

Ya la

MICROWORLDS AND REAL WORLDS - AN AGENDA FOR EVALUATION

Barry MacDonald
Professor of Education
Centre for Applied Research in Education
University of East Anglia

(Invited address. 'The European Conference about Information Technology in Education: A Critical Insight'. Barcelona, November, 1992)

Introduction and Overview

The main focus of this presentation is the development of computer based learning in English schools. Most of what I have to say probably applies to the rest of the United Kingdom, but there are variations which I do not intend to deal with. My concern is with Government policy and practice, and with the reasons why, in a country which is committed to evaluating all venture expenditure, the Government has chosen to insulate its substantial investment in this development from external scrutiny. Speaking as a specialist in educational evaluation, with an interest in theories and strategies of change, I also want to comment in a more general way on the characteristic features of CBL as an educational movement and on the political and economic contexts in which its evolving forms seek a location in educational practice. CBL has, in global terms, a long history, but it has seldom been exposed to systematic examination of its claims. At the present time political interest in its promotion has intensified and I argue that there is an urgent need to monitor its further development, not least because evaluation can help to create shared learning about its potential and problems.

Given this focus on development in schools I shall not, in the main body of this presentation, have much to say about CBL research, although I am at this time completing a four-year evaluation of an IT in education research initiative launched in 1988 by the national Economic and Social Research Council. In marked contrast to the Government, the Council commissioned this work as an explicitly policy oriented evaluation. Nevertheless, since the link between research and action is an important consideration, I shall begin this introduction and

overview of my presentation with a brief sketch of that context in Britain, drawing attention to some problematic aspects of the linkage problem.

My Government has spent a substantial sum of money over the past twenty-five years modernising and sustaining the computer facilities of our universities, most of it to enhance their research capabilities, some of it for administration. This expenditure has not been evaluated, but at least it makes sense. Research, both in the natural and the social sciences, is increasingly computer based, and research into computer applications is clearly important for technology based futures, in peace or in war.

The use of computers for teaching and learning in higher education has been slower to develop over this period, largely confined to undergraduate service courses and individual enthusiasms. At the same time this general support for improved computer facilities in the research community has stimulated a new wave of research into learning processes; sometimes attracting into that field a less parochial array of investigators than have traditionally been interested in the somewhat low status matter of human cognition.

What has emerged from this is an academic community of computer-based learning experts of a peculiar character, not necessarily rooted, as are other academic groups of educators in England, in an intimate knowledge of, and commitment to, the processes of mass schooling. Some are, some are not, but the multi-disciplinary nature of computer-based learning research generates multiple agendas, and some uneasy inter-dependencies. And when such a community is called upon to service the needs of schools, it would be surprising if the link between research and action proved to be unproblematic, or indeed the commitment to the mission wholehearted in every case.

Support for CBL research has varied sources, but the most important has been the Council which, in the early eighties identified information technology in education as a priority area. Reports were commissioned, discussions and workshops held to begin to define a programme of substantive research. The Council recognised the importance of involving practitioners and policymakers in this process, and of links with commercial organisations in the computer industries. It appointed a Co-ordinator to develop this national process of deliberation and in 1988 announced a five-year, £3 million initiative. The intention was to support ten or eleven multi-disciplinary, multi-institutional teams for three-year periods to carry out a broad range of basic research, but basic research with the user market firmly in mind and in touch. That market was the school teacher market. Let me briefly summarise some difficulties that arose.

Firstly, the Council did not maintain its financial commitment. Only three groups were funded, plus a co-ordinating unit and an evaluation. There was no critical mass, in a sense no programme.

Secondly, there were few products for ready use, partly because basic research is a slow process, partly because most researchers prefer high powered machines, mainly American, while the schools have low-powered machines, almost exclusively British, as a result of Government policy. Whose task is it to do the conversion job? Answer - nobody's. Researchers are reluctant, they want to go on with their research. After all, their careers are determined by research success, not by implementation activities. And the Council's remit is research, not dissemination.

I'll say no more about the research context in Britain, but as we leave that context and move to development, we find that the kind of collective ambivalence that characterises the research community's attitude to development is writ large across the range of school-oriented action, to which I now turn.

My Government has also spent a great deal of money, especially during the last twelve years, promoting computer-based learning in schools. Like its investment in higher education, this has also not been evaluated. Unlike that investment, it is not at all clear why they are doing this or what the Government hopes to accomplish by it.

In part the obscurity arises because three different Ministries have been involved in separately financing this promotion - the Department of Education (which last year resolved its own ambivalence by changing its title to the Department for Education), the Department of Trade and Industry, and the Department of Employment. Although the Cabinet Office reassures us that the days of inter-Departmental rivalry are over and a new era of cross-Departmental teamwork ushered in, what evidence we can muster in the absence of evaluation suggests that CBL in schools has been, and continues to be disputed Government territory, with implicated Ministries pursuing separate, and in some aspects, mutually destructive agendas. It doesn't help that two of these departments, the Department of Trade and Industry and the Department of Employment, have provided schools with hardware and software without any particular educational end in view, so that we are left to infer their intentions from their Departmental responsibilities, and that the third, the Department for Education, has largely left unstated the educational rationale that presumably underpinned its various investments throughout the eighties.

The only thing that is clear is that the Government thinks CBL is an essential component of the curriculum. In fact it has now been made mandatory for all teachers and all pupils. But

no government, least of all mine, will continue for ever to subsidise its provision, and CBL is still a long way from solving its problems of widespread implementation in an educationally defensible form. A combination of blind faith and insulation from scrutiny - the most striking characteristics of the hectic activity in this field that we have witnessed over these twelve years, is surely not the best way to tackle the problems that have to be overcome before the future of CBL is entrusted to market forces. We need a continuing comprehensive overview of a still highly fragmented constituency in order to construct in a cumulative way an integrative theory of action.

This is a task for independent evaluation - of policies, of programmes and of activities on the ground, taking all interests into impartial account. Evaluation has not to date been high on the agenda of CBL enthusiasts at any level. Much has been claimed, little assessed and even less achieved in our classrooms. Protected by its popularity - kids like it, parents value it, aspiring politicians wear it like a lapel badge, CBL has for the most part escaped a number of hard questions. It is time to ask them now, while the field is still fluid. If CBL is inevitable in our school systems, then we must learn from our experience in order to shape its future.

