for introducing the technology and initiating the community self-education process would be to locate terminals in public buildings and encourage different community groups to use the facility for trial periods. This, linked with the community-to-community demonstration process, would provide for a good initiation of the education process.

6.12 Evaluation of rural systems needed.

Once initiated, the existing data bases, information retrieval systems, teleconferencing functions, and educational software will have to be adequate to continue the learning process and to satisfy the problem solving demands of rural communities and groups. It is perhaps this area of the information backup that will need the greatest attention once the introduction of new technology to rural areas has taken place. This has already begun and a careful evaluation of existing rural systems needs to be undertaken in order to promote further development in this field.

6.13 Conclusion: Education.

In summary, the educational component in making the link between new technologies and rural development is vital. It involves educational processes at all levels and in all its manifold types, but with particular emphasis on community education in the informal sense. Centralised institutions can best offer assistance in terms of the provision of equal opportunity and hardware in addition to educating future generations for literacy in informatics. In the short term, the support of spontaneous initiatives among rural communities to form networks, exchange visits, ideas and information, to experiment with the various technologies as they develop should be an immediate priority. Extending the formal education role into informal areas of community education might be an important part of this and would help to prepare the rural education system for a more community based role in the future.

VII CONCLUSIONS

The following are some of the main conclusions which arose from the seminar.

1. Rural people can benefit from the applications of new computer and communications technologies. The main reasons for this lie in the 'distance shrinking' nature of these technologies, and the increasing quality and decreasing costs of telecommunications and associated computer hardware.
2. Rural applications must be driven by need rather than by technology. A clear articulation of problems, needs and opportunities will lead in turn to a clear expression of 'demand' for different types of application.
3. The drive for mass experience – both in schools and out of them – will be crucial in articulating these applications. The most appropriate ways in which this experience and involvement can be brought about will be culturally dependent, but in general people should feel comfortable in the selected environment, find it easily accessible and familiar as a place of informal meeting, recreation or learning. There is indeed a case for experimentation in this area, but the lessons of experience to date should be examined carefully.
4. Public, private and voluntary sector activities can now be economically and effectively undertaken and developed on a decentralised basis using such technology and this includes important areas of higher education and research. This point needs to be repeatedly and forcibly made in order to overcome traditional obstacles to such processes. Those responsible need to re-examine their systems of organisation and hierarchy with a view to such decentralisation. This is entirely consistent with the development of democracy in society – in itself an important goal for development, rural or urban.
5. In order to realise the potential benefits certain prerequisites are necessary.
   - Rural people have to engage with the new technology not as a solution in itself but as a means of improved self-development, as a means of resisting further external domination and dependence, and as a means of participating more effectively in the wider economy and society.
   - There must however be a need and a desire both to tackle rural problems, and to engage with new technology in the processes involved.

— An adequate communications infrastructure is essential and although this will normally be in the hands of centralised authorities, **collective action** at local levels could be important in creating the critical mass of demand for certain facilities such as access to data communications networks.

6. There is a need for further effort both to bring the specific needs and opportunities of rural areas with regard to communications technologies to the attention of telecommunications authorities and to assess and evaluate the experience of new initiatives in this field.

There is every reason to believe that the development and application of selected new technologies by rural people would greatly enhance the democratic process and self-reliance of rural groups and communities. It is to be hoped that rural people and their institutions will seize this chance.

ANNEXE 1: CASE STUDIES

BRUETEL

by Kenny Matheson

Information Technology has now allowed us to improve the communications link between our schools in the Western Isles of Scotland. Since April 1984 the secondary schools throughout the Western Isles have been able to fully utilise their micros. Using a modem they can now access by telephone our database for software information, downloading programs and educational information. This year the first nine primary schools in our Authority were also introduced to the database, using PRESTEL adaptors.

Schools can access the database at a time that is convenient to them. It is essentially a service for schools in our region, and it is up to the teachers in the schools to specify what kind of information they would find useful to have readily available on a local database. Each school can now use their micro as an additional resource provider, as well as using it as an educational tool in the classroom.

All databases have names, and our local database 'BRUETEL' is no exception. Why BRUETEL? The database provides a similar service to British Telecom's 'PRESTEL' Service. The Gaelic (which is the native language of the local people in the Highlands and Islands of Scotland) for the word 'press' of 'PRESTEL' is Brue (pronounced 'brew'). The small crofting township in which BRUETEL is situated is also called 'Brue' – which in this case is the Norse word for bridge!

So the name BRUETEL is really quite apt as our work bridges and co-ordinates the many different fields of education, both within our Local Authority, and also from our region out to mainland databases such as UK PRESTEL and SCET (Scottish Council for Educational Technology) database at Glasgow, and beyond.

Information Technology allows us to access Mainland/European/Worldwide databases, and download any relevant information and data that would be useful to us locally in the Western Isles. Our schools and educational establishments can then access the BRUETEL database for that information. This makes financial sense, saving teachers the time they might otherwise spend searching for, and locating some information they know is held on a specific database.

It also saves the Local Authority paying for numerous expensive trunk calls for schools accessing mainland databases, when we can make one phone call for that information, store it on our database, and then make it available to all schools in The Western Isles, at local call rate.

BRUETEL Database Hardware Configuration and Operation.

