MANAGEMENT OF INNOVATION IN SCHOOL TECHNOLOGY

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ABSTRACT

MANAGING INNOVATION IN SCHOOL TECHNOLOGY

This thesis documents and evaluates two associated topics of action research in the form of case studies in school technology. Its emphasis is on the role of strategic planning in the management of innovation within this increasingly important area of the English school curriculum.

The research was carried out during a period in which British industrial innovation, and its effective management, was seen to be crucial to the nation's economic well being in the face of international competition. Growing acceptance of the importance of technology in general schooling, evidenced by its inclusion in the national curriculum embodied in the 1988 Education Reform Act, is set against the interlinked cultural, epistemological and professional barriers to its acceptance as high status activity within schools. It is argued that considerable energy expenditure is required before the intentions of the Reform Act become reality, and that innovation will need to be effectively managed. The study is therefore set against a review of the literature of innovation management in three spheres: curriculum development; the diffusion of innovations; and industrial management.

The first case study examines the implementation of an innovatory interpretation of the school subject Craft, Design and Technology (CDT) within the City of Manchester Education Authority. It tests the feasibility of developing a 'concept base' approach to CDT by teachers collaborating and being supported by the authority's inspector for CDT. It concludes that the innovation in a simple form is feasible, given

that certain conditions and levels of resourcing can be met, but that in a more elaborate form, the innovation is severely problematic. The turbulence and rapid change being experienced within schools in the late nineteen eighties increases the severity of these problems.

The second case study describes a project carried out in the North West of England in which various local education authorities and institutions of higher education collaborated to reduce perceived severe qualitative and quantitative shortages of CDT teachers. Five project aims were tested within the research and it is concluded that under certain conditions they are achievable, but that collaboration between institutions with different goals and customs is difficult, and that the quality of management information available to CDT staffing decision makers in the region was insufficiently accurate or sophisticated for effective innovation to proceed.

In conclusion, certain generalisations are made relating to the effective management of innovation in school technology. These include: the inevitability of transactional distortion of objectives in the journey from intention to outcome; the need to formulate and understand objectives and defend them from this drift, albeit in flexible ways; the need for incentives and central control in such collaborative endeavours; and finally the need for simple and effective communications within innovations.

PREFACE

This thesis presents the work of the author as a part-time post-graduate student of the University of Salford from July 1985 to August 1988. Except where stated, the contents of the thesis are substantially the author's own and as far as is known this thesis, or one essentially like it, is not being submitted to any other university.

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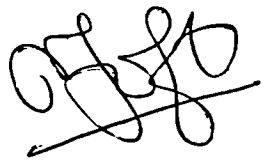

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SECTION ONE: BACKGROUND TO THE MANAGEMENT OF INNOVATION IN SCHOOL TECHNOLOGY

INTRODUCTION : THE PURPOSE OF THIS STUDY

As the research which is described in the present study was being conducted, the education system in England and Wales was experiencing radical changes of direction and perturbations within its flow. A fundamental tenet underscoring these changes - namely that during the compulsory years from 5 to 16 standards needed to be raised and objectives re-oriented - can be traced back at least to the 'Ruskin' speech of Prime Minister Callaghan in 1976[1]. The changes are, at the time of writing, being enshrined by parliament in an education bill[2]. One of the intentions behind this bill is to establish a national curriculum for the compulsory years: it is proposed that this curriculum will give all pupils in the state sector significant entitlement to technology for approximately 10% of their studies.

School technology has evolved rapidly since the watershed Schools Council research and development projects of the late nineteen sixties and early nineteen seventies - 'Project Technology' and the 'Design and Craft Project'[3]. However, before Technology can take its place as an effectively taught mainstream subject for all pupils within the national curriculum, it is the writer's belief that a widespread range and depth of innovation must be brought about to shape its evolution and implementation.

It is also the writer's belief that such innovation will be considerably easier to effect if two conditions are met, namely that:

(1) innovators work within coherent strategic plans, whilst being prepared to seize unforeseen opportunities or respond positively to any unwanted consequences of their plans; and

(2) that the field of school technology is traditionally lacking in skilled manpower and resources despite recent significant injections, and innovations will therefore be most effectively and economically realised when professionals collaborate with and between establishments.

These beliefs are not in themselves hypotheses. However, this thesis reports on research carried out by the writer to test two separate but related hypotheses, both of which derived from the beliefs expressed above. They are:

1. That a concept-base approach to Craft Design and Technology (CDT) education can be developed and implemented by teachers collaborating, and being aided by the local education authority (LEA) CDT inspector, within the course of their professional duties, whilst insights are revealed, through systematic study, into the detailed forces impinging upon this innovation in the Manchester LEA.

2. That the five aims(*) of the CDT Support Through Change Project can be strategically implemented through managed collaboration between specified agencies whilst insights are revealed, through systematic study, into the forces impinging upon CDT teacher supply in the North West of England.

* These aims are enumerated on pages 286 and 287.

Sections two and three of the present study embody case studies which document pieces of action research conducted by the writer to test these hypotheses. Section two focuses on the Concept Base CDT Project in the City of Manchester Local Education Authority, and section three focuses on the CDT Support Through Change Project in the North West of England: both were directed by the writer. Prior to these sections, the context in which school technology currently evolves is examined, and literature relating to educational research methods and management of innovation strategies is reviewed. Section four draws conclusions from the three preceeding sections to highlight elements of potentially useful management strategies for future innovations in this area. It also identifies some linked sectors in which further research would be of use to practitioners.

REFERENCES

1. Callaghan, James, Autumn 1976, Speech on education, given at Ruskin College, Oxford, reported in Holt, M, 1980, 'Schools and Curriculum Change', London: McGraw-Hill Book Company (UK) Ltd, page 7.

2. House of Commons, 1988, Education Reform Bill, London: HMSO.

3. Dodd, T, 1978, 'Design and Technology in the School Curriculum', London: Hodder and Stoughton.

CHAPTER 1: SCHOOL TECHNOLOGY IN CONTEXT

1.1 SUMMARY

This chapter represents an attempt to shed light on the various interrelated forces which impinge upon the evolution of school technology. Its main arguments can be summarised as follows. Our culture is complex and multi-faceted, and is strongly flavoured by its advanced industrial base. For its children to be educated to be able to cope effectively as adults, they have need, amongst other needs, for an induction into technology at school. The recent Education for Capability movement underscores this argument, and is advancing side by side with school technology, and with one of its more specific subject manifestations, Craft Design and Technology.

This advance, however, is checked by various forces in the system. Late nineteenth century English religious evangelism, the pursuit by the English upper classes of the gentleman ideal, and the relatively high priority historically given to finance and banking in this country, linger as powerful cultural forces to render manufacturing a low status occupation. A concomitant low status is also ascribed to school technology. Similarly, although it is possible to reconcile the 'inside' and 'outside' views of knowledge by accepting that knowledge is objective but not absolute, there is, arguably, a clear imbalance in the education system towards propositional knowledge and against practical knowledge and capability. Although this imbalance is changing, it still represents a brake on the progress of school technology. And finally, even within a professional context featuring increasing central government control and requirements for higher standards and the quantification of achievement, it is evident that teachers as individuals and groups can bring about and block change in the system, often in the midst of serious conflict.

1.2 ASPECTS OF THE ENGLISH EDUCATION SYSTEM

During the last century, English education has grown into a complex system of intentions, actions and outcomes. A large body of theory has been amassed and for Warnock[1] "there is almost no aspect of education, whether at school or university, which is not open to question". Education, nevertheless, has a clear central purpose, which this complexity can easily obscure.

Children have innate capacities, for example to breathe, and variable potentials to learn more complex behaviour, such as driving a car or writing a scientific paper. This learning is not an isolated process: it occurs within a culture, defined by Tyler[2] as "that complex whole which includes knowledge, belief, art, morals, law, custom and other capabilities acquired by man as a member of society". The relationship between a culture and its members is more dynamic than this, however. Parsons[3] described culture as "on the one hand the product of, on the other hand a determinant of, systems of social interaction". Children learn about their culture by being part of it; being part of their culture enables them to acquire language and behaviour as tools which will shape their individual development. In some cases, children will mature and learn to shape their culture.

Taken together, two forms of learning coalesce in the central purpose of education, which is taken in this study to be the initiation of students into their culture. This initiation embodies, in ratios which vary with the culture, social learning for cultural continuity and individual learning for personal growth.

However, modern pluralistic societies require a flexible view of culture, one which recognises sub-groups. Twentieth century English culture is exceedingly complex. One of its major constituents is what Baynes[4] called the 'material culture' which before the industrial revolution formed an all-embracing ambience in which people lived: a structure for existence. People were inducted into this material culture by direct contact with building, artefact construction and the craftsmen of the time, informally, almost by seepage. In a relatively static world, this form of induction was adequate. After the industrial revolution, however, when technology became much more complex and dynamic, formal schooling evolved to initiate pupils into their culture. Baynes argued that schooling failed to offer a technological induction and that consequently the 'educated' person today has a relatively poor appreciation of materials, aesthetics and technology.

Clearly, our 'material culture' depends on a range of increasingly sophisticated technologies. A simple assumption is made: if education is to initiate students into their culture, and if our culture is partly material and underpinned by technology, then education must expose students to technology. Furthermore, an education system which inadequately inducts its students into contemporary technology can be legitimately classed as dysfunctional. In being so, it fails, as Mattick has argued[5], to produce truly effective individuals. This study is therefore concerned with the purpose of school technology (intentions), how it is transacted in schools (actions), and the extent to which intentions are realised (outcomes).

Like any other school subject, technology is part of a complex whole, and is heavily influenced, if not determined, by several interacting contexts. These need to be analysed if the scope of school technology is to be understood, but one significant rider must be acknowledged. Physical systems can be studied scientifically and knowledge about them can be ascertained by observation, experiment and the use of logic to draw conclusions within the framework of a hypothesis. However, education is a social system. Schon[6] has advanced six reasons to explain why there are fundamental problems in coming to know about social systems: (1) the data is extremely complex; (2) there are differing definitions of problems; (3) there are varying reporting systems; (4) considerable time is needed to gather information; (5) some data rapidly becomes obsolete; (6) conclusions are perspectives on situations rather than solid empirically founded statements. The problem of coming to know things about social systems essentially derives from the differing values of the different participants: this creates an inherent ambiguity, an overload of information and a "Rashoman effect, in which different and incompatible perspectives on the situation"[7] are generated. Schon proposed two major responses to the problem: (1) systems analysis, and (2) existentialism, a relativist philosophy in which phenomena are taken entirely as experienced. Both recognise information overload, instability and the unpredictable dynamics of social change. In this study, school technology will be assumed to function within three contextual sub-systems: the cultural, the epistemological, and the professional. Before turning to these, however, it is necessary to clarify the term 'School Technology'.

1.3 EDUCATION FOR CAPABILITY AND SCHOOL TECHNOLOGY

In 1978[8] a group of private individuals drafted a manifesto entitled 'Education For Capability'. The manifesto, reproduced in Appendix 1, was subsequently signed by many eminent figures and taken under the wing of the Royal Society of Arts. The manifesto was thus transformed into an influential national campaign, orchestrated to push the education system away from a perceived overemphasis on comprehension, or acquiring and recording knowledge, and cultivation, or appreciating our cultural values. It rested on the assumption that the "great majority of learners - whether pupils at school, students at universities, polytechnics or colleges, or adults still wanting to learn - are destined for a productive life of practical action. They are going to do things, design things, make things, organise things, for the most part in co-operation with other people"[9]. Accordingly, the campaign aimed to augment education's twin goals of comprehension and cultivation with four others: competence, in the practice of skills and use of knowledge; coping with problems; creativity; and co-operation.