Changing Rhetoric and Changing Times

Seen as an educational movement, computer based learning doesn't appear to make sense. Perhaps that's why it doesn't make progress, in terms of its impact on schooling. Broadly speaking, it is a thirty year old movement, largely confined to the USA for the first decade. It began there as an electronic page turner in an attempt to revive a dead idea, programmed learning, and an unpopular psychology, behaviourism, which confined its development to rigidly controlled instructional forms. But the educational culture of the time was progressive, favouring active, social and collaborative learning. And America was a dominant world power with a buoyant economy, so that even if traditional CAI had been able to prove its labour saving claims, which it didn't, it was running against the grain of curriculum development. It was a movement without educational credentials.

By the end of the decade the concept of the learner as captive of the computer was challenged by the concept of the learner as controller, and throughout the seventies and into the eighties the voices and the imagery of people like Seymour Papert became more dominant in the discourse about computer based educational futures. Computer power was to be placed within the command of the pupil. In this scenario the teacher as PLATO gives way to the learner as Einstein, pondering, and I quote, "the simple rules that govern life and the universe." (Bonello-Kubath & Kubath, 1988)

Here we have a transformational projection beyond the wildest dreams of the progressive movement. Let me quote again, "The goal is also to engender an appreciation of meta-level intellectual activities which increasingly include assigning appropriate information processing tasks to machines while getting on with the higher level human thinking." (McLean, 1982) Now, there are many more modest expressions of these heady aspirations, but what they all have in common is a learning environment that is radically different from the computer managed classrooms of the CAI pioneers and, what is more to the point, radically opposed to contemporary trends in schooling. In this hypothesised environment traditional teaching has no place, the teacher is a facilitator and orchestrator of a multiple modality, diverse set of learning activities, the social dimension of learning is restored through computer-mediated collaborative forms of work, children learn how to think rather than what to think and develop their own learning styles.

These are good liberal ideas. Take out the technology, and they have a lot in common with the aspirations underlying many of the curriculum developments of the sixties in my country, or with the progressive movement in post-war USA. But once again the computer-based learning community, having transformed itself and acquired impeccable credentials, is running against the tide. Because the tide has turned. Those countries which for twenty years invested heavily in professionally led curriculum development have now abandoned that enterprise and its values, in favour of a centrally controlled production model of schooling on traditional lines. So the new, revamped CBL makes no more sense now than the old did in its time.

On the contrary, the prospects for American-style CAI have never been better. In Britain we have a government of the radical right which has been in power for thirteen years and has only recently been re-elected for another five years. During that time it has taken a decentralised, power-sharing system of schooling and transformed it into a centralised system under political control. Let me mention just some of its features. We have a national curriculum specified in terms of content and goals for each subject at each stage, and a national assessment system of attainment tests to monitor both individual and collective progress. These tests also function as a form of comparative accountability for individual teachers and schools, now under the lay control of governors with budgetary autonomy. Experimentation in the classroom, or what we used to call curriculum development, requires the specific permission of the Minister of Education himself. All this is couched in terms of equality of opportunity and entitlement and the need to raise standards of course, but what appears to be emerging is a highly stratified system of schools, teachers and learners, powered by the values of possessive individualism and negative interdependence, i.e. a competitive, not a collaborative learning environment.

That's what we have, and it is awfully difficult to see in that context how the kind of learning environment for CBL I described earlier can be attained. The Minister of Education, at a Conservative Party conference last month, made the Government's priorities crystal clear when he called for "back to the basics" and "traditional" teaching. And he can do it. As we all know, attainment tests can and do control not just the content but also pedagogy of provision, and when they are used, as our Government intends, as a measure of teacher performance and therefore of teacher competence, then what we can expect is a high level of standardisation in the educational process and a level of educational ambition restricted to what these tests can reliably and validly measure.

These are precisely the conditions in which traditional CAI can thrive. It is stable, standardised, universal and measurable, and therefore commercially viable. And don't think that CAI has disappeared from American schools or been superseded by more sophisticated and intelligent tutorial systems. Not in market terms it hasn't. From its early days in the sixties its marketing strategy was based on a combination of forecasts of rising labour costs in the public school system of the USA, falling costs of computer hardware, federal commitment to subsidising remedial programmes for disadvantaged children, and a continuing emphasis on basic skills of literacy and numeracy.

Now, almost thirty years on, that commercial strategy is coming good, both in domestic and export terms. Admittedly federal subsidy has declined sharply, but the other assumptions were well-founded. In most respects the educational legacy of Reagan/Thatcher economics has been remarkably similar. In the USA, following the publication of A Nation at Risk in 1983, which talked of "unilateral educational disarmament" and of a "cafeteria-style curriculum", State after State moved quickly to take more direct control of their school systems, to specify syllabi, to introduce or extend criterion-referenced assessment, to emphasise basic skills and transmission teaching, especially for low-achieving children. And some people are even talking up the idea of a national curriculum to raise standards across the USA, thus guaranteeing an educational 'entitlement' to every child.

As in Britain this egalitarian rhetoric has been heard in some very elitist quarters, and has been supported by political groups which should know better. Nothing is better calculated to reassert and rationalise cultural group dominance than the imposition of an academic curriculum and an instructional pedagogy on all children. It is only too easy to see the attractions of such systems in countries which, like Britain and the USA, have polarised their societies and, in the context of bankrupt economic policies, seek political salvation in protecting the "haves" and controlling the "have nots".

What does this mean for the future of computer-based learning in schools? According to a recent review of computer-based learning in the USA (Scott, T. et al. 1992), by 1985 some 400,000 public school pupils, the great majority of them from inner city, culturally disadvantaged populations, were doing drill and practice CBL on a daily basis, with more sophisticated CBL confined to wealthy schools. A two tier system of CBL then, for a two tier society? The commercial corporations who are busy selling CBL in the USA in the form of integrated learning packages don't see it that way. The only market they can see is the inner city market and the only product they are pushing is the low level, low cost, teacher free, teacher proof drill and practice in the basic skills package. It dovetails neatly into the new emphasis on performance monitoring, with the computer's capacity to maintain records of achievement for both individuals and groups.