The BRUETEL database is run on a Torch 68000 Computer, which is a hard-disk machine with five drives. Each drive can currently hold a four thousand frame database.

The software for the database was written by 'Metrotel Viewdata Systems Ltd' and includes facilities for creating and editing frames, bulk updating, talk communications with automatic dialling, frame management system and page cycling facility.

The communications side of the database is controlled by a 'Tomac' multi-modem unit which can control up to 15 users accessing simultaneously.

When a school is ready to access the database for the first time, and the teacher has a convenient moment, they can contact the database operator. They are then issued with 'log-on' instructions – personal user number and password. The steps they have to follow for registration, downloading frames and computer programs are all explained. That teachers can then demonstrate and guide the rest of the school staff, and of course come back to the operator if problems arise.

Types of Frames on the Database:

There are three types of information on the database:

(a) Telesoftware-computer programs in a format that allows them to be held in the database and then transmitted from the database via – modem – telephone line – modem – and into the school computer.

(b) Frames of information – giving further information about the database and the school computers; frames to help with school administration and teaching (area information, school year, in-service dates, local holidays, sport, art/music/drama, local history/culture) and picture frames using coloured graphics. Frames can be in Gaelic or English or both, and are good visual aids, exciting for the classroom.

(c) Response frames – where schools can fill in frames by answering questions on certain topics or for administrative purposes. Schools also use this facility to register when coming on-line, sending basic messages, ordering program documentation, etc.

We hope to have mailbox facility for schools by the end of this year. This will allow schools to send messages to each other.

Conclusion

The BRUETEL Co-ordinators's job is both very worthwhile and exciting. Amongst other requirements, it demands a lot of time, energy, patience and determination.

I am also very fortunate to have joined an enthusiastic team of individuals, who are prepared to spend long hours working hard, and against odds, to ensure that a job gets done, and done well.

BRUETEL serves what many would term as a remote, rural, crofting community.

We are isolated from the benefits of major cities with their grand universities, super commercial and industrial enterprises along with their sophisticated communications networks.

But this new technology can be of as much relevance and benefit to the small rural community co-operative, as it undoubtedly is to the busy high street concerns in major urban centres.

BRUETEL demonstrates how this new technology can help and indeed benefit every population sector of a rural community and how it can be usefully applied to help those who are, through no fault of their own, often bewildered and frightened by the technological advances of microcomputers and Information Technology and whose applications do not always seem to be at all 'caring'.

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PIRATE

by Rhys Taylor

In the mainly rural county of Devon (England) a computer-based **Public Information Service** provides a good demonstration of skilful combination of human and technological potential. The Public Information in Rural Areas Technology Experiment (PIRATE) uses an information 'database' held on a Torch CH520 computer to support an information service of local relevance to the people of two small towns and the surrounding villages.

Public enquiries can be entered by un-trained users on a visual display screen, without the need for a keyboard. (An experimental 'ALS Browser' terminal). Selected information can also be printed, if required.

Subjects covered include:

Public services
Education
Welfare
Family and personal services
Information
Health
Housing
Industry
Commerce
Leisure
Transport, etc.

The PIRATE project began in 1984, adding the element of new technology to an established group of co-operating advice and information services which used the public library building at South Molton. Village residents from surrounding areas were accustomed to visiting or telephoning this 'Information Centre' which was widely publicised in this rural area by a monthly newsletter. This pioneering Information Centre was started in 1980 with national finance from the British Library, and the Development Commission (both later funded PIRATE). South Molton Information Centre today operates with local authority funding, from County, District, Town and Parish Councils.

The 'new technology application' of PIRATE has therefore been built upon an established and personal service. Once its relevance and ease-of-use were estabished at South Molton, the technology was transferred (in May, 1986 using a second set of equipment), to Honiton

Library, where its use has developed rapidly. A third Devon town, Ilfracombe, is to be included in the Summer, 1987.

Links between small microcomputers, used at town and village schools, and the PIRATE computers are being arranged for 1988. This will further widen public use of the information service. A co-ordinator and her assistant have developed PIRATE, in turn training other people, such as voluntary advice agency workers or library staff. The micro-computers are well used, for example, in production of text (word-processing) during the hours when not required for the information service. They also have – in common with many microcomputers – a facility for communication via telephone lines. Future developments may make more use of the communications facility.

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GRASSROOTS

by Elizabeth Black and Leslie G. Richards

In Canada there are just under two thousand households accessing a commercial informational database for farmers called GRASSROOTS.

GRASSROOTS uses NAPLPS, a protocol for creating, storing, transmitting and retrieving computer text and graphics. Videotex "pages" can be sent by telephone, cable or satellite and are displayed on a terminal which can be either a PC or TV set with NAPLPS decoder.

The average GRASSROOTS user is 35 years old, a cash cropper or beef producer on a 1000 acre farm, with gross sales in excess of two hundred thousand dollars a year. The user of 2 years ago would have initially spent $750 on a videotex decoder and $45 per month on communications and $15 a month on subscription fees to GRASSROOTS. The present user spends $145 on a software decoder to use on his personal computer and in Ontario spends $9 per month on GRASSROOTS subscription and 10 cents per minute communications costs.

He spends an average of 17 minutes per day looking at information on grain futures, street prices, local and regional weather forecasts, market analyses and newsletters.

In 1982, the University of Guelph was awarded a videotex equipment grant by the Federal Department of Communication.