Education For Capability has since penetrated the English education system at a number of levels; for example, the recently introduced General Certificate of Secondary Education is designed "to ensure proper discrimination so that candidates across the ability range are given opportunities to demonstrate their knowledge, abilities and achievements - that is, to show what they know, understand and can do"*[10] although the precise meaning of can do is problematic. More recently, this aim has been extended to the primary and secondary levels of the proposed national curriculum, in which it is intended that attainment targets will be set, at least in Mathematics, English and Science, to "establish what children

* my emphasis

should normally be expected to know, understand and be able to do* at around the ages of 7, 11, 14 and 16.."[11]. Similarly, the Technical and Vocational Education Initiative pilot scheme, intended to link 14-18 education programmes more closely to the world of industry and technology, and to develop pupil capability 'to do' (see above), is currently being extended nationally[12]. And at higher education level, at least one university - Salford - has education for capability as a primary institutional aim[13].

School Technology manifests itself in various ways within this broadly advancing campaign for capability. Confusion is evident at all levels in the education system, however, from classroom to Her Majesty's Inspectorate[14], as various programmes are advocated, including technology across the curriculum, technology as a discrete subject and technology subsumed in such subjects as Craft, Design and Technology (CDT) and Science. This confusion is understandable given that the aims of English education are not defined, and indeed, as shown in section 1.4.1, the very concept of knowledge as a definable entity is problematic. Black and Harrison[15] defined technology as "the practical method which has enabled us to raise ourselves above the animals and to create not only our habitats, our food supply, our comfort and our means of health, travel and communication, but also our arts - painting, sculpture, music and literature. These are the results of human capability for action ... technology is thus an essential part of human culture because it is concerned with the achievement of a wide range of human purposes". They also cited a previous definition of technology as "a disciplined process using resources of materials, energy and natural phenomena to achieve human purposes". However, they recognised that much technological

* my emphasis

education in schools drew almost exclusively on civil, electrical and mechanical engineering sources, whilst areas such as "Fibres, Clothing, Food Production and Processing, Nutrition, Biotechnology, Environmental Control, Medicine, Traffic, Urban Design and the whole of the Chemical Industry, to name but a few, are largely ignored"[16]. They argued that technology needs to draw upon the resources of a number of school subjects, and with the exception of a minority of schools with unusually able teachers, no one secondary school department has the capacity to deliver a broad technology curriculum on its own.

In fact, various subjects, for example, Craft, Design and Technology (CDT), do currently contribute in various ways to a broad technological education. The purpose of CDT, with which this study is primarily concerned, has recently been defined by H. M. Inspectorate as "to enable pupils to be inventive in designing practical solutions to problems and so bring about change and improvements in existing situations. In CDT, ideas are conceived, developed, modified and given shape in artefacts through which the original ideas can then be evaluated"[17].

CDT has only recently been concerned with the broad processes and content of modern design and technology. It originated in a form of handicraft teaching which reflected not just the pre-vocational philosophy of the late nineteenth century 'Manual Trainers', slightly influenced by the folk-oriented Scandinavian Slloyd School[18], but also the values of the British 'Arts and Crafts Movement'. This movement, deeply influenced by such anti-industrial figures as Pugin, Ruskin and, in particular, William Morris, gained ground in the late nineteenth century, partly as a

backlash against the visual squalor of contemporary industrial design, and partly in reflection of a utopian romantic nostalgia for the rural and hand-production values which were felt to characterise medieval times[19]. Until very recently, at Shoreditch Training College and Loughborough College, the two main teacher training institutions for handicraft, Arts and Crafts values were highly esteemed. At Loughborough, Edward Barnsley, as a consultant, provided a direct link with the Cotswold 'Utopian Craftsmen' until the late nineteen-sixties. As the majority of teacher training lecturers in handicraft elsewhere had themselves trained at Loughborough or Shoreditch, these values were wide-spread[20]. In a very profound sense, it is arguable that the romantic anti-industrial culture of the Arts and Crafts movement permeated the educational philosophy underscoring handicraft, and indeed still lingers as an influential, if invisible, influence on CDT.

The Education Reform Bill of 1988 makes provision for the definition of the subjects which are intended to comprise the national curriculum. At the time of writing, working parties are working, or about to start working, under Department of Education and Science direction. Science and Technology are to be closely linked, although their precise nature is still far from clear.

Commenting on the claims to ownership of technology by the science and CDT teaching bodies, Eggleston highlighted the lack of communication between teachers of these respective subjects and the possibility of an emerging schism with "high status technology taught by scientists in their laboratories, and low status practical technology taught by CDT teachers in their workshops"[21]. The avoidance of such a schism represented, for Eggleston, a

crucial management objective for schools in the near future. Yet this schism already existed and, for example, the take-over of Engineering Science at GCE Advanced Level by physicists within an examination board has been unequivocally documented by Carter et al[22].

1.4 THE CULTURAL CONTEXT OF SCHOOL TECHNOLOGY

School technology, in its various forms, and despite its internal inconsistencies, is developing in tandem with the Education for Capability campaign. The capabilities it promotes - controlling and changing our surroundings to meet our needs - are systematised and amplified in industry, particularly manufacturing industry.

Industrial systems have evolved differently in different regions and countries. The natures of the cultures in which industrial systems have evolved clearly influence this spacial differentiation. In England, during the eighteenth century, the acceleration of industrial growth was fuelled, according to Derry and Williams[23], by: the craft skills of Hugenot refugees; the strength of puritan capitalism; freedom from invasion; free trade within the island; the impulse to develop labour-saving devices to compensate for the country's population sparsity; good water transport; an abundance of coal; and a banking system able to invest capital in local, national and international enterprises.

Barnett portrayed the English ruling class which presided over this eighteenth century growth as hard, aggressive and acquisitive, forging foreign policy to expand markets and acquire new resources, colonies, naval bases and profit. "Between 1689 and 1815, in the

face of formidable rivals and despite the loss of America, England grew from a second-rank nation on the periphery of the continent into a great power whose wealth, stability and liberty were the envy of Europe"[24]. Military domination after the defeat of France in 1815 enabled British industry to grow unchallenged for thirty years, within a forcefully expansionist imperial culture. At the 1851 Great Exhibition "Britain succeeded in its unavowed aim of outclassing the work of thirteen European countries, thirteen American countries, and seven others participating apart from the colonies"[25].

Lacking international competition, and assured of colonial markets by military strength, British industry had little incentive to sharpen its efficiency. By the 1870's, its international lead was being eroded by Germany and the USA. Both Wiener[26] and Barnett[27] link this failure to compete to another factor - the cultural characteristics of the ruling landed gentry which changed sharply during the nineteenth century. Three major cultural forces were at play.

Firstly, during the early nineteenth century, a surge of religious evangelism swept the nation. It was channelled through the family, the non-conformist sect, and later the public school. It came to influence not only personal life, but social and international relations as well, as assertive British pragmatism gave way to doctrinaire principle and humanitarian concern. Protective trade barriers were shed and hard strategic thinking was softened by the application of morals to the affairs of state. In Barnett's view, this did not occur amongst Britain's industrial competitors.

Secondly, the eighteenth century gentry, which had previously grown immensely powerful just after the Civil War, had increased its power by harnessing new technology to estate agriculture. This key social group thus developed an all-embracing hegemony which proved irresistable to rural industrialists seeking social advancement. According to Beuret[28], they adopted "the culture and trappings of the traditional English upper-middle class elite, by buying country estates, sending their sons to public school, and often neglecting the industry which had been the source of their wealth; for industry or 'trade' was seen as dirty, demeaning and beneath the dignity of a 'gentleman'". Thus the Darbys retreated from iron, the Arkwrights, Fieldens, Reels and Strutts from cotton, and the Whitbreads from brewing[29]. Some of the children of this rising class were educated at the gentry-dominated public schools where manufacturing, science and technology were excluded in preference for a classical religious curriculum and the cultivation of the gentleman ideal. This ideal enshrined a system of values which Wiener[30] argued was antipathetic to industrial enterprise: the propensity was for rural living, leisure, enjoyment, style and political service. As a result, many talented members of the gentry did not enter manufacturing industry, or specialise in contemporary technology. The twentieth century grammar schools compounded this tendency[31] by educating students for professional and clerical jobs rather than for manufacturing. Conversely, those who ran industry were largely self-taught and spawned, according to Wiener, a 'cult of the practical man' which disdained formal training in engineering and management. The twin cults of the 'educated amateur' and the 'practical man' "strengthened resistance to science-based innovation ... [and] ... theoretically grounded

knowledge"[32]. The status of the educated amateur and his predilection for science rather than engineering, clearly reflected the high social class from which he emerged. For example, according to Heywood[33]: the "Royal Society clearly has the highest status among the engineering, medical and scientific learned and professional institutions, but it would not regard itself as a professional institution ... Scientists do not need to think of themselves as professionals and are clearly distinguished from the technicians in the field. Engineers need to think of themselves as professionals in order to separate themselves from the technicians and mechanics who call themselves engineers. Physicists do not need to call themselves chartered physicists whereas to secure this separation, engineers seek to call themselves chartered engineers".

Thus the profound influence of the English social class structure can be seen: Musgrove[34] argued that English society is still pervasively influenced by its once all-embracing binary structure, with the gentry-aristocracy on one side of the divide and the rest of society on the other. For Musgrove, the gentry hegemony which bound this social fabric together still deeply but covertly influences our social institutions, including education.

Thirdly, the expanding British empire reinforced London's position as a world financial centre. Gordon and Lawton[35] have argued that the depression of the 1870's and 1880's "intensified the tendency for British capital to be invested abroad, especially in the Empire, rather than in our home industries. England became the world financial centre for banking, insurance and commerce and the manpower need was predominantly for clerks rather than technologists".

These three cultural forces deeply influenced the way members of our culture came to think about industry and technological education. Wiener has shown that of "all industrial sectors, production was, in the twentieth century, the worst paid, and the least likely to lead to high management positions"[36], in stark contrast to the situation in Germany, Japan and Sweden. It is within this anti-industrial cultural context that the development of school technology has to be examined. Cultural contexts, however, are not timeless immutable forces; they are human constructs and, as such, are subject to the kind of change which happened in nineteenth century Britain. Present political drives towards an 'enterprise culture' may herald such a change.

1.5 THE EPISTEMOLOGICAL CONTEXT OF SCHOOL TECHNOLOGY

1.5.1 Philosophical Foundations of Knowledge

The 1987 Department of Education and Science 'Consultative Document: The National Curriculum 5-16'[37], identified the subjects which are intended to constitute the prescribed future curriculum in the upper secondary school phase: English; Mathematics; Combined Sciences; Technology; Modern Foreign Language; History/Geography; Art/Music/Drama/Design; and Physical Education. The document's clear and simple grouping of subjects rests, however, upon certain assumptions about the nature of knowledge which need to be closely scrutinised.

The very concept of human knowledge is complex, problematic and open to different interpretations. A realist view[38] assumes that: (a) a physical universe exists independently of our perception; (b) we can know aspects of this universe fairly

clearly through sense-experience; and (c) our sense-impressions are caused by objects in the universe. This common sense view, espoused as it is by the 'man in the street', has been variously challenged, however. For example, some philosophers argue that there is no certain guarantee that we perceive the world as it really is, and that our perception is determined by the nature of our sense organs. An opposing view - idealism - assumes that physical objects are no more than families of sense-experiences and that all existence resides in human consciousness. Musgrove has argued that, at its extremes, this latter view slides dangerously into solipsism[39].

These polarised stances, and stances in between, have been variously debated throughout the evolution of western philosophy[40]. It is not appropriate here to become entangled in their technical complexity, yet strands of each conflicting philosophy regularly penetrate, implicitly and explicitly, arguments about the contents of the school curriculum. In particular, realism often underpins an extreme absolutist notion that certain disciplines are the indubitable constituents of a liberal education; idealism, conversely, frequently underpins the extreme relativist position which rejects the disciplines as reflections of reality, and holds that they are merely social constructions of reality, and are consequently not the necessary foundation stones of the curriculum.