So is that the future for CBL, in our own inner cities on this side of the Atlantic? Does it make any sense at all to talk, as some contemporary advocates do, of children "becoming their own epistemologists" (Bonello-Kubath & Kubath, op.cit.), of computer based networking "catalysing critical analysis by students of societal issues that may pose a challenge to the status quo"? (Cummins & Sayers, 1990) Even if there was a market, which there isn't, even if there was a profit to be made from that market, which there isn't, even if any of us had governments which would back such ideas, which we don't, how is such a transformation of schooling to be brought about?

CBL and Innovation Theory

Here the literature of CBL is seriously deficient, both in its attention to this issue and in its response to it. Sometimes it seems to be assumed that CBL can realise its intended effects, on individuals, pairs, or groups, independent of what else is going on in the classrooms, either before or after, or contemporaneously. Sometimes, and a great deal of hope rests on this proposition, it is argued that CBL is a powerful agent of change, capable of compelling a reconstruction of the learning environment, i.e. the catalytic power of CBL, the Trojan horse theory of transformation. And sometimes, much more so in recent years with growing recognition of the social nature of effective learning, teacher education is seen to be the key.

The point is that these are all discredited beliefs. You wouldn't think, reading the CBL literature, that we have thirty or forty years of experience, bitter experience of the most part, of curriculum innovations intended to achieve the kind of transformation that CBL enthusiasts dream of. We began by thinking it would be easy, a matter of rewriting the textbooks or of producing and disseminating curriculum packages, went on from that simplistic view to a new slogan, "No curriculum

development without teacher development", and from that to the realisation that institutional change was a necessary precondition of teachers being able to change. By this time the very notion of single innovations having the power to change learning environments had been discarded, the illusion that they could only be sustained by the temporary infusion of additional resources and rewards. The institution was the catalyst, not the innovation, neutralising and assimilating every intervention that constituted a threat to its arrangements, values and habits. And schools themselves were, as Ernest House pointed out in his classic evaluation of the politics of innovation, 'frozen' institutions, locked in the social order of the institutional structure of social management and control. (House, 1974)

This massive failure, in terms of its objectives, of a professionally led movement to modernise schooling and improve its quality, made it easy, both in the USA and in Britain, for governments to step in and take control of schooling in the ways I have summarised, to marginalise the infrastructure professionals, or the 'educational establishment' as our Prime Minister calls us, and to put into reverse the professionalisation of teachers, replacing that concept with something closer to a workbench view of teaching.

But my main point at this juncture is how insulated the CBL community seems to be from this body of experience and strategic thinking about educational change, from matters that preoccupy other groups concerned with school improvement. Of course, CBL is different from other educational innovations, even technological ones like radio and television, whose advocates also promised a revolution, but which have settled for a modest place in the classroom. It's an evolving innovation, constantly changing its form, its capabilities and therefore its educational possibilities. It is dominated by technology push and by computer specific interests, compulsively chasing an ever constant horizon. The lumpen, recalcitrant, slow moving mass of the real world of schooling can be seen as an irritating distraction. Some of the names given to contemporary software programmes invite such comment. Take Shopping on Mars, or The Alternative Reality Kit, for example. Why bother with the real world when you can invent your own?

But we are here to discuss IT in education, and we are invited to take seriously the claim that CBL is an educational movement, that is to say a movement intent upon changing educational practice by, in its own terms, emancipating and empowering learners. Where, when and how are questions that are put to other innovations - why not to CBL? And that raises a big question. As the gap grows between the educational imagination of the inventors and the ideological and economic feasibility of their scenarios (rising software costs having

replaced hardware costs as the main financial disincentive) why do governments continue to invest in it?

At this point I want to switch my focus away from the USA, which I have used mainly to illustrate the directions which the commercial dynamic is taking, and focus on the case I know best - England. Now I know that there are many different countries represented at this Conference, all at historically different points of engagement with the development of CBL, as they are with respect to overhaul of school systems and curricula. For some, perhaps even most, CBL is something new in educational settings, a genuine untried innovation, for which they are still seeking government support. Do not despair. If England is anything to go by, you'll get it, and keep it no matter what happens.

In my country, CBL is the long distance runner of post-war curriculum development. It could even be called the sole survivor, with a record of twenty years of continuous Government backing. In that time a hundred other ideas for improving the quality of educational practice have come and gone - taken the money, had a go, and left little trace. None of them achieved the promised transformation, though some were influential for a while, and some founded traditions, in action research, in teacher education and in school development, which embodied the learning curve of which I have spoken, and which were beginning to flourish before the juggernaut of political control rolled over them.

CBL in Britain, on the other hand, has had more public and private money (including voluntary parental contributions) invested in it than any other innovations, some £200 million pounds in the past twenty years, nearly all of it in the last decade. And still it goes on, despite the successive failure of successive investments. There is little to show in terms of educational impact. There isn't much on any scale, and most of what there is would blush for shame in the light of even a benevolent educational critique. CBL is truly the phoenix of educational innovation.

Now, some of the reasons for this apparently indestructible faith in the future of CBL are obvious, and they are the reasons why I suggest that those of you who don't have government backing will get it.

The Industrial Rationale

We live in an increasingly computer-dependent world, a process that is already irreversible whether we look at industry, commerce, war or social management and services, whether we look West or East, North or South, at the developed, developing or third world economies. It is also an increasingly competitive world of economic interdependence, in which, for Western nations at least, the command of computer power is seen

to be an essential precondition of competitive success in wealth creation. Computerware and computer-based products are therefore both an industry and a market in themselves as well as a means of enhancing the quality and lowering the costs of other goods and services.

Back in the sixties, European anxieties about the threat posed to our science-based industrial future by growing American domination of data-processing and communication technology rumbled intermittently in the corridors of political power, some arguing for a European response, others for national initiatives because of the urgency of the situation. It was seen to be a task for government, and a comprehensive one, much influenced by a speech of Hubert Humphrey, then Vice-President of the USA, in a speech in Paris in 1967, when he said, "If technological advance occurs more rapidly in the United States than elsewhere the reason must be sought in educational, organisational and economic factors."