The study on agricultural information was the result of an invitation from Infomart to conduct a joint six month field trial to introduce GRASSROOTS to Ontario. The project had three objectives:–

- to create a professional "Videotex Production Centre" at the University of Guelph, to be called Universitel;
- to create agricultural content relevant to Ontario;
- and to test this service on Ontario farms.

The field trial operated from April to September of 1983. Infomart provided training for the videotex production staff at Guelph and software development for three of the farm management programs. A production target of 300 pages of Ontario content was more than doubled during the six month trial.

The type of content produced ranged from:–

1. a daily market summary of Ontario commodities supplied by the Ontario Ministry of Agriculture and Food;
2. a Calendar of Agricultural Events;
3. a list of Independent Study programs with on-line registration;

4. farm management programs such as:–
   — Crop Budgeting Aid
   — Sire Selectors
   — Corn Yield Predictors.
5. on-line ordering of audio cassettes on animal health care seminars;
6. a listing of OMAF publications;
7. insect control in field crops;
8. research reports on corn, canola, winter wheat, barley and triticale;
9. fertilizer and crop rotation recommendations.

The 24-hour weather forecast was expanded by INFOMART to include Central and Western Ontario. INFOMART also added Ontario market quotations and agricultural news.
Several agribusinesses contributed product information of interest to the Ontario farmer and Toronto Stock Exchange trading information was added.

To make this database available to Ontario farmers, two trial areas were chosen: Guelph, in central Ontario, with its hog and dairy operations, and Chatham, in the heart of southwestern Ontario's cash crop region.

To provide communications to these two areas, a dedicated 4,800 bps dataroute was leased from Bell Canada, and a 16 port concentrator was installed at Guelph. This was also the route for pages created in Guelph to be downloaded to the GRASSROOTS database in Winnipeg.

Terminals were installed on 40 farms and the farmers were offered the service for two months. They were required to complete a questionnaire prior to terminal installation and a second one at the end of the trial period. In addition, on-line responses were solicited during the trial. Service included a videotex decoder, monitor and modem, free telecommunication over the installed network, training in the use of the service and maintenance of equipment.

At the end of the trial, the participants were invited to continue the service by buying or leasing a terminal and paying a 10% per minute telecommunications charge. Eight trial participants in the field trial were not from a specific group or size of farm operation. However, most had gross sales over two hundred thousand dollars, more than half were active in commodity markets and ten per cent were active in the stock market. 14% owned a micro, 65% were seriously considering purchasing one.

The overall reaction to the field trial was positive. Generally, the participants were impressed with the weather reporting system and felt it had some advantages over their present sources. Some, however, viewed it as a luxury. Both the cash crop and beef producers thought the database useful. Cash crop farmers felt there was enough market information to make purchasing the information service viable. Dairy farmers indicated they needed little in the way of marketing information.

Results of the field trial were influenced by several factors:–

1. The bulk of the content on the GRASSROOTS database is directed mainly towards cash crop farmers and beef producers. For other Ontario agricultural groups – dairy, small fruit and swine farmers there was very little information pertaining to Ontario conditions.
2. The time of year chosen for the field trial (April to September) may have influenced the reaction of farmers to the system, since their free time was limited by seasonal demands.
3. The lack of a reasonable rural telecommunications service for Ontario presented a major block in acceptance of this or any other videotex service. Access costs of five cents a minute in Manitoba and seven cents a minute in Saskatchewan were considered reasonable. In Ontario, Datapac, at fifteen cents a minute, is not available in most rural areas. A long distance charge of 35 to 70 cents a minute to reach a Datapac port is seen as prohibitive.
4. The promised supply from industry of low cost decoders never happened. Since the field trial, a major advance has been made in the availability of videotex software decoders for microcomputers ranging in price from $99 to $200 Canadian.

Another major advance that is now available is a program running on a PC that will communicate to a remote database, enter the user's ID and password, select designated pages from the database, such as the afternoon weather forecast, the latest prices for corn on Chicago Board of Trade, the latest news item on AgAlert. It will capture these pages on a disk, logoff and disconnect. At his leisure, the farmer can call up the stored pages, study them and even print hard copies.

The present market in Ontario for a videotex information service appears to be both limited and selective. Any thought of expanding that market to the dairy industry, for example, is going to take more than an inexpensive decoder or cheap communication costs. It will take

content of direct relevance to the farmer.

The current subscriber status of GRASSROOTS is:

Alberta	225
Saskatchewan	403
Manitoba	410
Ontario	178
Total paying subscribers	1700

TELEHOUSE: Scandanavian Information and Community Service Centres

This article is an excerpt from the speech of Lars Qvortrup, European coordinator of the FAST Programme on "social experiments with information technology", at the international expert meeting on New Technologies, held in Berlin (West) in November 1985 around the theme: New social responsibilities and forms of intervention.

In Sweden and in Denmark a number of so-called Information and Community Service Centres (ICSCs) have been (or are being) established. The main aim of the ICSCs is to provide isolated village communities with access to telecommunications services. Instead of linking individual households onto a network, the working-parties on these projects have chosen to concentrate I.T. facilities within specially designed "TELE-HOUSES", containing video and E.D.P. equipment which are thus at the disposal of the entire local communities involved. The facilities are intended as much for the private as for commercial use, with satellite T.V. reception, teleshopping, interactive citizens advice services, etc. . . .