It is possible to reconcile these two views. In doing so, Hospers argued that there clearly are objects in the universe, each of which has certain properties. Some objects have properties in common and, by virtue of this, can be grouped.

This similarity is independent of our minds and our "classification of properties is a joint work of nature and ourselves: it rests upon the facts of nature, on what properties things have and how much similarity there is among things in the world that we classify under the same concept; but it also rests upon our interests, on whether we choose to group certain similarities together and, if we do, on where we choose to erect the boundary between one property and another (such as between blue and green). The similarities exist in nature, but what we do with them in erecting a conceptual structure is up to us"[41].

1.5.2 Conceptual Structures and The School Curriculum

The polarisation between idealism and realism is generic to a number of other related polarisations. Functionalist approaches to sociology, which Cohen[42] showed serve to take the status quo for granted, contrast with phenomenological approaches wherein sociologists question the status quo. Similarly, classical evaluation, using an agricultural-botanical research model which depends on quantifiable results contrasts, according to Holt[43], with an illuminative, anthropological research model which is concerned with description and interpretation rather than quantifiable measurement. Understandably, Eggleston[44] noted the extreme complexity of curriculum studies, trapped as it is within these contrasting ways of conceptualisation. In order to understand them, and their underlying ideologies, he used his own conceptualisation, in which a 'received perspective' contrasts with a 'reflexive perspective', both of which can be reconciled within his 'restructuring perspective'. This reconciliation of sociological stances corresponds closely to Hospers' philosophical reconciliation described above.

From the 'received' vantage point, schools preserve the established order by dispensing given disciplines of knowledge. This is buttressed philosophically and psychologically, and two of the most coherent justifications have been advanced by Hirst and Bruner, whom, as Heywood has noted[45], both rest their case on the common "idea (with its origins in Plato) that there are common structures of knowledge in the mind of the learner which can be drawn out."

The philosopher Hirst[46] has argued that a liberal education should derive from a number of differentiated cognitive systems, disciplines, or 'forms of knowledge'. He suggested: scientific; mathematical; religious; moral; historical; sociological; and aesthetic. Each 'form of knowledge', being a complex and separate way of understanding human experience, is: publicly definable; open to learning; embodied in its own language and conceptual structure; and based on expressions which are testable against experience using specialised ways of conducting such tests. Other 'fields of knowledge', such as geography or engineering, are interdisciplinary and defined by their subject content rather than any logical structure. For Hirst, the fundamental purpose of education is the development of the mind's capacity to progressively enter the forms and fields of knowledge.

Bruner's[47] independently erected psychological case projects the disciplines as cultural roots of the individual's thinking. In this view, education is a process of progressively initiating students into the disciplines in order to extend their innate and potential capacities. Man's use of mind depends on, and is amplified by, the disciplines, and for learning to be effective,

it should follow the structural framework of each discipline.

The common belief of writers within this perspective, according to Eggleston, "is that there are established and knowable structures of knowledge that exist independently of teachers .. that these patterns may be discovered, clarified and comprehended, and that adherence to them is either necessary or at least highly desirable if curriculum is to be meaningful and learning experiences successful"[48].

Within a contrasting reflexive school of thought, certain modern sociologists have asserted that the curriculum, far from resting on absolute epistemological ground, is nothing more than a construction of teachers. Manheim paved the way by showing that "mental structures are inevitably differently formed in different historical and social settings"[49]. Our differing backgrounds thus give rise to perceptions which vary between groups; each group comes to accept a necessarily limited view of reality, and with the exception of mathematical and certain scientifically derived knowledge, individuals form different interpretations of reality. Heywood[50] described the process of learning as a system by which the brain, being deluged by information, sifts and classifies so that the individual can make sense of his surroundings. Various psychologists have proposed that in the mind are schema, which are "active organisations of past reactions or of past experiences which must always be supposed to be operating in any well adapted response"[51]. These schema enable us to process information in our own individual ways, but they also limit our vision as individuals impose their own mental frameworks onto incoming data. Phenomenologists study how

individuals perceive reality within social contexts, and how they respond to these perceptions. Knowledge and truth, in this sense, are not absolute and external to the individual; they are relative and internal. The work of Berger and Luckman, according to Eggleston[52], suggests that our perception of reality in all social systems is an artefact and, as such, can be redefined and changed. Clearly, the individual's knowledge is influenced by (a) his own particular mental frame of reference and (b) the social setting in which he operates.

This reflexive perspective was addressed to education in a seminal work edited by Young[53], from which Lawton[54] isolated five key propositions. These are: (a) education is organised to preserve the status quo in society; (b) the way knowledge is stratified in schools is problematic; (c) barriers between subjects are arbitrary, simply erected for administrative convenience; (d) all knowledge is socially constructed; (e) rationality itself is merely a convention.

The reflexive perspective penetrates the school curriculum in many ways, for example: negotiating the content of courses with disaffected pupils; devising programmes of active learning for inner-city pupils, as Midwinter advocated[55], which are firmly rooted within their neighbourhood and localised experiences; and as Illich[56] and Reimer[57] have preached, abolishing formal compulsory schooling altogether because it allegedly alienates and corrupts.

The hard absolutism of the extreme received perspective is clearly vulnerable. It fails to account for derivations from

given patterns of knowledge and in Esland's words, it "ignores the intentionality and expressivity of human action, and the entire complex process of intersubjective negotiation of meanings .... it disguises as given a world which has to be continually interpreted"[58].

Conversely, the soft relativism of the extreme reflexive perspective is philosophically vulnerable because it fails to recognise similarities in individuals' perceptions of reality. Warnock[59] argued that the "body of knowledge which the teacher is hired to share with his pupils is, in fact, a body of agreed facts, interpretations of facts, explanations of facts, law-like statements and reductions to order of otherwise chaotic material".

In this sense, knowledge is objective, but it is not absolute: it is always provisional and subject to revision and contradiction. In Eggleston's restructuring perspective, the school curriculum rests on two pillars: the consciousness of those who participate, especially the teachers; and the objective realities of knowledge and the social structure.

1.5.3 Knowledge and Capability

Before leaving this topic, however, it is necessary to stress that much of the literature in each perspective focuses on the development of mind through the processing of knowledge, whether the latter is individually constructed, interpreted or accepted as given. Propositional knowledge - knowing that something is the case and understanding why - arguably forms the core of each particular interpretation. A significant omission is evident.

Bantock clarified this omission in his analysis of the cultural basis of education[60] in which he argued that an academic curriculum is a distortion of the more practical needs of the majority of the population. Archer[61] went further and attempted to explain the academic concentration of the English school curriculum in terms of historical accident: "It is a curious twist in fortunes, that when the craft guilds lost their general educational role, somewhere between the fourteenth and eighteenth centuries, it was the rather narrow specialist, bookish universities, academies and schools which had been set up to train priests to read and translate the scriptures which became the guardians of what we now call general education".

Educational theory is complicated by the conflict between such a knowledge-centred interpretation of schooling and more child- or student-centred interpretations. Dewey[62 63], one of the most widely quoted theorists in the USA and UK, reconciled this conflict within a highly comprehensive, and tested, theory. His theory can be summarised as follows:

- we are all uniquely individual but cannot become fully human without the support of our culture;

- education, in a fundamental sense, must therefore reconcile personal and social developments;

- assuming that democracy is a cultural ideal, education must enable pupils to become participatory decision-makers who can empathise with other individuals and groups, thus promoting individual growth and the health of democracy;

- growth is a central concept, and democracy provides the

cultural context for individual growth;

- schools promote this growth by enhancing the quality of pupils' experiences;

- enquiry is a sound vehicle to lead pupils into further experiences, which in turn bring about learning of knowledge, skills and attitudes;

- in particular, skills learned whilst solving problems are likely to be of future wide-ranging use, given that as a species we survive by overcoming problems and seizing opportunities which arise in our environment;

- confronting pupils with new problems forces them to draw upon more than their already acquired intellectual resources, hence they have to learn in order to solve the problem.

Dewey's pragmatic theory of knowledge was embodied in a model curriculum used in his teacher training programme at the end of the 19th century at Chicago University. His first plan of 1896[64] identified some basic survival activities of our species - the provision of food, clothing and artefacts - as core curriculum activities to be used as a springboard to raise pupils from what is of obvious relevance to their survival, towards more formal and abstract study. The activities also enabled pupils to participate in a democratic fashion. Dewey argued that this approach would eliminate the sharp boundaries between academic specialisms, enable the child to see his growing knowledge and skills base in a holistic fashion, and provide a solid concrete foundation for later specialist study.

Ironically, Eisenstein has argued that the spread of printing through Europe augmented cultural differentiation, as in certain upper social circles 'booklearning' became the "focus of daily life during childhood, adolescence and early manhood"[65], and the school became an agent of strict discipline in the shift from learning by doing to learning by reading. As political and economic power became more diffuse in the late nineteenth century "... a much distilled form of learning through words and numbers came to form the core ..."[66] of English state education.

Dewey sought to revert this distortion, at least in the early phases of learning, but the English education system, as argued above, has clearly not absorbed Dewey's ideas wholesale. Nevertheless, there are many examples evident, such as learning by discovery and activity methods in primary schools[67], project work in higher education[68], the development of school technology's focus on project work, active learning in TVEI programmes, and the Education for Capability movement itself. Proponents of experiential learning, in its various forms, seek to overcome the fundamental problem identified by Taba[69], namely that "the real problem is not so much in the limitation of human potentiality to learn as in the fact that education is governed by concepts which reduce its power or in the inadequate mobilisation of available technology and resources for stimulation of learning, including an adequate control of the conditions under which learning occurs."

"Most vital learning is experiencing of a sort. To learn to think one needs to go through certain processes of inquiring, analysing and concluding ... To learn a principle means to see

how it operates ... To learn sensitivity is to experience a feeling of identifying oneself with something ....."

"One condition for extending the scope of learning is to create situations which make possible such experiencing in the sense of an active transaction."

Clearly, if general education is to promote the growth of students within our 'material culture', a culture which draws heavily on capability of one kind or another, it can be argued that education should promote and give pupils experiences within the various capabilities as well as understanding, and indeed that teachers should use these capabilities, as Dewey proposed, as vehicles for more abstract learning. It has already been stressed that this study assumes that capability, including technological capability, should be a substantial ingredient in any modern school curriculum evolved within a restructuring perspective. Propositional knowledge is a necessary ingredient of a relevant curriculum. It is not in itself sufficient, however, and must be complemented by learning to know how to do and achieve, and learning by doing.

1.6 THE PROFESSIONAL CONTEXT OF SCHOOL TECHNOLOGY

So far, it has been argued that the development of school technology is strongly influenced, even circumscribed, by the major external contexts of our culture, and our conceptualisations of knowledge. A third context impinges more obviously on the daily operations of school technology: this professional context is a shifting network of influences centred on the practice of teaching

in the classroom. Although a quantification of such influences would not be possible in this study, for the reasons advanced by Schon[6], any serious attempt to bring about curriculum development will be unlikely to succeed unless the influences are understood and allowed for[70].

1.6.1 The Social Mood and Curriculum Control

Holt[71] noted a shift in the 1970s in the prevailing social attitudes to education, which in 1974 consumed 16% of the national budget. Spiralling costs generated by expansion in the 1960s were sharply questioned after the 1974 oil crisis, as indeed was the very effectiveness of comprehensive schools. Prime Minister Callaghan's 'Ruskin Speech' of 1976 "caught accurately the prevailing mood of the time, and the mounting interest in ways of making schools accountable for their use of scarce resources"[72].