In 1969 there was a call for action from a British Parliamentary Committee, and in 1973 the first major Government initiative in CBL was launched, an initiative which in its structure embodied, for the first time, an explicit link between economic development and educational development.

But more of that later. The issue is, it's all very well to say there is a link between education and the economy, but what is it? Some people doubt if there is one. Certainly international comparisons of national investment levels in education bear no systematic relationship to economic prosperity. This doesn't stop people from all over the West trooping over to Japan, looking in their schools for explanations of the Japanese miracle. What they find is rote learning and the encouragement, by parents and teachers, of a degree of competitive intensity between pupils that mocks any notion of schooling as a civilising process. The parallel trends in the USA and Britain are moderate by comparison.

But all Western governments feel more and more compelled to intervene in the educational systems they provide - not just to control costs and win votes, although failing economies invariably scapegoat schooling, but to assert a view of the relationship between education and the economy. This always involves a projection of labour market needs, an increasingly hazardous exercise in the context of global economics.

Twenty years ago, about the time when the term 'computer literacy' was coined and advocated as an essential addition to the traditional view of basic skills, the general view was that the advanced industrial nations needed a large, highly skilled workforce to man the technology-based and technologised workplaces of the future. That view has since become more complicated by a number of factors - the main ones being the unexpectedly fast and fierce growth of competitiveness in that

marketplace of the developing world with its low unit costs, draining away investment in the West by the mobile internationals, and the increasing capacity of computer-based applications to deskill some occupations and eliminate others.

For the free marketeers who have ruled Britain for the past thirteen years, the response has been to privatise public utilities and publicly owned industries, leaving them free to pursue profitability without regard to social considerations, and to urge automation of labour-intensive skilled occupations. The cost of these policies is a growing problem of social management - of rising levels of unemployment, rising levels of crime, rising levels of discontent among the underemployed, and political turbulence and instability. It is not just a British problem - there are now some sixteen million unemployed in the European Community, three of them in Britain.

The point is that the kind of economic and technological determinism that powered the rhetoric of government intervention in the sixties and seventies drew its confidence from an industrial projection predicated on high tech skills and full employment. That projection has not been fulfilled, and has been replaced by a scenario of labour-saving capitalisation of a scaled-down manufacturing base with a very limited requirement for high-tech, high fliers, a larger requirement of low paid, minimally skilled minders, and a permanent pool of work seekers surplus to requirements. In these circumstances we are entitled to ask "what now is the rationale of government support for CBL in schools, given so little evidence of its educational effectiveness?" In the absence of a satisfactory answer, we may be tempted to conclude that it has little to do with education, and everything to do with providing a hidden subsidy to the IT industry and with using schools as a lever to persuade industrialists to invest in technology. This still leaves us with the question of what the Government wants from CBL. Although successive governments in the UK have so far backed the professionals' opposition to drill and practice CAI, this still remains the most common form of CBL in our classrooms, and it's not difficult to imagine that a cost-conscious government with a 'back to basics' war cry, having established through curriculum control the conditions in which high volume, low cost technology can flourish, will at some point be tempted in that direction. But leaving that option on one side, we can still pose the question. If it is no longer computer literacy for all, what is it? Computer deference, computer loyalty? Better education, or anything goes acclimatisation?

As we shall see, it's a rather confused picture, not least because of the uncertainties surrounding the future of the IT industry itself in the British economy to which I will now briefly turn.

Notwithstanding the political demand for comprehensive government action in 1969 to galvanise IT development, the computer industry continued to languish throughout the seventies and by 1983 was in a mess - fragmented, small in world terms, with a rapidly growing trade deficit, unable to finance its own research and development needs. This was two years after the Japanese launched their fifth generation computing programme.

The Government responded with a five year, £350 million pound initiative, in advanced information technology, designed to improve the competitive position of the IT industry. It was a collaboration between government, industry and academia, with £70 million going to the universities, who were becoming adept at sustaining their computer interests by varying their proposals to suit the priorities and requirements of a changing pattern of sponsorship, in this case the Ministry of Trade and Industry, the Ministry of Defence and the Science and Engineering Research Council. This was pre-competitive Rand D, a concept which rationalises costs and risk among competitors to establish a shared technology base before they separate to compete in the market.

It was assumed that the programme would be followed by a second and even a third phase, in the hope that it would establish a structural change in the organisation of IT R & D on the basis of which the national industry could flourish.

In the event these hopes were dashed and there was no continuation into the nineties. The main strategic goal was not achieved. The industry continued to decline, market shares dropped, some industries passed into foreign ownership. I won't go into the reasons, as given by the programme evaluators, but it's difficult not to agree with them that too much too soon was expected of the initiative, especially in the context of a general decline in the economy. The Government continues to look for cost-effective ways of marshalling the necessary resources for industrial resurgence in IT, as indeed does the European Community, but continues to be restricted by the political disease of short-termism, and the lack of will to invest in sufficient scale to match the problem. Both these problems have also afflicted educational investment, as we shall see.

There are two points I want to make about this initiative. The first is that it was independently evaluated and the evaluation published, hardly surprising perhaps in a country that has insisted, for some years now, that all venture capital programmes be submitted to external scrutiny, but a scrutiny, which is notable for its absence in the area of CBL educational investment. The second is that, although I have mentioned both the strategic and the structural goals of the initiative, these were at no stage of the initiative clearly set out - they were in fact reconstructed by the evaluators through a process of

sifting and synthesising the documentation. Well, that seems to fit the old saying - "If you don't know where you're going, any road will do." Little wonder that many of the participants cried, "foul" when the initiative was pronounced a failure.

That is the background, political, educational and economic, against which most of the educational initiatives I will describe has been played out. Keep it in mind as we go on from here.

The Development of Computer-based Learning in England

In 1973 the Government launched the first of a series of initiatives in CBL, called the National Development Programme in Computer Assisted Learning, with development in Higher Education its major focus. I was responsible for the educational evaluation of that Programme. This was followed, at the beginning of the eighties, with a second major initiative, this time confined to the schools, and concerned to promote and exploit the micro-processor revolution. There was no evaluation. By the second half of the eighties, there were a number of initiatives in the field, emanating from three different Ministries, variously concerned with programme development, infrastructure, hardware supply, software subsidy, teacher education and support. But again, no independent evaluation, or virtually none.