The public provision of I.T. facilities is obviously partly designed to supply smaller rural communities and isolated businesses with an informational infra-structure which would be far too costly for them to invest in individually. But it is also partly designed to strengthen these local communities technologically, so as to help them to avoid the twin threats of economic stagnation (as the otherwise inevitable result of commercial and administration centralisation) and cultural impoverishment (as the result of cultural centralisation and the replacement of local cultural activies by isolated consumption of passive T.V. entertainment).

ICSCs – Structure and Function

ICSCs are being established in the Danish municipalities of Lemvig and Edvad, and in the municipality of Harjedalen in Sweden (where there are TELE-HOUSES under construction in small villages).

The first fully equipped ICSC to open was the one in Vemdalen: "Harjedalens telestuga". Eemdalen is a small rural village with 800 inhabitants, which is 125 Km from the nearest town Ostersund (with 50,000 inhabitants) and 400 Km north-west of Stockholm.

Harjedalens telestuga is equipped with teleprinting and facsimile transceiving devices, with interactive videotex, and with fifteen personal computers. At the beginning of 1986, the Swedish P.T.T., "Televerket", will install satellite T.V. reception equipment and video communication equipment, as well, with two-way micro-link video access to the local university in Ostersund and to the municipal administration in Sveg, 60 Km from Vemdalen. In all, the tele-houses at Harjedalen is supposed to provide the village community with six basic services:–

1. *Information retrieval.* The local population can retrieve information from the municipal administration, from the local library and from national and international data bases.
2. *A consultancy service.* One full-time consultant is employed at the tele-house. He provides a consultancy service for the small firms, custom-designing and/or tailoring computer programs etc. The consultant is also the manager of the TELE-HOUSE and he gives in-training and adult extension courses in E.D.P. and I.T.
3. *Distance working.* The TELE-HOUSE will provide local employees with distance working facilities. Living in Vemdalen you often have to travel 50-100 Km to your place of work (and unemployment figures are far above the average). But in the future a number of administrative work stations will be installed at the tele-house. It is, however, a precondition that distance working isn't "home working", but is a communal activity supporting a working fellowship.
4. *Training and education.* Even beforehand the official opening of the TELE-HOUSE in Vemdalen, 10% of the 800 inhabitants in Vemdalen had finished an introductory computer course at the TELE-HOUSE. At a later stage the tele-house will offer educational packages for study groups, combining computer-aided training and video communication facilities with access to the university in Ostersund.
5. *National and international communications.* All the local inhabitants may use the teleprinting and facsimile transceiving devices at the TELE-HOUSE for national and international communications. This is considered to be important for the small local firms which cannot afford to buy individual devices. They can use the TELE-HOUSE as an electronic post office, sending messages, or using it as a communal mail-box.
6. *An electronic village hall.* "Harjedalens telestuga" is not devoted only to business and educational activities. It is also intended to

become a centre for the local community's cultural and political life. In the first phase, there is interactive videotex access to information from the local municipality and from the municipal library. But at a later stage, from the beginning of 1986, the Swedish P.T.T., "Televerket", will install receiving equipment for international satellite television. People will then be able to meet in the "telestuga's" living room, watch television, discuss local politics (with online access to relevant information), and arrange long-distance video, meetings with interest groups in the community of Harjedalen, or elsewhere in Sweden. The "Harjedalens telestuga" is thus intended to function as a real electronic village hall for the community Vemdalen.

The Economic, Political and Historically Anticipative Significance of ICSCs.

A general tendency towards the centralisation and the concentration of capital is the economic background against which the ICSC initiatives in Denmark and Sweden have emerged. In the municipality of Lemvig, in Denmark, this economic problem is especially felt by the agricultural sector. In 1950, 465,900 people were employed in the agricultural sector, but in 1980 the figure was only 162,880. And if the existing trends continue unmodified, there will only be some 30,000 full-time farms left in 1990. With 30,000 farms spread over the total rural area in Denmark, many traditional functions in the small villages (local shops, craftsmen, schools, public libraries, post offices, etc.) will disappear.

The ICSC initiatives are, however, not only reactions to economic tendencies, but also to many years of centralised political planning, in that they represent what one might call local activities. Traditionally (i.e. within the 50-year period of the Social Democratically sponsored mixed economies) local structural problems have been met by national planning initiatives. Today the dominant strategy has changed. Local action is now taken to meet local problems.

The concept of TELE-HOUSE is closely related to the vision of the so-called "global village". What is conceived of here is the ability of information technology to open doors and windows onto a world of information and experience which has hither-to only been available in the metropolis; while at the same time enabling citizens to retain the advantages of traditional provincial town life with its easy manageability and familiar neighbourhood fellowship.

TELEDEV: "telematique" at the service of local development teams

Translation and summary of a French paper by Mariatta Idman-Philp, Arkelton Trust.

This is a new means of communication. It can be used 24 hours a day with any "minitel". The rate is related to distance. Training is easy. A message can be left in case the correspondent is absent, and simultaneous communications between several persons is possible.

It is an expanding network (150 in August, 1985; 250 in February, 1986; an estimated 600 by the end of 1986). It is an association of users which:–

- ensures control of the total project;
- welcomes new users and takes care of their training;
- researches the installation of new services as required;
- negotiates the experience of hardware and software on recommendation by the users;
- looks into methods of funding (sales, sponsors).