Since the implementation of the 1944 Education Act, the balance of power in determining the structure of school curricula had swung away from central government towards the teaching profession. In the 1960s, the teacher-dominated Schools Council added considerable authority to the notion of teacher autonomy in curriculum control. Callaghan's speech, and the subsequent 1977 Green Paper[73], started to push the pendulum back towards greater government control. In July 1987, with a sizeable government majority in the legislative bodies, and nearly a full term of office ahead, the Department of Education and Science and the Welsh Office issued a consultative document proposing: (a) a national curriculum prescribing a range of compulsory subjects for the 5-16 age range; (b) greater parental choice of school,

and (c) increased management power for headteachers and governors with a concomitant decrease in local education authority power. After the consultation period, the Secretary of State for Education and Science told local education authority leaders on 21st October 1987, that an Education Bill would be introduced in the House of Commons in November 1987, containing precisely those measures outlined in the consultation document[74]. Significantly, a Mori poll conducted on 19th October 1987 for the Sunday Times suggested that 53% of adults were in favour of a nationally prescribed curriculum, whereas only 22% were opposed[75].

1.6.2 Points of Leverage on the School System

Curriculum control is multi-layered, however, despite periodic shifts in the balance of power. Lawton[76] identified four distinct but interacting levels: (a) central government guidelines; (b) local education authority implementation of central guidelines; (c) schools converting guidelines into curricula; and (d) teachers developing learning methods appropriate to their pupils. At the time of writing, it is not precisely clear how the new balance will manifest itself at these four levels, except that central government is widely regarded as seeking greater control, for example by its specification for a national curriculum. It is clear, though, that other forces impinge. Commenting on curriculum control in the USA, Kirst and Walker discussed "points of leverage" by which they meant "individuals or institutions that have the capacity to effect a substantial influence on the curriculum output of a school system"[77]. They noted the exceeding complexity of attempts to map out curriculum leverage points, and argued that it was currently impossible to quantify

the influences of various parties to show input-output interactions in any one local area. However, they identified three broad influences, each of which is pertinent to the English system.

Firstly, minimum standards are established by various testing agencies. In this country most secondary level pupils are entered for external examinations at the age of sixteen. After 1951, academically able pupils sat for General Certificate of Education (GCE) examinations, at 'Ordinary' level for sixteen year olds and at 'Advanced' and 'Special' levels for eighteen and nineteen year olds. Control was vested in a number of examination boards, most of which were affiliated to universities. After 1965, pupils whose ability lay within the approximate range between the twentieth and sixtieth percentile were eligible to be entered for the award of Certificate of Secondary Education (CSE). Examination boards were created to administer this award, and were heavily influenced by practising teachers, who had considerable power, but according to Holt[78] only "in terms of .... subject specialist and .... of choice between various subject-based curricula".

The Waddell Committee proposed in 1978 a unified examination system for sixteen year olds: the subsequent General Certificate of Secondary Education has replaced GCE (O Level) and CSE. The new examination is administered by five regional bodies, each of which has high teacher representation on subject committees, but which can only offer syllabuses to schools which have been approved by the new government appointed Secondary Examination Council. Each syllabus must be written within tightly defined

'National Criteria' or 'General Criteria'[79], issued by the Department of Education and Science.

Beyond this level, GCE Advanced level examinations continue to form the core of sixth form general education, with current moves to widen the range of subjects studied by introducing an A/S level. Here the content to be studied will be half that of a GCE A level examination, although similar intellectual demands will be made. Control is vested in the five regional boards, with some teacher representation and answerability to the Secondary Examination Council.

The Certificate of Pre-Vocational Education (CPVE) has been established as an alternative to academic subject-based sixth form courses. Students follow a holistically designed, rather than subject-based course, created locally in schools and colleges. The CPVE is administed by a new national Council for Pre-Vocational Qualifications.

The curriculum of all but the least able pupils is therefore circumscribed by examinations which are in part externally controlled. The proposed national curriculum is intended to ensure greater commonality in what students study across the country and, for example, all fourteen to sixteen year olds are likely to spend the majority of their timetable engaged in: English, Mathematics, Science, History/Geography, a Foreign Language, Technology, Creative Arts and Physical Education[80]. The government also intend that pupils will be regularly tested within a national testing system.

Kirst's and Walker's second 'point of leverage' is the range and type of teaching materials available. In England, textbooks are not centrally prescribed and schools are free, subject to finance, to purchase from a wide range of competing commercially produced textbooks, multi-media learning packs, and software. Many of the Schools Council funded projects, for example the Design and Craft Project (1967-73) also generated ranges of new teaching materials which were commercially published. There is little, if any, centrally coordinated advice to teachers in the choice of appropriate materials.

A third 'point of leverage' - external groups demanding change - is too wide-ranging, and fluid, to be discussed in depth here. There are three significant pressures, however, which are currently impinging. Firstly, the present government requires a rise in standards in schools. To this end, it has created a new teachers' contract which specifies duties and enshrines the principle of teacher appraisal. Secondly, the Manpower Services Commission has, through a series of phases, now persuaded all of the local education authorities in England and Wales to participate in its Technical and Vocational Education Initiative. This is a highly-funded but narrowly-targetted scheme intended to increase the technical and vocational orientation of the curriculum for fourteen to eighteen year olds, and it has, according to Sikes[81], been heavily criticised by teachers for its divisive influences within particular 'TVEI schools'. Thirdly, in conjunction with industry, the Department of Education and Science is attempting to establish twenty City Technology Colleges[82] for pupils in the 11-18 age range. The intention is to raise levels of motivation and achievement in

pre-vocational education within certain deprived inner-city areas, and in the long term to provide a model for local education authorities to use in modifying their comprehensive schools, along technological lines.

1.6.3 Subjects, Teachers and Curriculum Control

Writing before the current shifts in the balance of curriculum power, Eggleston[83] argued that although teachers had gained considerable control over what and how they taught, their choices were severely circumscribed by their own professional socialisation, and a sharing of values with senior school management in striving to ensure the maintenance of classroom control. Taylor's research into how teachers planned their courses clearly indicated that they rarely started with a formal list of objectives. Rather they "appear to start, understandably enough, with the context of teaching, follow this with a consideration of the kind of learning situation likely to interest and involve their pupils, and only after this consider the purposes which their teaching is to serve"[84]. Sikes, Mesor and Woods found that in secondary schools, "in some way or other, most of what teachers say about their careers relates to their subject"[85]. Also, they revealed how teachers in schools perceive a hierarchy of subject status and how this influenced the allocation of resources. Accordingly, many teachers developed deliberate strategies to enhance subject status in a tacit recognition of curriculum drift. According to Heywood[86] "while the British system finances developments in technological education, there is a general drift towards 'Oxbridge' ideas which have the highest status and this reinforces the regard which these institutions have of themselves". Subjects and their

status reflect this drift which is clearly of high significance in the daily operation of secondary schools. In section four of this chapter, received and reflexive influences on subject manifestation were reviewed. Beyond these, influence of subject status is evident, and it draws upon these two perspectives and the subject-based pressure groups which identify with them. Musgrove exhorted researchers to study "subjects both within the school and the nation at large as social systems sustained by communication networks, material endowments and ideologies. Within a school and within a wider society subjects as communities of people, competing and collaborating with one another, defining and defending their boundaries, demanding allegiance from their members and conferring a sense of identity upon them ... even innovation which appears to be essentially intellectual in character can usefully be examined as the outcome of social interaction ...." [87].

Goodson's[88] research in this sphere revealed that the academic disciplines taught in schools do not, as protagonists of the received perspective would argue, necessarily reflect or follow their university counterparts. For example, geography which is now an accepted university field, was initially planted in universities as a means of supplying teachers of geography for schools. It evolved from an early low status position by changing its methods, becoming more quantitative, scientific and geared to model-building. He concluded that subjects are evidently not unchanging embodiments of intrinsically worthwhile knowledge, but are in a constant state of flux, heavily influenced by individuals and groups who promote and present their disciplines. Goodson's specific subject-based research

findings reflect the professional reality of curriculum development in general: different perceptions surface within complex social interactions and this inevitably precipitates conflict, defence of interests, and negotiation. Shipman's [89] evaluation of a major Schools Council project showed that 'horse trading' crucially underpins the way curriculum decisions are made and how resources are allocated.

In a study of excellence in America's most effective companies, Peters and Waterman[90] identified "Autonomy and Entrepreneurship" as a major factor distinguishing effective from ineffective companies. Within this factor, they found that innovation and product success were often attributable to the energetic and almost fanatical way in which certain innovators - "product champions" - went about their work. The best companies found ways to encourage and support their product champions, even to the extent of tolerating a degree of failure. Similarly in education, subject development is often driven forwards by individuals and groups, or product champions. In fact, Musgrave, in a study of the evolution of English technical education [91] identified the intervention of prominent individuals as a constant factor pushing developments forward.

Penfold's account of the transformation of handicraft into CDT throws this factor into sharp and detailed relief[92]. In the 1960's, a number of individual teachers such as Sommerhoff at Sevenoaks School and Sneed at Ealing Grammar School developed technology courses for pupils, their spectacular success being largely due to their role as energetic product champions.

The Institution of Mechanical Engineers' report (Page Report)[93] noted that many of these product champions had turned towards technology for educational, not prevocational reasons.

Similarly, the major Schools Council Project - Project Technology - owed much to the work of Porter, the Department of Education and Science Staff Inspector for handicraft. Yet, in contrast, other prominent individuals acted in opposition. On the one hand, many influential figures in school science rejected this project because they perceived it to be too craft oriented. On the other hand, handicraft teachers were mainly sceptical of the claims being made for the role of technology in their subject. Much conflict ensued, and is still evident and, as Eggleston[21] reminded us, there is still a very real danger of technology being developed independently, and only partially in each case, by both science and CDT professional sub-groups which can only be wasteful of resources and perpetuate the divide between the academic and the practical in English schools. In this sense, the autonomy and power of sub-groups and product champions can, without adequate central co-ordination, be profoundly dysfunctional, despite the evidence which suggests that product champions play a significant role in the development of educational programmes.

1.7 CONCLUSION

The chapter has thus erected an overarching conceptualisation of the contextual sub-systems which currently influence the development of school technology. The three sub-systems discussed - cultural, epistemological, professional - are inextricably

interwoven and must be understood holistically by agents of change if their activity is to bring about changes in the system according to plan. One central factor stands out: it is essential that such change agents understand the relationship between their intentions, the eventual outcomes, and the barriers that lie in between.

In a previous study, the writer[94] identified five major barriers to the successful implementation of curriculum intention in school technology. These were: (a) the social and cultural forces at play; (b) epistemology; (c) pedagogy; (d) teacher supply; and (e) the nature of curriculum development within the social system of the school.

In a different paper[70], the writer argued that the successful penetration of technology into the school curriculum would require a sophisticated systems approach, in which developments would take place at levels ranging from central government action to classroom teaching. The present study examines in more detail some of the barriers, and attempts to clarify the action needed in certain sub-systems if technology is to develop its full educational potential. Sections two and three focus on action research case studies which highlight some of these barriers in greater depth; before turning to these, however, it is necessary to examine educational research and the management of change.

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APPENDIX 1

THE EDUCATION FOR CAPABILITY MANIFESTO

There is a serious imbalance in Britain today in the full process which is described by the words 'education' and 'training'. The idea of the 'educated person' is that of a scholarly individual who has been neither educated nor trained to exercise useful skills; who is able to understand but not to act. Young people in secondary or higher education increasingly specialise, and do so too often in ways which mean that they are taught to practice only the skills of scholarship and science. They acquire knowledge of particular subjects, but are not equipped to use knowledge in ways which are relevant to the world outside the education system.

This imbalance is harmful to individuals, to industry and to society. A well-balanced education should, of course, embrace analysis and the acquisition of knowledge. But it must also include the exercise of creative skills, the competence to undertake and complete tasks and the ability to cope with everyday life; and also doing all these things in co-operation with others.