The main facts are that in the eighties the government invested some £180 million in the development of CBL in the school system, and that at the end of it CBL was made mandatory for all schools, all teachers, all children as part of the national curriculum.

The first thing to say about that is that it is an astonishing outcome. Nothing that we know about the current state and status of CBL in the schools remotely suggests that it is ready for the kind of freezing process entailed in the production model of schooling, and nothing that we know about the state and status of CBL's in the curriculum resources market remotely suggests that it can be safely left to claim its share of individual school budgets.

In 1988 we were asked by one government ministry to do a quick 'state of the nation' report on CBL in schools and to make recommendations. Let me read you some extracts from that Report to underline these points.

"Primary schools, by virtue of their organisation and freedom from exam pressures, lend themselves to good educational deployment of computers - group collaboration and cross-curricular work. Although good practice has been slow to emerge, the last two years have seen a breakthrough, on the part of some teachers in some schools, to experimental and

innovatory practice that constitutes a departure from drill and practice, instructional routines.... It remains true, however, that even the few computers available (and it is still few despite the increase) are far from being fully utilised."

"The situation in the secondary schools is considerably worse, despite the greater number of computers available to teachers. Initially devoted to support examination courses in Computer and Business Studies, they were, and to some extent still are, confined to a few teachers and students. The notion of cross-curricular application is still, for the most part, just dawning on teachers, and computer enthusiasts are having a hard time promoting across the school use."

"In both sectors more equipment is needed, and existing equipment needs replacing and updating. Teacher training, both in-service and pre-service, is also a prime requirement. Children are well-disposed towards computers, teachers less so, either because they feel incompetent, or because the available facilities are inadequate, or because they are not convinced of the educational potential."

"In 1988 it is clear that a beachhead in the schools has been established, but no more. The basic need, for more and better machinery, remains a priority that can only be met from central funding. The need for more and better educational practice is just as critical. One will not take us much further without the other. Both require central support." (MacDonald et al, 1988)

This picture of CBL in schools has since been confirmed by other surveys and estimates, including one which said that the schools needed another 150,000 machines simply to meet the ratios required by the National Curriculum.

Many CBL enthusiasts have hailed the incorporation into the mandatory curriculum as the breakthrough they've been hoping for, the coercive element ensuring that it is taken seriously and spreads rapidly through teacher training and curriculum practice. That is perfectly true, but the enthusiasm is surely misplaced. Taken at its face value, that is to say treated like any other curriculum requirement - no subsidies, no more than its fair share of the paltry £30 million the Government has made available for the implementation of the national curriculum, it would in my view constitute an abandonment of CBL to a predictable fate - poor practice, almost instant obsolescence and widespread teacher disillusion and cynicism.

Surely the Government doesn't mean it. If it does, then the story of what happened in the eighties has less import. But I don't believe it for one moment. It doesn't make sense in terms of the Government's continuing commitment to an IT future. Of course, on the other hand, I don't believe that the Government's intentions with respect to CBL support are based

on a realistic calculation of the costs of institutionalising and sustaining CBL. Even ballpark figures for such an enterprise are rare, hardly surprising when one American (Lickleder, 1984) was bold enough to estimate the cost of a ten-year programme to provide and support an electronic desk for every American pupil at \$130 billion. Some support will, however, be provided.

If that view is correct, then CBL will continue to be treated as an exceptional case calling for ad hoc investment by government, and that makes the experience of the past twenty years significant in terms of the lessons it has to offer about how best that commitment can effectively be discharged.

Let us look first at the lessons from the seventies that should have, and perhaps did provide a basis for investment in the eighties, and I am referring here to the previously mentioned National Development Programme in CAL, a five year initiative that a team, under my direction, evaluated.

The Case of the National Programme as a Model Initiative

The launching of the Programme, together with its organisation and strategy marked a significant departure on the part of Government, at that time a Conservative Government, with Mrs Thatcher as Minister of Education, from the established machinery and style that had for ten years dominated the curriculum development mission. Till then curriculum development had been largely left to professional control, to the so-called educational establishment, through ad hoc agencies such as, in the case of schools, the Schools Council and to a lesser and more specialised extent the National Council for Educational Technology. Now it could be said that the Programme, which encompassed further and higher education as well as schools, and industrial and military training, was too broad in its scope to be suitably allocated to any of these agencies. Much more influential than that, however, was the fact that the Government was fed up with the failure of these agencies to achieve widespread take up of their projects, which it attributed to a culture of soft-nosed persuasion and respect for teacher choice.

Perhaps even more influential was the adoption by Government of a new role for its own civil servants in government departments, the role of actively securing departmental objectives. Managerialism had come to Whitehall, and its first embodiment was the Programme. Instead of farming out the two and a half million pound programme to the established agencies, the Government set up a task force under the management of an ad hoc committee of civil servants from the seven contributing ministries, all with a direct or indirect interest either in education or the computer industry, under the chairmanship of the Ministry of Education.

The Programme marked the beginning of hands-on control by Government, of collaboration between Ministries, and of a hard-nosed approach influenced by systems theory and management by objectives. The Committee appointed a small professional Directorate, commissioned two evaluations (the other one was financial) and invited bids for funds. Funding took the form of matched funding, by which applicants had to put up the equivalent resource commitment to that which they sought, and stepped funding, putting continuity at risk by making it dependent upon satisfactory progress at the end of each tranche. Whether or not progress was satisfactory was a matter for Committee to decide on the basis of reports by the Programme Director and the evaluators. That was basically the new model. Thirty-five projects were funded, and the Committee met five or six times a year to consider their progress.

In our final report to the Committee, we commented at length on the programme as a model for future government investment, since the continuation of an active government role in CBT looked essential, and in particular on its value as an instrument of public learning.