TELEDEV aims to group in one single system all the local development structures so as to avoid categorizing the different participants.

At present TELEDEV covers a great number of different associations all over France.

TELEDEV wants to remain an information exchange system, and a means of communication which is simple, inexpensive to use and managed in a flexible and decentralized fashion.

Hence, TELEDEV has chosen to

- be accessible to the general public: minitel;
- not to become a data bank;
- let the quality of its members count for more than the mass of data in its memory.

A group of members can reserve space collectively on a particular theme. The association and Alto (who runs the project) may advise prospective new groups on all relevant aspects. It organizes training courses on a regular basis (also on request: costs and conditions to be discussed).

Anyone can obtain a personal "mailbox" which permits sending and receiving messages, establishing files, circulation lists etc.

To belong to TELEDEV you must

— have a minitel (free in the Zones d'annuaire electronique, rented at 85FF elsewhere);

— subscribe to TELEDEV at 400FF per year in 1986 giving you membership of the association, users manual, right of access for 12 months and technical assistance;

— pay to the association the costs/use per hour either by pre-payment of a quota (20 hours=1,650FF, 40 hours=3,250FF) or by payment by quarterly invoice based on 80FF per hour (1½ hour minimum/quarter and 60FF by way of charge per invoice).

ANNEXE 2: ANNOTATED BIBLIOGRAPHY

The following books and articles provide useful further reading on the many and various issues discussed in this report. We are grateful to Plenum Publishing Ltd. for permission to use the explanations for some of these words and phrases which appear in Elisabeth Gerver's book 'Humanising Technology', and to contributions from seminar participants.

Arkleton Trust (1984) "Education Training and Rural Development", summary report on an E.E.C. sponsored collaborative programme between rural areas in Italy, Ireland, and Scotland in 1982/83, argues that economic and social changes taking place in rural areas require new approaches to adult education and training and identifies the need for training in the use of application of new technologies.

Arkleton Trust (1984) "Future Issues in Rural Development". Report of a seminar held in Scotland from 7-11 October 1984. (Arkleton Trust, with Ernest Cook Trust; 85/4/E), price (paperback) £2.50, 29pp. The main issues identified at the seminar are outlined and a number of implications for rural development and agriculture are discussed: impending adjustments at the farm level resulting from changes in the CAP; protection of the rural environment; rural communities and the perception of these be urban-based educational institutions; equity in development; and the need for a new model for agricultural and rural change.

Arkleton Trust (1983) "Institutional Approaches to Rural Development in Europe". Report of an international seminar held in Scotland in 1982 to examine public policies towards rural development, the role of public agencies and the new requirements to support diversification and self reliance.

Bassand, Brugger, Bryden, Friedman, Stuckey (eds.) (1986). "Self-reliant Development in Europe". Published by Gower Press. A review of the theoretical and practical background to cause for self-reliant regional and rural development, and an assessment of recent social movements and action for self-reliance.

Black, John B. (1986) "Reducing Isolation: Telecomunications and Rural Development". The sixth Arkleton Lecture given during the 1986 Seminar on "New Technology and Rural Development". A review of recent advances in Telecomunications technology and an assessment of their potential advantages for rural communities.

B.B.C. T.V. "The Electronic Office", 1984 – A series of six programmes which explains and explores the revolution in office technology, including the detailed characteristics and effects of many contemporary computer applications.

British Telecom. Packet-Switch Stream. First steps in packet switching. A 'plain language' guide to packet switching for the layman. Very helpful about PADS, protocols and so on.

Brochet, Madge Grant (1986) "Effective moderation of Computer Conferences, notes and suggestions". Computing support service, University of Guelph. Useful guidance on computer conferencing derived for ideas generated on a special conference on CoSy and shared with COM users in Sweden.

Burkitt, Alan, and Williams, Elaine. "The Silicon Civilisation." London: W. H. Allen, 1981. A very readable account of the development of the micro-chip and its social implications.

Covvey, H. Dominic, and McAlister, Harding Neil. "Computer Choices: Beware of Conspicuous Computing". Reading, Mass: Addison-Wesley, 1982. A realistic look at what computers really have to offer organizations, and how people can best choose a system for their own needs.

Dertouzos, Michael, and Moses, Joel (Eds.). "The Computer Age: A Twenty Year View." Cambridge, Mass: MIT Press, 1979. A collection of essays which presents overall a balanced account of the complex effects of computerization, including individual use of computers, trends in traditional computer uses, social and economic effects, and expectations of computerization, underlying technological trends, and a sample of the major attitudes toward the development of artificial intelligence.

Gerver, Elisabeth. "Humanizing Technology". Computers in community use and Adult Education. Plenum Press, 1986. Written in plain English, this book is essential reading for those involved in community action and Further Education and who are using , or contemplating use of, computers in their work. Contains some helpful case studies which illustrate the pitfalls as well as the successful applications of computers in Adult Education.

Gerver, Elisabeth, and Lewis, Linda. "Women, Computers and Adult Education: Liberation or Oppression?" Convergence, 1984, 17, 4. An investigation of the extent of the under-representation of women in learning about computers, together with an analysis of the factors involved and suggestions about how to improve the situation.