There exists in its own right a culture which is concerned with doing, making and organising and the creative arts. This culture emphasises the day to day management of affairs, the formulation and solution of problems and the design, manufacture and marketing of goods and services.

Educators should spend more time preparing people in this way for a life outside the education system. The country would benefit significantly in economic terms from what is here described as Education for Capability.

CHAPTER 2: RESEARCH IN EDUCATION - AN OVERVIEW

2.1 SUMMARY

Educational researchers have moral and professional responsibilities to get as close to the truth as possible, given the potential importance of their findings for future generations of pupils. Truth, however, is a complex concept and it is necessary to distinguish between (a) necessary truth, ie that which is true because, logically, we do not allow it to be otherwise, and (b) contingent truth, ie that which we deem to be true after verification. Researchers largely seek to establish contingent truth, although usually only in a 'weak' sense, in which they have good reason to believe in the truth of a proposition, but no certain proof. Inductive reasoning is used to draw conclusions from situations which are not necessarily present in initial premises: this, when reliable and valid, yields contingent truth and hence new knowledge.

There are difficulties with educational research, however, which relate to social complexity and a frequent inability to isolate and control all variables. Despite this, a range of effective ways of conducting educational research have been developed: they range from the experimental approach to open-ended enquiry. Each has been attempted in education with success, and the researcher's choice of method is determined by the objectives of the research and the conditions under which it is to be carried out.

The hypotheses tested in this thesis were specific to two projects, conducted within complex social systems, and which were established to manage innovation. Action research was identified as an

appropriate research method to test these hypotheses, and is critically examined in this chapter as a basis for the research described in this thesis.

2.2 KNOWLEDGE AND TRUTH

Musgrove concluded his highly critical account of the recent sociology of education by stating that the "record of sociology in its application to the study and practice of education since the war is a sorry story. Quite apart from its tragic practical consequences, one wonders at the intellectual shoddiness of it all .... It has been a tawdry, over-hasty but curiously bombastic exercise as reviewed in this book, pretentious and arrogant, often with careless, incompetent, or non-too-scrupulous treatment of evidence either through cowardice in the face of fashion or perhaps unawareness that truth matters"[1]. Such an unequivocal condemnation may or may not be an overstatement; yet researchers into the field of education undoubtedly face an overwhelming professional and moral imperative to ensure that the knowledge they purport to discover is as close to the truth as possible. Before discussing educational research, and the selection of the methods used in this study, it is necessary to briefly examine what it means for knowledge about the education system to be true.

In section 1.5.2 of the last chapter, it was argued that we are, as a species, able to perceive objects and their properties, and that we group properties into conceptual frameworks. This classification rests jointly on the actual properties of objects, and on our interpretations of concrete phenonema. A science can be both a body of knowledge about classifications of phenomena and a method of increasing this knowledge. As activity, it subsumes

observation, description, classification, experiment and measurement, explanation, generalisation and prediction and, according to Scriven "it is continuous with pre-scientific activities directed to the same ends, and .... these, in turn, are an extension of pre-linguistic adaptive behaviour".[2]

Science as activity is thus a systematic search for truth. Philosophers, however, distinguish between two types of truth. On the one hand, necessary or a priori truths necessarily hold true on all occasions, for example "if this object is all black, it is not red". On the other hand, contingent or a posteriori truths, for example "this black object rests on my chair" just happen to be true; we can only regard them as true after verification. Much of mathematics or logic, as the philosopher Mill pointed out[3], is based on necessary truths. As disciplines, they are independent of experience: they do not owe their validity to empirical verification. They are universally true because we simply never allow them to be anything else. Empirical science, on the other hand, rests firmly on the search for contingent truth. Yet, as the philosopher Hu me pointed out, no proposition whose validity is subject to experience can be logically certain[4], which casts doubt on the actual possibility of determining absolute truth.

Science, and one of its derivatives - educational research - are therefore concerned with a search for knowledge embodied in contingent a posteriori truth. However, given that certain scientific propositions are relatively a priori[5], it is false to say that all science is concerned with the a posteriori. Nevertheless, science, being a search largely for contingent truths, is concerned with the growth of propositional knowledge, or

knowing that 'something is the case'. Hospers[6] delineated the requirements for true propositional knowledge as: (1) we must know that the proposition is true; (2) we must believe that it is true; and (3) there must be evidence to lead us to believe in its truth. How much evidence, though, is a major philosophical problem. He differentiated between 'weak' and 'strong' senses of to know: to know in the weak sense involves having good reason to believe in its truth; to know in the strong sense involves having absolutely conclusive evidence. Most skeptical philosophers have granted few, if any, propositions whose truth we could know in a strong sense. For most of the time, science is a search for the truth in its weak sense.

2.3 CONTINGENT TRUTH AND INDUCTIVE REASONING

Pre-scientific modes of acquiring knowledge included (1) acceptance of authority, (2) reliance on personal experience and (3) the use of deductive reasoning[7]. Borg and Gall have noted how the first two are insufficient means of coming to know the truth. Firstly, the uncritical "acceptance of Aristotle's pronouncements greatly retarded the growth of knowledge in the Middle Ages. Uncritical applications of Freudian concepts to elementary school education led to amazing blunders in some of the 'progressive schools' of the 1920's. Uncritical acceptance of the sales pitch of producers of multimedia learning materials by today's educators may well lead to another educational fiasco because these techniques, though promising, are often untested and are far from the level of perfection suggested by the salesmen"[8]. Secondly, personal "experience almost always constitutes insufficient evidence upon which to make decisions, even if the individual were unable to

remember and objectively evaluate that experience. We know from psychological research that the individual tends to remember evidence that supports her opinion and to forget or distort evidence that does not. Personal experience often leads the individual to draw conclusions or assume relationships that are false"[9]. (In contrast, phenomenologists dispute this conclusion - see page 20). Thirdly, deductive reasoning, in which the conclusion flows logically from the premises - for example "if it is raining the streets will be wet; it is raining; therefore the streets will be wet" - does not yield new knowledge. Rather, it is concerned with logic, the validity of reasoning, and necessary truth[10].

Inductive reasoning, on the other hand, is a system for drawing conclusions which are not necessarily present in the premises. Even where the premises are true "they do not render the conclusion <u>certain</u> but only <u>probable</u> to one degree or another"[11]. An inductive statement like "I have observed ten thousand crows, all of which are black, therefore all crows are black" is not necessarily true. It may be contingently true, if the evidence is valid, or it may be false. Thus although knowledge derived from inductive reasoning may not be false neither will its contingent truth be certain. That is logically impossible assuming that it is not possible to be certain that <u>all</u> instances of the evidence have been observed. Given that all instances - a potentially infinite concept - could logically never be observed, samples are selected for observation in which case sample size and representativeness are crucial. Inductive reasoning thus leads to "conclusions which are true in varying degrees of probability"[12] and this probability reflects the predictive validity enshrined in particular uses of

samples.

2.4 DIFFICULTIES WITH EDUCATIONAL RESEARCH AND INDUCTIVE REASONING

The use of inductive reasoning and scientific methods to discover truth about the education system is a vast international enterprise. Despite the scale of this activity however there are fundamental difficulties in coming to know - in valid and reliable ways - about aspects of the system. These difficulties, embodied as they are in all research into social systems, were noted in the previous chapter: in particular, Schon's definition of the problem was highlighted (see page 7). In this context, the success of educational research must be gauged in terms of the extent to which its inductive reasoning and empirical methodology can be adapted to the complexity of the phenomena under scrutiny.

Lovell and Lawson[13] showed that even in the natural sciences, which are essentially concerned with impersonal systems of matter and energy, there are no methods for obtaining absolute truth. Indeed, as argued above, there are strong grounds to suggest that the attainment of absolute contingent truth is logically impossible. Furthermore, Kuhn has shown how science is encapsulated within frameworks or paradigms. Most scientists work within a framework of 'normal science' and share common assumptions about the universe. However, when 'normal science' repeatedly throws up anomalies that cannot be explained within the existing framework, this framework is subverted and a 'scientific revolution' occurs. A period in which various theories compete for dominance ends when one theory emerges to form the basis of a new normal science. Such revolutions - or 'paradigm shifts' - involve the reconstruction of

prior theory and the re-evaluation of prior fact"[14].

Within any particular paradigm, although human groups show some stable characteristics, thus facilitating some prediction, four difficulties greatly lower the accuracy of prediction in social science[15]. Firstly, the values and prejudices of the researcher often impinge. Secondly, it is not always possible to observe directly; researchers often need to observe from a distance. Thirdly, human uniqueness and changeability renders research rarely repeatable. And finally, there are many interwoven variables which are difficult to assess and which swell complexity.

Borg and Gall[16] identified three constituents of this complexity: (a) the complexity of the stimulus to which individuals are exposed: (b) the different reactions of individuals to the same stimulus; and (c) the complexities of the reactions of an individual to a stimulus.

In addition, according to Borg and Gall[17], many practitioners and administrators are antipathetic to educational research for a number of reasons. Firstly, some research has generated no tangible results despite having consumed large amounts of money. Secondly, there are general deep-seated antagonisms to science and technology per se, and in particular many 'people-oriented' teachers find quantitative methods alien. And thirdly, there is a substantial professional gap in education between researchers and practitioners.

Nevertheless there clearly are effective ways of researching into

education. Lovell and Lawson[18] identified three aims for educational research. Firstly it should explain, and give rise to generalisations which are predictive. Secondly, it should promote control, for which sound knowledge is a prerequisite, despite the difficulties in establishing it in social systems. Thirdly, research should lead to the erection of conceptual frameworks within which future events can be predicted. Lovell and Lawson[19] also pin-pointed three divisions in the activity of educational research: to study what happens in the system; to tackle developmental problems;and to conduct basic investigative research. Whereas the second is an example of applied research, the first and third are facets of basic research. The "distinction between basic and applied research was established in the first half of the present century; basic research was defined as the work of scientists and others who pursued their investigations without conscious goals apart from the desire to unravel the secrets of nature. In modern industrial research and development programmes, basic research, though sometimes called pure research, is usually not entirely pure; it is commonly directed toward a generalised goal, such as the investigation of a newly discovered frontier of technology that promises to relate to the problems of a given industry. Applied research carries the findings of basic research to a point at which they can be exploited to meet a specific need".[20]

The present study uses applied research of a developmental nature with particular reference to ways of managing change in school technology, and, as will be displayed in subsequent narrative, has been conducted with cognizance of the difficulties inherent in using inductive reasoning and scientific method in education.

2.5 RECENT PERSPECTIVES ON EDUCATIONAL RESEARCH

By 1980, according to Nisbet[21], educational research had developed, from an earlier emphasis on experimental, empirical methodology, to incorporate a broad church of styles. He identified the five styles, ranging from the traditional psychological to the more recent sociological, and from a traditional 'agricultural' model - devoted to experiments to improve products by manipulating treatments - to the more holistic 'anthropological' model in which the researcher enters the situation being researched to observe; for example, illuminative evaluation is a general strategy used to study a situation in all its complexity, paying heed to numerous variable, participants, local factors, unforeseen developments, and transactions[22]. Nisbet's five styles were:

(1) the experimental approach uses empirical methods and assumes that educational research can be conducted experimentally and that a theory can be built; as yet, few of our major educational problems have proved susceptible to this approach;

(2) the exploratory survey gathers information as a basis for decision making, but the resulting data is only news and needs to be fitted into a theoretical perspective to be of wider use;

(3) curriculum development creates new syllabus content and methods, subjects them to field trials and evaluates their output; it draws on theory, survey, experiments, field trials and open-ended enquiry.

(4) in action research, the researcher links innovation to

research to intervene in a situation, change it and assess the results.