We began by conceding that at first sight the Programme appeared to be a well designed instrument. It stimulated and supported a range of computer applications in many areas of already visible development, it enabled the exploration of alternative pedagogies, it involved increasing numbers of teachers and students in these activities. Through its diverse evaluative mechanisms the Programme generated an enormous yield of information about its investments and created channels through which this information flowed regularly from the coal faces of experience to the learning centre of the organisation where it could be sifted and stored. Since this centre had direct links into the executive agencies of Government, as well as into the independent research bureaucracies, the Programme seemed to be well designed not only to fulfil its own needs for ongoing informed control but also to generate specialised expertise to guide government action in the future.

But close analysis suggested otherwise. We made a number of points.

A task force, by definition, has a terminal date, in this case the end of 1977. What happens to its expertise? The key figures to look at in this respect were those which concerned the dissipation of those whose full-time involvement in the Programme gave them opportunities to acquire expertise, i.e. the project development staff and the Directorate. At the end only one in five of the development staff had any prospect of continuity in their institutions, and the Directorate packed their bags and departed the educational field. No doubt this dissipation was of some help to IT industry and commerce, but the point is it was no longer available to the Government.

This leads us to consider the learning capital accumulated by the permanent civil servants on the Programme Committee, a resource surely to be stored and reemployed to shape the future. There are several points to be made here. These were general administrators, not experts in the field. What is more the little time available at meetings, plus the need to get through a crowded agenda, meant they had limited opportunity to engage in more than cursory discussions of particular projects and almost no time to assimilate and distil the overall experience as it unfolded. In consequence there was a de facto delegation of responsibility for judgement to the full-time Directorate, the real centre of Programme learning with direct and continuous access to the projects and to the independent evaluation teams. But, and it is a big but, the civil servants remained accountable to their political masters for the success of a programme over which they exercised no more than boundary control. They were de facto compelled to place their trust in the Director. This placed them in a very vulnerable position - hypersensitive to criticism, resistant to self-examination, and almost invariably hostile to the policy and management aspects of the evaluation we tried to implement.

There is a further point. Even if we concede that the civil servants acquired a valuable stock of learning, that learning was itself certain to be dissipated because civil servants in the British government are moved frequently, both within departments and across ministries.

Our view, in summary, was that the Government's preference for a non-institutional and essentially ephemeral structure had paid a high price in terms of the retention of expertise for future use. By not entrusting the responsibility to the obvious candidate - The National Council for Educational Technology, which was confined to a purely administrative role with respect to the Programme, it meant that the central UK agency for educational technology had been denied an opportunity to acquire the depth of experience that might have institutionalised the management expertise which such initiatives call for.

We concluded this analysis by saying that innovation structures like the Programme, each time they are created to meet a particular need, may have to re-invent the learning wheel.

That evaluation report was neither published nor disseminated by the Government. We submitted it to the Ministry of Education for circulation, but I discovered much later that it was not even disseminated to the members of the Programme Committee. We were ourselves free to publish, but we could not persuade a commercial publisher to take it on, and did not have the means ourselves to give it effective circulation (it was, and remains, almost four hundred pages long).

At this point, I had better say something about the evaluation of the Programme, since it may have had something to do with the subsequent disappearance of evaluation from subsequent initiatives.

Back in the early sixties, the model of evaluation then prevalent was associated with behavioural objectives. You took any educational innovation, turned its aims into learning objectives, and employed evaluators as measurers of intended outcomes. In the course of the sixties, this model came in for a lot of criticism. It was not informative enough, not helpful enough with explanations of shortfall so there was a big movement, of which I was part, away from the measurement of outcomes towards more descriptive/interpretive studies that concentrated on depicting the circumstances, processes and difficulties of innovation, offering a better understanding of the problems of introducing new practices. Naturalistic forms of enquiry evolved in this context.

This alternative movement in evaluation was making a lot of headway and by the seventies had become the dominant approach in England to the evaluation of educational activities.

Coming up to the Programme, I myself had added to this approach a more explicitly political dimension, seeing evaluation as a form of democratic accountability for public expenditure in education, with this accountability by no means confined to the success or otherwise of the Programme implementation, but extended to include management and policymaking responsibilities. The Programme was the first real test of the viability and resilience of this approach. Conflict, at least between the Committee and our evaluation, was inevitable.

They wanted hard, simple, quantifiable measures of success and failure. This is perfectly understandable - with the shift to policy concerns and centralised decision-making, we found ourselves dealing with decision-makers with neither the time nor the patience to deal with complex information, nor with the contradictions or ambivalence that tend to characterise particular cases of educational action.

This kind of evaluation tends also to pose another difficulty. When as an evaluator you look very closely at what educators are doing, and you are able to take full account of the constraints under which they operate, you may well conclude that those activities need changing if they are to become effective, but you are also likely to vindicate the actions of those responsible as being intelligent people working with integrity on difficult problems. The implication is usually that these people need more help with the problem and this is not a conclusion that universally finds favour with those whose priority may be to cut out wasteful activity, and to include the people involved with the waste. For this purpose an aims/achievement model of evaluation affords far more freedom,

since it will inevitably reveal failure without explanation, making it much easier to blame the performers rather than the providers of the service.

I shall try to summarise the long battle with Programme Committee in the form of a proposition/counter proposition that encapsulates the main points of the dispute.

1. They wanted an aims/achievement model of evaluation. The funded projects were required to state their objectives before they got any money. They wanted an evaluation focus on whether those objectives were achieved.

We said no - that was unfair. None of the projects would achieve all their objectives - so they would all fail on that criterion. We would portray their efforts to achieve those objectives so that the Committee could judge whether they were engaged in worthwhile activities, given their constraints and opportunities.

2. They wanted us to make recommendations about which projects should be supported, which terminated.

We said no - it was their task and responsibility to make such judgements, not ours. They would have to read the evaluation reports, and make up their minds. We are just brokers of information - go-betweens linking people and institutions who want to trade knowledge of each other.

3. They wanted us to add to the written reports - to tell them things about the projects we could not put in the reports.

We said no - no secret reporting. Our reports were all negotiated with the people whose work we commented on, and not given to the Committee until those people agreed they were accurate, relevant and fair. We would not add to them.

4. They said the reports were too long and too complex for a busy Committee to deal with. Could we not summarise them?

We said they were as short as we could make them and still negotiate them with the people whose work was being evaluated. We serve the judgement, not the judge.