Gerver, Elisabeth. "Computers and Adult Learning." Milton Keynes: Open University Press, 1984. Explores existing developments in using computers in adult education, including learning by and about computers.

Hawkridge, David. "New Information Technology in Education." London: Croom Helm, 1983. Surveys most of the important developments in the field, and contains many useful suggestions for further reading.

Kirkpatrick, Duncan. (1985) "Education for Development in Rural Areas". A background paper for the seminar on 'Future Issues in Rural Development'. (Arkleton Trust, with Ernest Cook Trust; 85/6/E), price (paperback) £2.00, 8pp. In three sections covering: current trends in the education system and the creation of opportunity with regard to rural development; the role of education in addressing trends in employment, technology and leisure in rural society; and the broad principles of education relevant to rural areas.

Laver, Murray. "Computors and Social Change". Cambridge: Cambridge University Press, 1980. An excellent general introduction to the social, economic, and political implications of computerization written by a computer specialist who avoids jargon.

Legge, Derek. "Development of Information, Guidance, and Counselling Services." Amersfoort, the Netherlands: European Bureau of Adult Education, 1981. While not about using computers in this field, nevertheless offers a helpful account of the ideal and actual characteristics of such services.

"Micro Electronics Information Technology and Canadian Society". Workshop report Queens University of Kingston, May 5-7, 1982. A useful collection of papers speculating and reporting on the impact of IT.

Newby, Howard. (1985) "Rural Communities and New Technology". A background paper for the seminar on 'Future Issues in Rural Development'. (Arkleton Trust, with Ernest Cook Trust; 85/7/E), price (paperback) £2.00, 9pp. In four sections covering the background to the current process of economic restructuring now affecting the relationship between rural and urban areas; technological change, management of rural society, public policy and the role of self help.

Nitsch, Ulrich. "Appropriate Use of Computers". Paper presented at the seventh European Seminar in Extension Education, Asker, Norway, August 26th-31st, 1985. Reports on the use made by farmers of computers, reporting on what types of farmer tend to use the computers, how they use them, what training is needed, and how they could be used in extension work.

Rennie, Frank. (1987) "Popular Education for Change". Fellowship report on a study visit to The Highland Research of Education Center, Tennessee, U.S.A., argues the case for participatory research and education and horizontal linkages/networks between rural community groups. Arkleton Trust.

Scott, Ian. "The Periphery is the Centre. A Study of Community Development Practice in the West of Ireland 1983/84". (Arkleton Trust, Enstone, Oxfordshire; 85/3/E), price (paperback) £4.00, 1985, 89pp. Provides a background to involvement in community development, the extent of state intervention and the role of Irish language in this process. Case studies are used to illustrate initiatives, problems and state/local relations for a number of issues: the role of Community Councils and Development Committees; community cooperatives; and education and community development (adult education, pre-school, and environmental education). Two appendices cover the work of the Gaeltacht Development Authority and list the community cooperatives, development committees and educational establishments.

Sieghart, Paul. (Ed.). "Micro-Chips with Everything: The Consequences of Information of Technology". London: Comedia Publishing Group in association with the Institute of Contemporary Arts, 1982. A collection of contributions on the often contradictory effects of information technology on our lives, including the impact on the Third World, implications of computerization for work and leisure, the issue of privacy, and significant changes in the mass media.

Toffler, Alvin. "The Third Wave". New York: William Morrow, 1981. A widely read discussion of the implications of computerization on society, including how and if we may work in the future.

Tracy, M. (1938) "Problems in the Formulation and Implementation of Rural Development Policies in the European Community". Argues the need for local level approaches to rural development and appropriate mechanisms to encourage this at national and E.E.C. levels. The Arkleton Lecture, 1983.

Weizenbaum, Joseph. "Computer Power and Human Reason." San Francisco: Freeman, 1976. The classic attack on the over-enthusiastic promotion of artificial intelligence, reminding us of the human purposes which lie behind the use of computers.

ANNEXE 3: GLOSSARY.

The following words and phrases appear in this report. We are grateful to Plenum Publishing Ltd. for permission to use the explanations for some of these words and phrases which appear in Elizabeth Gerver's book 'Humanising Technology'.

Applications: A term referring to the uses to which a computer program is put; word-processing is one example of an application.
Artificial intelligence: The area of computer science concerned with computer programs which attempt to emulate the processes of human thinking.
Binary: Refers to a choice of only two alternatives, such as on-off or 1-0. It is the basic operating principle of all computers.
Business Computer: Term often used for a sophisticated micro-computer intended for serious business applications, such as word processing, accounting, or data bases; also known as a "desktop computer".
Computer: An electronic machine that stores and manipulates data by following detailed instructions.
Computer aided learning: One of many terms referring to the use of computers for educational purposes, with the implication that other methods are used as well.
Computer assisted learning: Another term for using computers for educational purposes, with the implication that other methods are also used.
Computer assisted instruction: Using a computer for teaching purposes; in Britain the term often implies a highly pedagogical approach.
Computer based education: Another term for using computers for educational purposes.
Computer based learning: Yet another term for using computers for educational purposes.
Computer conferencing: Refers to communication among two or more people by way of computers linked to one another, often by telecommunications.
Computer literacy: A term, discussed at length in the text, which has a wide range of meanings. It generally includes familiarity with the uses and abuses of computers and the ability to use a computer keyboard.
Computer system: Term used for the inter-relating or interacting components of one or more computers.
Computing: Refers to the process of interacting with computers.