(5) open-ended enquiry, which leans heavily towards phenomenology and the reflexive sociological approaches discussed in the previous chapter (pages 20 - 22), relies on participant observation, accepts the assumptions of the persons being observed, and generates a theory which is grounded in everyday life; the observer attempts to develop an intimate understanding of the situation, from within.

The choice of style in any particular research project will be determined by the objectives of the research and the conditions within which the research will be conducted. Arguably, each style has been used with profit in appropriate circumstances.

Although each style will relate to developmental research, two in particular are strongly concerned with development: action research and curriculum development. Stenhouse distinguished between two contrasting views of developmental research in the curriculum field - as intention and as performance - and argued that curriculum research is essentially concerned with the relationship between the two views. As a strong advocate of the teacher becoming a researcher, and in recognition of the widespread gaps between theory and practice in curriculum, he argued that the gaps "can be closed only by adopting a research and development approach to one's own teaching, whether alone or in a group of co-operating teachers".[23]

As implied in the previous section, it is part of the folklore of

the school teacher, rightly or wrongly, that traditional educational research which derives from psychometric testing has had little noticeable effect on classroom teaching. Becher[24] outlined the attempts of some researchers to overcome this partly by improving communications with practitioners, and partly by developing action programmes based on research. Becher proposed a further strategy. He argued that researchers research the wrong problems - those defined and circumscribed by their own interests and specialist skills - focusing on the finding of similarities in situations to discover generalised laws as in physical science. Equally, in curriculum research, the researcher is remote from daily practice: the problem of dissemination of findings from the researcher to the practitioner is perceived as one of logistics and structure.

However, human institutions are not just structures which affect people within; in practice, these people shape the institution and therefore "the problems on which educational research and development should engage should be those which are defined by a close study of educational practice"[25]. Becher argued that researchers should adopt strategies of finding out at the source of action, taking educational research as part of the human sciences rather than physical sciences. Furthermore, they should adopt a broad, non-specialist, holistic approach to problems and to find these problems by studying educational practice rather than the dictates of the researcher's own interests.

The alternative methodology of such styles derives from the historian, anthropologist and interpretive critic, and is not oriented towards the wide ranging and generalised objectivity of,

say, clinical drug trials. Nevertheless, quantitative techniques are used. The researcher seeks differences, but does not abandon the search for generality. But these generalisations "are designed to throw into relief, and make more readily understandable, the underlying features of those human interrelationships that typify the educational process. And above all, the researchers who work within this tradition attempt to present their findings in ways which will be both informative and illuminating for practitioners and policy makers, and not just technically impressive for their fellow-researchers[26].

Action research in particular links research to the formation and development of policy and furnished the methodology for the Manchester and North West Region developmental exercises with which this study is concerned.

2.6 ACTION RESEARCH AND THE MANAGEMENT OF INNOVATION

Halsey[27] defined action research as "small-scale intervention in the functioning of the real world, usually in administrative systems, and the close examination of the effects of such interventions". It draws upon two distinct traditions: that of research which is concerned with control, replication, precision and generalisation; and administrative action which is concerned more with the operation of the real world, and with specific instances; it thus links understanding with capability in order to enhance both.

Halsey[28] identified five distinctive types of action research. Firstly social planning, as a pilot for large-scale intervention,

used to field test ideas for decision making about the intervention. Secondly, a research approach aims more to develop theoretical knowledge; the researcher escapes from normal constraints and manipulates relationships by inducing change, and observes the results. Thirdly, a political approach embodies taking action in response to a problem; by focusing on action, the public eye is kept on the problem in anticipation of future large-scale public interest or funding. Fourthly, a diversionary approach may be used to defuse political pressure for change by diverting reformist zeal into pointless investigation; and fifthly, a multiplier approach "seeks to use the social context of the project to increase its own effects; though the resource inputs are small-scale, it is anticipated that the outcomes could be substantial, if attitudes are changed and participants mobilised for wider action, (a) search for likely 'multiplier' effects, and an attempt to identify the outcomes that occur".[29]

More specifically, Kelly[30] identified two main styles of action research used in English education, and argued the case for a third. Firstly, in experimental social administration, professional researchers and action workers are brought together to bring about change and observe the results. The existing practitioners are deliberately circumvented to prevent them distorting the changes to be brought about. Starting with a hypothesis derived from previous research, the project unfolds with research and action having distinctly separate roles. The educational priority area projects[31], designed to raise standards of pupil achievement in inner city areas, are classic examples of this approach.

Secondly, a teacher-as-researcher model, espoused by Stenhouse[32], starts from problems identified by teachers, not research findings. Action is less planned and formal than in the previous model and there is no division of labour between research and action. According to Kelly, the evidence to date suggests that this model has only been feasible when teachers receive strong support from outside.

Thirdly, Kelly postulated a simultaneous-integrated model, which combines a strong research component and respect for the position of the participants. Action and research are integrated. She quoted Hult and Lennung[33] who argued that this model of action research:

"(1) simultaneously assists in practical problem solving and expands scientific knowledge
(2) as well as enhances the competencies of the respective action
(3) being performed collaboratively
(4) in an immediate situation
(5) using data feedback in a cyclical process
(6) aiming at increased understanding of a given social situation
(7) primarily applicable for the understanding of change processes in social system
(8) and undertaken within a mutually ethical framework."

The Manchester CDT project which is the subject of section two of this study, falls into the teacher-as-researcher category because it was carried out by groups of teachers developing curricula and evaluating the outcomes, with support from beyond their schools. On the other hand, the North West CDT project, which is the subject of section three, falls into the simultaneous-integrated category,

because practitioners from various sectors of the education service were brought together and helped to collaborate to solve intractable teacher supply problems, with the aid of sustained data feedback.

Before looking in depth at these examples of action research, it is necessary to identify its drawbacks. In essence, action research is criticised because it does not properly use inductive reasoning and empirical methodology to attempt to build knowledge scientifically, for example by rigorously controlling variables. Given the great differences between research and action, internal conflict between the two may render one subordinate to the other. Compromise between the two traditions is usual in action research projects, and within projects there will be different relative emphases giving rise, for example, to "a project where the action control is high (which)* may not produce outcomes that stand up to serious research examination: and on the other hand, the project where research control is high (which)* may present a very limited set of findings which are of little direct value from the planning point of view, though they may well produce a further set of questions for research investigations"[34].

For Halsey, there were three major implications of the interplay between research and action. Firstly, the researcher has a strong social responsibility to carefully interpret research findings. Secondly, research will tend to lead to conservative action. Thirdly, projects usually embody a compromise between research and action. "Action research is unlikely ever to yield neat and

* my insertion

definite prescriptions from field tested plans. What it offers is an aid to intelligent decision making, not a substitute for it"[35].

The extent to which action and research combined to create knowledge in two cases is discussed in sections two and three.

Finally, recent "theory and research in the sociology of science have also qualified the older picture of the processes of scientific discovery as based entirely on foresight, planning, rationality, and ready acceptance. These characteristics certainly can be seen in large measure in most discoveries. But in addition, in many discoveries, there is an admixture of the unplanned, the nonrational or irrational, and the obstructive, contributed by the discoverer himself or by others. These characteristics manifest themselves in the pattern of serendipity in discovery and in the pattern of resistance by scientists themselves to certain scientific discoveries. The serendipity pattern occurs, and in action research it occurs very often, when the researcher comes by happy chance on something he was not looking for, that is, some anomaly that presents him with the unexpected opportunity to change his preconceptions about his research and make a new discovery"[36].

The extent to which this serendipity pattern did occur in the two case studies, particularly the North West Region CDT project, is discussed in sections two and three.

2.7 CONCLUSION

Action research was thus chosen for the present study because of its affinity with the objectives of the two projects detailed in the next two sections and, in particular, with the nature of the

two related hypotheses which were tested. Moreover, the action element was essentially concerned with the management of innovation. It is to a survey of the literature in this field which the study now turns.

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CHAPTER 3: MANAGING INNOVATION - A LITERATURE SURVEY

3.1 SUMMARY

This study is concerned with innovation, which is taken, simply, to mean the bringing of an invention into widespread and effective use. Innovation, like all change, can threaten the security of individuals and institutions, in which case a resistive counter-reaction is often launched. To overcome this, various systems of innovation management have evolved, are documented, and are open to academic enquiry. Three of these are examined: curriculum development within the education service; innovation diffusion in general terms; and industrial management which, given the competitive and ever changing nature of industry, is, when effective, usually concerned with the management of change and innovation rather than just the administration of the status quo. Conclusions are reached within each category and are then integrated into a final statement relating to some underlying principles of innovation in school technology. These principles specifically concern: strategic planning; barriers to innovation; tactics to overcome barriers; collaboration within networks; and the nature of individuals and institutions within innovation processes. They are documented here as the basis from which the management of innovation - or action - of sections two and three of the present study were derived, and later tested.

3.2 THE NEED FOR INNOVATION IN CONTEMPORARY ENGLISH EDUCATION

Numerous writers have attempted to characterise the accelerating change which is sweeping through late twentieth century civilization. Toffler[1], for example, outlined the massive and far-reaching changes taking place, internationally, in work, social

and political frameworks, economics, and attitudes. Schon[2] argued that humans have a fundamental belief in a stable state, however, which "served primarily to protect us from apprehension of the threats inherent in change. Belief in stability is a means of maintaining stability, or at any rate the illusion of it". For Schon, there was thus a conflict between the change precipitated by our technological adaptability, and the intertia, left behind by our relatively low attitudinal adaptability.

Despite this potentially stultifying conflict, change increasingly affects our institutions. Dainton[3] argued that current scientific knowledge "is changing fundamentally the tools we use, and that this will alter the way humans work and to a degree comparable in magnitude to the transition wrought by the Industrial Revolution some two centuries ago. For this country, this process both threatens with possible failure and beckons with opportunities of success. What happens may in large measure depend on the quality of our educational system and the resources we apply to it".

British cultural and attitudinal brakes on change were discussed in chapter one. In recent years, a number of initiatives have arguably brought about perceptible shifts in British attitudes to change, and Chandler[4] has identified some of those which were brought about during 'Industry Year' (1980). However, he argued that they were unfolding too slowly, largely because we were employing an inappropriate ratio of effort between our intentions and our attempts to realise them. In this sense, he argued that we require more effective management of innovation; this present study focuses on potentially effective ways of managing the relationships between intentions, actions and outcomes in the context of school

technology (see Page 6). Action research as an overall tool for this management was identified in Chapter two and its links to the present study were introduced. Before examining two action research case studies, however, it is necessary to focus on the literature of innovation management, in order to set them in an empirical context.

3.3 DEFINITIONS

The literature of innovation management is extensive and has evolved from a number of specialist fields, each with its own operational and linguistic tradition. Although studies and texts have increasingly become cross-disciplinary, there is evidence of confusion and imprecision in the use of certain key concepts, including: change; innovation; diffusion; development; curriculum; barrier; management; and resistance. In the interests of greater clarity in the present study, these concepts are defined below, and the definitions given are adhered to throughout the study.

CHANGE: "To make (a thing) other than it was; to render different, alter, modify, transmute."[5]

INNOVATION: "The action of introducing a new product into the market; a product newly brought onto the market; ... the bringing of an invention into widespread practical use .... Invention may thus be construed as the first stage of the much more extensive and complex total process of innovation."[5]

DIFFUSION (in the social or anthropological sense) "is the process by which an innovation is communicated through

certain channels over time among members of a social system... Diffusion is a kind of social change defined as the process by which alteration occurs in the structure and function of a social system. When new ideas are invented, diffused, and are adopted or rejected, leading to certain consequences, social change occurs ...."[6]

DEVELOPMENT is "(1) a gradual unfolding, bringing into a fuller view; a fuller disclosure or working out of details... (4) Gradual advancement through progressive stages."[5]

CURRICULUM is more complex than a dictionary definition of "a course of study" as Heywood[7] has pointed out. He showed that the hidden curriculum has a profound influence on pupils and that it might be more effective than the formal curriculum in achieving educational goals. Stenhouse[8] points out two polarised views of curriculum. On the one hand, it is a plan for the content of courses, particularly in centralised education systems; on the other hand, it is the effects on pupils of all their experience for which the school is responsible. He argued "in essence .... curriculum study is concerned with the relationship between the two views of curriculum - as intention and reality ... our educational realities seldom conform to our educational intentions. We cannot put our policies into practice. We should not regard this as a failure peculiar to schools and teachers. We have only to look around us to confirm that it is part of the human lot.