5. They said - but we cannot handle all this complexity - are you saying we should not be making these decisions?

We said - that is for you to say, and for others who read the evaluation report on the work of this Committee.

6. They said - what do you mean, the evaluation of this Committee? We don't want you to evaluate us, only the projects.

We said - we're afraid we must - it would not be fair only to gather information about the projects. They want to know about how you do your work, whether you reached your objectives, whether you are doing a good job.

7. They said - who do you think you are? We are paying you to do as we say.

We said - we are your democratic independent evaluators. Simply because you pay for the evaluation does not mean that you have any special claim on its services, or exemption from its focus. You cannot buy an evaluation, you can only sponsor one. Anyone has a right to raise questions and issues for inclusion on the agenda of the evaluation, and no-one has the right to ask for information without being prepared to give it.

This conflict began with our very first report and continued to our last. In the first report we have been concerned with policy, and raised the issue of the relationship between the educational programme and the IT industry. Besides objecting to our interest (they thought it was none of our business) they totally rejected the idea that there was any relationship, despite the fact that the Ministries of Trade and Industry were represented on the Committee; and that they consistently argued for the support of British only computers.

CBL in Schools - The Eighties Initiatives

Let us move on to the eighties now, and to Government initiatives focussed on CBL in schools. I can't cover all of them, and none in any detail. But what we are looking for is evidence of the development of the Government's approach to supporting CBL. What lessons were learnt, what was changed, what continued from the legacy of the seventies. I'll try to summarise the main points.

1. The NDPCAL model was not repeated.
2. External evaluation was dropped.
3. The Ministries concerned went their own ways, pursuing their own interests, more in competition than collaboration. In particular the Departments of Education and of Trade and Industry pursued parallel interventions, but in an uncoordinated way, which caused serious problems at time because of their unplanned and uncoordinated interaction. For instance, the main Education initiative - the Microelectronics Programme (MEP) was forced prematurely to take into account the main Trade and Industry initiative, to make British machines available to schools on a matched funding basis. This put immense pressure on MEP, which had a brief to build an infrastructure of support for CBL throughout the country and to train teachers and to produce software for the whole range of curriculum subjects, to do all three at the same time because the schools were (relatively) flooded with machines.
4. MEP was given only three years for this massive task anyway, although it was belatedly extended for another two. The result was a failed attempt at the 'cascade' model of teacher training, and the sponsorship of software production at

high speed to meet the immediate need. It was, if you like, a social Darwinian approach to software production, with quantity not quality the criterion - what a critic called the "Let a thousand weeds bloom" approach. (Self, J. 1987)

5. MEP was set up in a non-institutionalised form, being located in a semi-detached house in a northern city, with a small Directorate. But it didn't have a Programme Committee, instead an Advisory Committee on which the three principal agencies of support for CBL development were represented. However, MEP was not allowed to devolve a share of its responsibilities to these agencies. Control and direction was retained by the Ministry in London.

6. As a result, MEP was entangled and strangled by its controlling bureaucracy, unable to learn and respond to its emerging and significantly underestimated workload without long delays in obtaining permission from London, and subject to uninformed interference.

Here are some quotes from a suppressed report by the Director of MEP, that indicate some of his frustration.

" - planning and much of the development work was far too rushed."

" - there was an expectation of results and attitude changes in far too short a time, and this pressurised people."

" - no innovatory programme with such a remit should start with less than five full years after all appointments have been taken up."

" - the staff should be trusted or not appointed. Lack of trust results in interference and counter-productive frustration."

" - innovation requires its own skills, and these are usually not understood by bureaucracy."

And here is a longer comment.

"During the five and a half years of the Programme, there were two Secretaries of State to whom it was responsible. More direct links were made to Parliamentary Under Secretaries of State, and MEP reported to three. During the last nine months, the Programme was linked to a Minister of State. At the officer level, the Programme was responsible to three different Under Secretaries, and these were supported by two Assistant Secretaries and three Principals. The longest contact was with one Principal who was responsible for four and a quarter years. Because of the short length of time that the Programme was linked to other people, it was very difficult to establish any depth of understanding and appreciation of its purpose. Thus

MEP was very dependent on the views of the one Principal referred to above for its political image within the Department. It is no criticism of this individual, who was generally supportive and helpful, to suggest that this was not the most satisfactory arrangement, particularly when the Department was so closely involved in agreeing the Programme's activities."

We can see clearly from this account, which would of course be disputed by the Ministry, that MEP was significantly different from NDPCAL in terms of the distribution of power and control. If the Director is to be believed, here we have the worst of all possible worlds - professional entrepreneurs under distant, underinformed but authoritarian control of the accountable civil servants.

MEP finished in 1986, its work, I am told (and here we are in the realm of personal testimony and rumour) rubbished by the Ministry, its Director's recommendation for continuity of the experienced central staff team ignored. I've also been told that the Director, in a fury of frustration and anger, shredded the entire files of five years' work. Bad news for historians, of course, and worse in the absence of any evaluation

MEP, the pump-priming initiative, was followed by MESU, the Microelectronics Support Unit, which was supposed to exploit and take further the fruits of MEP. But there was a gap of a year before a Director for MESU was appointed and, given the shredding, a rather difficult task of continuity. But in any case, again according to personal testimony, MESU was instructed by the Ministry to start again and do everything differently.

MESU began life in 1987 and continued to 1989. It, like MEP, began life in yet another city, and its own premises, though with a much larger staff. Its planning too was encumbered by other government initiatives as well as bureaucratic decision-making. Within a year it was amalgamated with the National Council for Educational Technology, based in London, a quasi-independent professional agency, but in reality totally under Ministry of Education control. This control was made explicit at around this time by the appointment to Chief Executive of the Council of a civil servant from the Ministry. Soon after, both the central teams of MEP and MESU, including the Directors, had packed their bags and gone.