Console: Term used for a keyboard and terminal used to communicate with a computer.
Data: Any numbers, words, or other precisely specified symbols that are manipulated by a computer.
Data base: A highly organized collection of data that can be searched to yield specific information.
Dial-up: Procedure by which a user dials a remote computer using the telephone lines and a computer with a modem and communications software.
Disk: A thin magnetic device that holds a large amount of data for use by a computer. A floppy disc is generally used with a relatively small computer and holds much less data than a hard disk.
Disk drive: A piece of equipment which holds a disk and transmits the data on it to and from a computer very quickly.
Documentation: Notes about the content and purposes of a computer program.
Dot matrix printer: A computer printer which produces print made up of little dots which, depending on how fine the dots are, can be considerably more difficult to read than the print of a "daisy-wheel" printer.
Download: The process of transferring data from one computer directly into the memory of another.
Echo: The return of data to the point from which it was sent.
Educational technology: Term used to refer to all of the technological means by which learning can be supported, including computers.
Electronic blackboard: Term used in the text to refer to Cyclops, a system developed by the Open University to allow telephone transmission of diagrams and other figures by way of a computer system.
Electronic mail: Term used to refer to communication between individuals via computers which are generally at a distance from one another.
Floppy disk: See "disk".
Glass Teletype: Simplest form of terminal used to communicate with a computer. Uses ASCII code.
Graphics: The visual material (other than text) that appears on the screen of a computer; it can include drawings, lines, graphs, charts, maps, and moving images.
Hard disk: See "disk".
Hardware: The various pieces of equipment used in computing.
High technology: An umbrella term which often includes sophisticated uses of computers.

Home computer: A term for a non-business micro-computer, often particularly well adapted for playing games and usually relatively easy to operate.
Informatics: Another term for information technology.
Information: Meaningful data or symbols.
Information retrieval: The process of getting useful information by searching a large amount of data.
Information technology: An umbrella term which usually refers to the use of computers and/or telecommunications systems. The terms "new technologies" and "new information technologies" both tend to be used in the same sense.
Interactive: Refers to the situation in which a user gives information to a computer which then gives a rapid response. The inference is that two-way communication is achieved.
I.P.S.S.: International Packet-Switched Services. As for P.S.S., but offered for international communications.
Keyboard: A device by which data is entered into computers. Micro-computers almost invariably have a QUERTY keyboard.
Log on: The process of starting to interact with a computer system, often used in a dial-up procedure.
Mainframe computer: The largest kind of computer.
Memory: Where a computer finds its instructions and its data and stores its results; the working capacity of a computer.
Micro: Term often used casually to refer to a micro-computer.
Micro-computer: The smallest kind of computer, also known as a "personal computer", or simply as a "micro".
Micro-electronics: A term usually used in connection with the technology of silicon chips; the word itself refers to that branch of electronics which deals with very small voltages and currents. See "micro-processor".
Micro-processor: A silicon chip which contains the components needed to carry out the operations determined by a program.
Micro-technology: Refers to the technology built on applications of the micro-processor.
Minicomputer: A medium sized computer.
Model: An analog of a real-life situation or system which can be used to elicit information about the likely behaviour of the real situation or system.
Modem: A device which enables computers to communicate over telephone wires.

Monitor: A term frequently used to refer to the television-like screen by which many computers display information.
Mouse: A device which enables a computer user to dispense with the keyboard for certain functions.
Network: A system in which computers communicate with one another.
Operating system: Refers to the program used by a computer to enable it to load a high-level language and to communicate with the user and with printers and disk drives, etc.
Packet: In order that data from different terminals and bound for different addresses (NUA's) can be interleaved and sent along a high speed telecommunications circuit, the 'data' from each source must be assembled into distinct parcels each with a code identifying source and destination. Such identified parcels are known as 'packets'. These 'packets' also permit automatic error checking.
Packet-Switching: This is an integral concept in the new telecommunications revolution, and, in particular, in the links between computer technology and communications technology which are revolutionising the way in which information of all kinds – text, numbers, pictures, sounds – can be moved between different locations. Such information can be, and is, readily converted into 'digital' form. Early examples of this included the pianola roll, and the ticker-tape. Once in digital form, information can be sent along wires, fibre-optic cables, or by radio or other wave forms, at very high speed. In packet-switching, this 'data' is bundled into 'packets' which each contain an address. These packets can then be sent down a line shared by a number of different users. Such facilities are rapidly becoming available world-wide. The essential points about packet-switching are low cost, high speed, error-trapping, removal of compatibility problems, and increasing ubiquity. In the UK it is possible to gain dial up access to Packet-Switching Services (P.S.S. and I.P.S.S.) from most locations, and pressure is on British Telecom to provide such access at local call rates. In dial-up systems, the packets are assembled at the nearest 'node', and protocols thereafter are standardised. Where a dedicated line (such as Dataline) is provided, however, the packets are 'assembled' and 'disassembled' locally, and this requires local X-25 protocols to ensure national and international compatibility.
PAD: Packet Assembler-Disassembler. For creating 'packets' out of ordinary data held on disk or inputted via keyboard or other device.
Personal Computer: See "micro-computer".