But as Karl Popper[9] has observed, improvement is possible if we are secure enough to face and study the nature of our failures. The central problem of curriculum study is the gap between our ideas and aspirations and our attempts to operationalise them."

BARRIER: "Anything material that stops advance, hostile or friendly, that defends from attack, prevents intercourse or union, or keeps separate and apart."[5]

MANAGEMENT is "the application of skill or care in the manipulation, use, treatment, or control (of things or persons) or in the conduct (of an enterprise, operation, etc)"[10].

RESIST: "Withstand action or effect of, prevent course of progress of; abstain from (pleasure, etc); strive against, try to impede"[11].

Whereas change is a neutral or even an accidental shift in conditions, innovation is a value-laden attempt to implement an invention, by installation or diffusion. Development is a gradual progressive growth, and will be regarded, in this study, as a broad contextual process which subsumes specific innovation. The school curriculum, itself a complex expression of a dynamic social reality, develops under the influence of major interconnected factors and barriers. One barrier will be the resistance of individuals and groups. Effective management of innovation in the developing context of the school curriculum is the central concern of the present study. The next section reviews the literature

relating to elements of change management in three separate, but conceptually related, fields - curriculum development, innovation diffusion and industrial management - leading to a discussion of design principles for strategies to bring about change in school technology.

3.4 CURICULUM DEVELOPMENT

3.4.1 Strategies of Curriculum Development

According to Stenhouse[12], the North Americans have been much more active in building strategies for curriculum development than the English. The successful Soviet launch of Sputnik in 1958 precipitated a major crisis in the USA's education system: in particular, there was a strong belief that much of what was taught in contemporary American schools was out of date. Consequently, a major federal initiative in curriculum development was launched, and this had repercussions on other western education systems, including the English one. A vast bank of knowledge about curriculum development has been generated by this activity. In 1962, Taba[13] produced a seminal text for graduate students, which was founded in this research tradition. Despite the passage of over a quarter of a century, much of what she wrote remains of high significance today.

Early 'top-down' curriculum development was conducted by centrally appointed committees. Their major drawback stemmed from (1) a failure to change the skills and attitudes of recipient teachers and (2) the distance between some proposals and the reality of the classroom[14].

A more 'grass-roots' approach emerged, with elected committees,

and much consideration was given to human relations theory. During the 1960's, various methods were developed, and each heavily stressed the importance of group dynamics, leadership and participation. Co-operative action research in which teachers researched problems of immediate concern, aided by professional researchers, flourished. Taba argued that all of this suffered three major deficiencies.

Firstly, there was too much extrapolation from the sound argument that those who use a development should be involved in its determination. In some cases, too many groups or individuals were drawn into decision making without having sufficient knowledge or breadth of vision to be able to contribute.

Secondly, there was an over-emphasis on formal representational committees to bring about change. Members were often chosen for their visibility in a system rather than for competence in, or commitment to, the task.

Thirdly, curriculum development was oversimplified, piecemeal and dependent on relatively untrained and busy teachers.

From these criticisms, Taba made a case for the concept of a strategy for institution-based curriculum development. She argued that "to change a curriculum means, in a way, to change an institution. Changing institutions means changing both goals and means ....."[15]. Similarly, changing the curriculum involved changing individuals in two ways; (1) cognitively (knowledge and skills); (2) and emotionally. The most effective developments would occur when these were both changed to a high degree. She

proposed six elements of planning to bring development about:

1) devise a systematic sequence of work for the strategy;

2) create the right conditions for productive work;

3) design the necessary training, linked to (2);

4) plan to change attitudes and habits;

5) identify competencies and levels of involvement required of individuals;

6) consider leadership skills.

She argued that a deductive sequence, starting with broad aims and proceeding to produce course units, failed to throw up the new ideas which arose from experimentation. "Instead of beginning with revising the general guides and developing new designs for scope and sequence as a first step (a plan which assumes that the understructure of that guide is as it should be), one needed to turn back to grass roots and start by creating new models of classroom teaching-learning units which illustrate and incorporate in practice new theoretical ideas and research data."[16] Her work strategy was thus:

1) produce work units experimentally;

2) test these for general validity and teachability;

3) revise, consolidate and where necessary produce a teachers' handbook.

4) develop a framework and evaluate within a wide perspective;

5) install or disseminate the new units, training teachers and creating any necessary administrative structures.

Shiman and Liebermann[17] took this view a stage further. In a five year study of change in eighteen Californian schools, they found a five stage process of change:

1) people talked about the possibility of change: disequilibrium followed;

2) some teachers made ad hoc changes and experimented;

3) this stimulated questioning and made uneasiness rise further;

4) problems arising from change began to surface;

5) this led to a consideration of philosophical questions.

There are clear similarities between this process and the innovation diffusion process outlined by Rogers (see section 3.5.2). Their empirical research uncovered difficulties in the prevalent systems approach to curriculum development. They concluded that teachers "want to start at <u>their</u> beginning" and that "there are persons who are particularly adept at fostering creative disequilibrium, providing alternative instructional models, raising the larger philosophical questions, or helping in evaluation. Only if they are sensitive to the school's particular situation and knowledgeable about the process of change that is always underway, though, can they effectively relate their intervention to the schools' needs. They must be able to understand, respond to, and work with the process rather

than impose their own program, strategy or idea ...."[18]

This would suggest that the work sequence proposed by Taba should be planned on an individual basis with full knowledge of the social system concerned, in order to reduce the likelihood of teacher resistance or even rejection. Yet in the 1980's, in the United Kingdom, central government has lost patience, not just with reluctant teachers, but with workers and professionals in many fields whose resistance to change, from one point of view, can be construed as the exercise of restrictive practices. This will undoubtedly alter the ways in which change in education will be propagated in future, as persuasion gives way to the exercise of increasingly centralised power.

A study of innovation in examinations in Ireland[19] relating to major shifts away from assessment based on syllabus content towards assessment of achievement with objectives concluded that, for innovation to be effective: (a) it needs to be plausible to those who are to implement or be affected by it; and (b) teachers, in failing to concede this plausibility, and parents, effectively blocked its implementation. Yet, in a small scale attempt to develop an objectives model in history, where attempts were made by the innovators to explain its rationale and educational advantages to teachers, and to consult with teachers as professional colleagues, the teachers responded positively. This has clear implications for the way external innovators relate to teachers and reflects many of the conclusions of Rogers noted in section 3.4 of the present study, as well as Taba's view of teacher motivation.

Notwithstanding shifts in the balance of power, however, Taba's resumee of teacher motivations is too perceptive to be ignored. She argued that production and training go hand in hand, and that curriculum research and development require: skills and knowledge beyond those usually possessed by teachers; a deep consideration of assumptions; an assault on the self-image of teachers which often depends on their perception of their own professional competence. Thus, for Taba, they needed:

1) training in appropriate skills, preferably only when they are seen to be relevant or needed;

2) encouragement to experiment and protection in the face of failure;

3) help in thinking through assumptions, evaluations and research.

Attitudes positive to change can be developed in teachers by:

1) creating involvement and task identification by starting from the concerns of teachers;

2) ensuring that the work is within the competence of teachers;

3) identifying problems and pursuing these through action research; this creates a context for theory to be understandable;

4) devoting sufficient time to changing attitudes;

5) limiting theory to that which teachers see as relevant and presenting it with the activity rather than before.

Teachers working in groups is an essential part of curriculum development: (1) it releases intelligence and raises the dynamism of thinking as associations are triggered; and (2) it gives moral support to teachers who are otherwise isolated in their innovating. This is not automatic, however, and groups should be carefully collected together and adequately led. Taba argued that a start should be made with volunteers who are concerned about the problem and willing to work. This contradicts the view that everyone should be involved: such widespread involvement is a strategic error as it drags in all sorts of "reluctant dragons" who may sabotage and drain the innovative energy of the group. Participation should be extended "at successive levels of work by adding personnel as the nature of the work, and therefore also the nature of its appeal, changes"[20].

Havelock[21] undertook a three year review of American literature on the dissemination and utilisation of knowledge in education, medicine, agriculture, technology and other fields. He cited 4000 studies and claimed that this was growing at the rate of 1000 per year in North America alone. From his review, Havelock construed three models of diffusion. He then went on to propose an amalgam of these. These models are widely quoted in the English literature of education.

Firstly, the Research, Development and Dissemination model was a highly centralised process, with five stages: (1) basic research; (2) applied research; (3) prototype development and testing; (4) mass production and packaging; (5) planned dissemination to the user. The user was then expected to adopt the innovation. It

rested on certain assumptions, for example, that a rational sequence is possible, long term planning is desirable, labour is co-ordinated and specialised, the consumer is passive and rational, and the high initial cost is offset by a long term pay-off. English curriculum writers such as Holt[22] have been highly critical of this technocratic and centralised approach. Their most pertinent points include: it assumes (1) that learning materials can be packaged without reference to teachers and can be engineered like new products; (2) that we know optimum learning methods; (3) that trialling gives insight into long term effects; (4) that local variation is not important. English curriculum projects which have adopted this style have suffered from low take-up: the "School's Council's own research has now revealed the poor take-up of many projects: for instance, only two out of eleven projects for primary school children have produced teaching materials that are used in more than a tenth of the schools"[23].

Secondly, Havelock's Social Interaction model described patterns through which innovations diffuse in social systems and links closely into the models discussed in section 3.4. It rested on five generalisations: (1) the user belongs to a social network which influences adoption; (2) his degree of centrality in the network will influence his speed of adoption; (3) informal personal contact is vital; (4) group membership is a major predictor of adoption; (5) adoption follows an S-curve.

This model is close to those outlined by Rogers (see section 3.5.2) and whilst there is a clear logic in relying upon diffusion through networks of interconnected people, problems in

its implementation will include: it is unrealistic in assuming that teachers have the time to get involved; it lacks a coherent system for the transmission of pedagogy; resources produced will rarely be of high quality; and local networks may not be self-sustaining without positive leadership.

A third, Problem Solving, model was the most popular in education. It assumed that innovation is part of a problem-solving process in the user system. It followed a sequence of: (1) need is felt; (2) the problem is diagnosed; (3) a search for ideas follows; (4) information is retrieved; (5) solutions are found; (6) these are applied. Outsiders have only a consultative role, and are essentially non-directive. The user system's internal resources are fully utilised. Because of local initiative, innovations have a strong chance of survival: the influence of human relations theory is evident here.

Holt[24] considered this to be of particular relevance to the school-focused change which has surfaced in England in the last decade, and that although teachers are not trained to use the method, adequate skills can be developed. Stenhouse[25] was critical because it retained the emphasis on final solutions, as did the two previous models: his answer was to adopt a teacher-as-researcher model (see page 56).

Havelock's three models represented particular schools of thought but he argued that each of them illustrated different but equally important aspects of a whole process. For example, the research, development and dissemination model will take place within a social system where social interaction and problem solving will

be going on. He proposed a fourth model: the Linkage model. Within this, a linkage agency would be created to set up effective links between the user system and resource systems. This enables users "to plug into the most sophisticated sources of information in such a way that they get knowledge and materials which are relevant and timely and truly cost-beneficial"[26]. The agency would thus create a chain of knowledge based on general collaboration. Linking itself to resource systems, it would also create: (1) a broad awareness of what is available; (2) contact between relevant sections; and (3) systematic testing of potential resources. Linking itself to the user system, it would create: (1) acceptance of the unity of the linkage agency and the user system; (2) its own awareness of the needs and capabilities of the user system; (3) an involvement to solve the client's problems.