Public Learning and Political Control - Concluding Comments

The account that I have sketched of government initiatives in the eighties is neither sufficiently comprehensive (there were many different initiatives, each seeking to plug a gap) nor sufficiently detailed to do justice to a period of intense activity in the promotion of CBL in schools. It is also a highly contestable account, not in any sense authorised by or

negotiated with anyone. In the absence of evaluation, no impartial account is available. Nevertheless, even this bare and contentious outline allows us to address issues that are central to the conduct of policy. One advantage of the task force of civil servants set up to manage the National Programme in the seventies was that it could escape the cumbersome and slow processes of authorisation that are characteristic of executive bureaucracies. This advantage was sacrificed in the eighties in favour of the restoration of ministry control, which trapped the entrepreneurial professionals in a web of spirit-sapping delays and widened the gap in knowledge and understanding between those in day-to-day contact with the realities of practitioner needs and priorities and those who controlled them. The Director of MEP, for instance, with a budget of £9 million, could not buy an item costing more than £50 without authorisation. The de facto power of the professional director of the National Programme, to which we referred in our analysis, was not repeated in the subsequent initiatives. The result, given the combination of short time scales and ludicrously underestimated tasks, was productivity without quality control.

We had also, in our critique, pointed to the high cost of temporary structures in terms of the dissipation of expertise and of learning from experience, but the initiatives of the eighties reinforced rather than countered this argument. The Government continued to bypass the established agencies of professional support and to ditch experienced personnel, whilst at the same time failing to provide from its own ranks the stability of responsibility over time that would have mitigated the severity of this loss. As vehicles of public learning, these initiatives were meagre in their yield. This would matter less if the experience of these initiatives did not make it clear that the Government is far from finding a form of successful synthesis between political accountability and professional expertise.

From this perspective it is difficult to see the eighties as other than a period of decline in the conduct of policy. I have attributed this to a failure of learning, but we can't leave out of account other factors - the increasing determination of Government to undermine professional influence on the development of education, the continuing uncertainty of purpose at the heart of the CBL enterprise, and the demands of the Treasury for ever tighter control of ministerial expenditure. But there is a more fundamental problem that arises from the shift from professional to civil servant responsibility for the management of change. For politicians, to whom these civil servants are accountable, the admission of error is highly problematic. Opponents will call for their resignation should they be foolish enough to confess that their initiatives have been seriously flawed. The civil servant managers of these initiatives know this well, and are reluctant to be the bringers of bad tidings to their ministers.

Programmes must appear to succeed even when they clearly have failed. These requirements severely restrict the possibilities of public learning when administrators are thrust into the front line as managers. Professionals, on the other hand (and I include academics in this broad category) recognise that the detection of error is essential to the construction of expertise and the advancement of knowledge. For them progress is a learning curve. Little wonder, in view of this phenomenon, that independent evaluation, which has a specific responsibility for contributing to and preserving what is learned from experience, are not in demand in a context-CBL, where the Government has assumed direct responsibility for a major area of educational investment.

But this really won't do, and I think the widespread complicity of CBL activists in this insulation from external scrutiny is something they will come to regret as the real world closes round their interests and aspirations. The CBL field has a poor record in evaluation, with almost all the efforts in evaluation devoted to a highly restricted set of questions concerned with comparative efficiency of simple instructional systems. It has an even poorer record in constructing appropriate forms of assessment for its claimed learning outcomes, leaving itself wide open to the crudities of contemporary attainment tests. Although I have emphasised in this presentation those issues which call for programme and policy evaluation, I perhaps need to remind you that it is the task of evaluation also to map the impact of CBL on learners as a basis for the construction of assessment. One of the widely conceded virtues of the evaluation, which I led, of the National Programme in the seventies was that, by studying the educational activities of the range of supported projects, we were able to infer their educational rationales and to construct paradigms of the various learning and teaching theories implicit in their practice. We also began, but to a more limited extent, to develop idiographic approaches to the analysis of student engagement with the computer, attempting to shift the approach to assessment from the achievement of prespecified outcomes to the post-hoc justification of the educational experiences provided.

We saw these products of the evaluation as a resource for further research and development, as well as for future evaluations, and there is some evidence that at least some research groups found them useful. But the Government continued throughout the eighties to leave research out of the policy equation, concentrating its resources on development. The irony is that its major investment in the eighties, the Micros in Schools Programme, proceeded without an educational rationale. It didn't have time to construct one, and it never heard about ours.

One final point. CBL is the best example one could find of an educational innovation that straddles a highly

compartmentalised, territorialed set of implicated interests. The problem is how these interests can be brought together in the most effectively synchronised way in order to shape its future. One of the advantages of evaluation is that it can cross territorial boundaries to an extent that is either impractical or unacceptable for those who live and work within its boxes. CBL is a case that calls for external evaluation. It can also tell the people what's going on. Not before time.

Postscript

In my country the Universities Funding Council has just launched its latest computer initiative - a three year £15 million programme in CBL undergraduate teaching. It's principal aim is to reduce the level of required staffing by the construction of common core, multi-site computer-based programmes, Sound familiar? Oh, and by the way, there's no independent evaluation.

References

- Bonello-Kubath, T. & Kubath, F. (1988) 'Motion in Mindspace' in Lewis, R. & Tagg, E.D. (eds.) Informatics and Education, Amsterdam, Elsevier Science Publishers B.V.
- Cummins, J. & Sayers, D. (1990) 'Education 2001: Learning networks and educational reform' in Computers in Schools 7 (1/2)
- House, E.R. (1974) The Politics of Educational Innovation, San Francisco, McCutchan Publishing Corporation
- Licklider, J.C.R. (1984) 'Information technology, education and the American future' in Peterson, D. (ed.) Intelligent Schoolhouse: Readings on Computers and Learning, Reston
- MacDonald, B. et al (1988) DTI Micros in Schools Support, Norwich, CARE, University of East Anglia
- McLean, R.S. (1982) 'The Microcomputer has a role in Human Evolution' in Lewis, R & Tagg, E.D. (eds.) Involving Micros in Education, North Holland Publishing Company
- Scott, T., Cole, M. & Engel, M. (1992) 'Computers and Education: A Cultural Constructivist Perspective' in Review of Research in Education, 18
- Self, J. (1987) 'The Institutionalisation of Mediocrity and the Influence of Outsiders' in Scanlon, E, & O'Shea, T. (eds.) Educational Computing, Wiley and Sons.

November, 1992