Port: That part of a computer from which certain kinds of information are fed in and out. Also used as a verb 'to port' meaning to transfer a program written for one operating system or computer to another.
Printer: Equipment that prints out information from the computer line by line.
Print-out: The information printed out by the computer printer.
Program: The instructions that tell a computer what to do.
Programmed Learning: Term referring to highly structured, regimented, predetermined learning, now often used in derogatory fashion.
Programmer: A person who writes computer programs.
Programming Language: A symbolic code which allows a programmer to communicate with a computer; there are many different programming languages, which bear variable relationships to English.
P.S.S.: Packet-Switched Services. High quality service offered by many national communications authorities (including British Telecom) to facilitate high speed accurate communications between remote computers. Involves the assembly of data in 'packets'.
QWERTY: Refers to the layout of a standard typewriter, which is used for most computer keyboards; the letters represent the first six letters of the keyboard.
Read: A term for obtaining data from one form of storage and transferring it into another.
Remote Computer: A computer which must be accessed by communications systems such as telephone lines, data lines, optical fibres, satellite communications, rather than directly by a console.
Remote work: Refers to work undertaken, often at home, at a distance from a central computer, with which the worker communicates.
Simulation: An analog of a real-life situation or system which can be used to elicit information about the real system.
Software: Computer programs.
Software package: Term used to refer to an entire program together with its documentation and other materials associated with it.
Teletext: Usually operated by television companies, and like **viewdata** use text and graphics, invokes a one-way flow of information, pages being encoded and sent together with television signals.
Terminal: A device for communicating with a computer, usually consisting of a keyboard, a monitor, and perhaps a printer.
Tree: Used here to refer to a computer structure of information in which one begins at a common starting point and then branches out for more specific information.

User friendly: Refers to a computer and/or programs which are supposed to be easy for beginners to use.
V.D.U.: Stands for visual display unit; an alternative term for monitor.
Videotex: Refers to computer-generated information displayed at a distance by a television screen. Also sometimes appears as "videotext".
Viewdata: Public database systems displaying both text and graphics, usually held page by page. Examples are PRESTEL (British Telecom) and BRUETEL. Differs from Teletext and Videotex because it is **interactive**.
Winchester: A term often used to refer to a "hard disk".
Word processing: Refers to computerized manipulation of words usually by way of a keyboard.
Write: To transfer data from one form of store onto another, as, for instance, from a disk to the main memory of a computer.
X-25: Internationally (CCITT) agreed protocol for packet-switching.

ARKLETON TRUST PUBLICATIONS

EDUCATING FOR THE YEAR 2000 – AGRICULTURAL EDUCATION AND TRAINING IN THE EUROPEAN COMMUNITY
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by Giuliano Cesarini.
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The Arkleton Lecture 1980 by J.G. Morris
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A report by a Third World Study Group on three rural development programmes in the UK.
A5 32pp price £2.00 US $4.50 including postage

CAN EDUCATION CHANGE RURAL FORTUNES?
Report of an international seminar held in Scotland in June 1980.
A5 44pp price £2.00 US $4.50 including postage

EDUCATION FOR DEVELOPMENT IN RURAL AREAS
Paper presented at the 1984 seminar on 'Future Issues in Rural Development' by Duncan Kirkpatrick.
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Paper presented at the 1984 seminar on 'Future Issues in Rural Development' by Howard Newby.
A4 16pp price £2.00 including postage
Now out of print but photocopies available

COMPETING USES OF LAND
Paper presented at the 1984 seminar on 'Future Issues in Rural Development' by Timothy O'Riordan.
A4 16pp price £2.00 including postage

THE PERIPHERY IS THE CENTRE
A study of community development practice in the West of Ireland 1983/84 by Ian Scott.
A5 108pp price £4.00 including postage
includes 8 black and white photographs

AGRICULTURE AND NATURE CONSERVATION IN CONFLICT – THE LESS FAVOURED AREAS OF FRANCE AND THE UK
Fellowship report by Malcolm Smith with the fieldwork undertaken in 1984.
A5 120pp price £3.00 including postage

REDUCING ISOLATION: TELECOMMUNICATIONS AND RURAL DEVELOPMENT
The Arkleton Lecture 1986 by Prof. John B. Black
A5 23pp price £2.50 including postage

POPULAR EDUCATION FOR CHANGE
Fellowship report by Dr. Frank Rennie on his study visit to The Highlander Research and Education Centre, Tennessee, U.S.A.
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THE PART-TIME HOLDING – AN ISLAND EXPERIENCE
The 1983 Arkleton Lecture by James Shaw Grant
A5 28pp price £2.00 including postage

EDUCATION, TRAINING AND RURAL DEVELOPMENT
Summary Report on an EEC sponsored collaborative programme between rural areas in Italy, Ireland and Scotland in 1982-83. By J. Bryden, P. Commins and E. Saraceno.
A5 40pp price £2.50 including postage

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Report of a seminar held in Scotland from 16 to 21 October 1983, by Keith Abercrombie.
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Published by the Arkleton Trust at Enstone, Oxon, OX7 4HH, England, U.K.
Printed by Stuart W. Sanderson, Unit 3a, Worcester Road Industrial Estate, Chipping Norton, Oxon.