3.4.2 Transaction in Curriculum Development

The stress laid by Stenhouse on the gap between curriculum intention and outcome has already been noted[8]. Within this gap, transactions between participants will take place and these will change the potential outcome. Hoyle[27] suggested that whereas some schools will change by becoming 'learning systems', others will resist change. In between, many attempting to innovate unaided will fail to varying degrees because of "tissue rejection". In such cases, mismatches between the innovation and the "pedagogical codes" of the school will form barriers. An innovation may thus fail because it embodies values which run counter to those of the school. Havelock[28] defined values as "the basic stop-and-go signals for human behaviour. Messages which clearly contradict pre-existing values will not get

anywhere and those which appeal to them will get far". Ruddock[29] referred to this phenomenon as the encounter of cultures, which she defined as complexes of shared understandings through which members interact. Whilst a culture in this sense confers security on its members, the relative strength of each culture will vary according to the venue of the encounter: inside the school, that of the teaching team will be at its strongest. Furthermore, hidden below overtly expressed values will often lie tacit assumptions which the threat of innovation may bring to the surface. In his evaluation of a major Schools Council project, Shipman[30] noted how difficult it was to detect exactly what these were and how an innovation might change them.

Adopting an innovation will thus make demands on a school's organisation. A school will presumably plan its organisation to meet its objectives and to take account of prevailing constraints. By tradition, English headteachers have considerable autonomy in planning, and this is clearly reflected in the diversity of organisational patterns. Bennett[31] posited four determinants of a school's organisational structure: environment, including tradition and external forces such as the local education authority; the headteacher and staff; the school's goals; and its particular situation including location and clientelle. A multiplicity of variables is clearly possible, and each may or may not present barriers to curriculum innovation. The Education Reform Bill which is passing through its committee stage at the time of writing, will reduce some of these variables by prescribing a national curriculum; however, if it enables schools to opt out of local authority control and devolves more power generally to headteachers and governors,

variants may well proliferate. Notwithstanding such potential changes, the values of the school will be expressed overtly in the intended curriculum and its day to day routines, and covertly in the "hidden curriculum" (see page 65). Thus, according to Heywood[32], the "implications of ... organisational effectiveness in normal and innovating circumstances lead to the view that structures in the school and classroom can have a profound effect on the characteristics of the hidden curriculum in the school".

Given the considerable energy expended on curriculum development in the last three decades, and the difficulties encountered by developers, especially in major projects, it is essential to study closely Heywood's conclusion[33] that all "the evidence suggests that the real potential for innovation in the absence of centralised direction must come from a steady flow of minor improvements in the curriculum made by teachers in the classroom".

Heywood, admittedly, was writing from the experience of the relatively centralised Irish education system. Yet, English education is arguably becoming more centralised. The Technical and Vocational Education Initiative (TVEI) referred to on page 5, has channelled resources and curriculum development energy in very specific directions recently, largely under the aegis of the Manpower Services Commission. Gleeson[34] argued that both "in terms of categorical funding and delivery, TVEI represents a distinct break with hitherto accepted models of curriculum development and reflects a 'new' approach to the ways in which government structures educational priorities at the local level. Following on as it does various 'crises' which beset schooling in

the late 1970's, TVEI has emerged as a prototype for implementing educational policy and change. According to the Secretary of State for Education and Science, for example, the proposed City Technology Colleges (CTCs) will build upon the lessons of TVEI, both in terms of curricular planning and earmarked expenditure .... In other respects too it is clear that TVEI extension is now closely associated with the delivery of a National Curriculum Policy".

TVEI is arguably the most ambitious and far reaching scheme to bring about innovation in the education system this century. Sponsored by the Manpower Services Commission rather than the Department of Education and Science, it aims to generate rapid change, and ensures that local education authorities provide hard evidence of strategic planning and evaluation as a precondition for payment of funds. It is clearly too early to evaluate its success in broad terms, but as Gleeson and Smith[35] argued, most of what "has emerged from the pilot schemes is an enthusiastic response from many teachers and students leading to a broadening of the curriculum and involving more student-centred, activity-based learning, often with new methods of assessment". They recognised, however, that success had so far been concentrated in the 14-16 age ranges, with little evidence of widespread developments in the 16-18 sector.

3.4.3 Conclusions From Curriculum Development

Despite recent centralising policies and the intervention of the Manpower Services Commission, curriculum development remains as an exceedingly complex set of operations. In the context of the present study, the following conclusions can be drawn from the

literature.

(a) Teachers

From this perspective, curriculum development will be enhanced by:

1) identifying teachers' problems for action research;

2) starting with the teachers' concerns, and planning to suit their circumstances;

3) ensuring that the development tasks are within the competence of the teachers;

4) helping teachers to think clearly, develop skills and cope with failure;

5) limiting theory to what is relevant, and presenting it at appropriate times when its relevance can be readily perceived;

6) spending sufficient time on the changing of attitudes.

(b) Groups

1) Good group work releases intelligence and provides moral support.

2) Groups must be carefully composed by:
   - avoiding too many members;
   - selecting these for their likely contribution rather than past status;
   - using skilled people with adequate time;

- expanding and diversifying as and when the work makes it necessary.

(c) Barriers

1) Barriers to change include:

- misunderstanding of the innovation; closed horizons and skills of teachers; resources, time, materials;
- the perceptions of pupils and parents;
- school organisation;
- school values.

2) As innovations spread outwards from talented innovators, dilutions and/or distortions will result unless support increases.

3) Change agents should intervene to deal with (i) and (ii).

(d) Institutions

1) Top-down approaches will fail unless they change teacher skills and attitudes.

2) Curriculum change usually requires institutional change which requires teachers to change.

3) Take-over bids usually fail: systems can usually resist until a change agent has to leave.

4) The values of a school will heavily influence the adoption of innovations.

5) However, incentives may override values; recognition is an effective curriculum development incentive.

6) Curriculum is not disseminated; it is largely negotiated.

7) Developments must be firmly rooted in classroom reality.

8) Until the advent of TVEI, there was an increasing UK trend towards local, small-scale, school based curriculum development.

9) Education is becoming increasingly centralised, and government agencies such as the Manpower Services Commission may accelerate change, especially that which is required by new legislation.

(e) Sequences

1) When planning a development, the following need to be considered: (a) sequence, (b) conditions for productive work, (c) training, (d) attitude and habit changes, (e) who will do what and when, (f) leadership.

2) A start needs to be made through small-scale experimentation with new ideas, testing, revising, developing a framework and implementing this.

3.5 INNOVATION DIFFUSION

Whereas curriculum development is a gradual process of making advances through stages in one facet (the curriculum) of a very complex organisation (for example the school), innovation diffusion is concerned with the implementation of particular ideas.

Paradoxically, whereas the latter process is specific to particular innovations and is therefore, in one sense, only a sub-set of curriculum development, it also features as a change process in many types of organisation: in this sense, it is a broader concept than curriculum development.

3.5.1 Human Responses to Technological Change

Schon[2], referred to in 3.2, made a major contribution to our understanding of the way change is propagated. One of his central ideas was that man is a technologically adaptive species, but lacks a concomitant emotional adaptivity. He suggested that we have a fundamental belief in a stable state: this belief protects individuals from those threats which are inherent in change. He also suggested that social systems have a similar tendency, and that in times of change, individuals and systems strive to maintain a belief in the stable state.

Heywood's[36] analysis of the psychology of this process, described on page 20 of the present study, carried the argument forwards in the sense that individuals develop personal mental constructs. These constructs, or schema, are organisations of past experience which enable us to survive by effectively processing information, but also act as conservative forces in limiting our vision.

According to Schon, social systems - consisting of interacting individuals, who play the roles which give the system its human characteristics - maintain themselves against the disintegrating impact of change. They effect this maintenance through dynamic conservatism, ie, in the face of change, development or innovation, the system, or rather individuals within the system,

expend energy to conserve the status quo; the more radical the change, the stronger will be the dynamic conservatism. The various methods used include: ignoring the innovation; launching a counter-attack; containing and isolating the innovation; and absorbing the innovation, redirecting it to serve the existing state of affairs.

This human dilemma is magnified by the increasing tension between accelerating technological change and our emotional drive for stability. He proposed a conceptual solution to the problem, namely that social systems become learning systems. He also critically reviewed ways in which innovation is diffused through systems.

He labeled the dominant mode of diffusion the centre to periphery model, which is similar to the 'top-down' approach described by Taba and noted on page 67. This rests on three assumptions:

1) an innovation is ready for use;
2) it is sent out from a central agency to users;
3) the process of sending out is managed.

Its success depends on four factors:

1) the level of energy and resources at the centre;
2) the number of points at the periphery;
3) the distance from the centre to the periphery, ie, the length of the communication lines;
4) the energy needed to ensure that a user at the periphery adopts the innovation.

He described a second model as proliferation of centres, being an elaboration of the above, in which a primary centre controls a series of secondary centres: these secondary centres actually diffuse the innovations to their own clusters of peripheral points or users.

Schon identified five problems inherent in these two models:

1) diffusion often becomes a battle between a dominant centre and a reluctant periphery; the more radical the innovation is for the periphery, the more the periphery will be potentially disrupted and therefore the more it will exercise dynamic conservatism to preserve its stable state;

2) both models rely on an effective communications infrastructure; if this fails, innovation will not diffuse;

3) the resources at the centre must be sufficient to service the periphery;

4) the motivation of a centrally directed agent of diffusion is critical; the further away he is from central control or support, the more likely will his motivation be to waver;

5) they fail to take into account regional differences in the periphery, although the proliferation of centres model is less prone to this problem.

Under these circumstances, diffusion of innovation "looks less like the dissemination of information than like a sequence of related disruptions of complex systems, resulting in each case in

a new configuration"[37]. The innovation will change in its transaction with each system, and it follows that one innovation could manifest itself differently in each different system. The problem then becomes "....to set in motion and guide a chain of related processes of social learning in which sequences of deliberate entrepreneurial intervention interact with unanticipated and inadvertent processes, all more adequately treated under the metaphor of battle than communication"[38].

He proposed the creation of self-transforming learning systems based on linkages and networks. Such systems would need to be evolved and controlled in broad terms, so that goals are met but changes can be made rapidly as conditions changed. Although this proposal is manifestly not of the centre to periphery kind, he argued that neither is it radically decentralised and uncontrollable.

As an abstraction, Schon's proposal is elegant. But it is left as an abstraction and suffers from the problem which seems also to be prevalent in curriculum development texts: namely, that the closer theory moves towards practice, and intention moves towards outcome, the weaker the argument becomes. However, his proposal has an inherent logic and the most positive reaction to it would be to 'flesh out its bones', formulate and test hypotheses, and build up a more applicable body of knowledge. This has been going on within the paradigm of Innovation Diffusion for some time; it is to this field that this chapter now turns.

3.5.2 Empirical Aspects of Innovation Diffusion

E M Rogers has been at the cutting edge of diffusion research in

the USA for at least twenty years. His text[39], which uses as a framework the concept of uncertainty and its relief by information provision, is thoroughly grounded in the findings of empirical research. He showed that in the USA the number of publications grew from 405 in 1952 to 3085 in 1983. This highly fashionable discipline emerged from a number of independent sources, including education, during this century. Recently, they coalesced into a more generalised framework, although much of the research tends to be carried out by specialists in their own fields.

Before 1970, diffusion research focused on: one way communication; one-to-many communication; products rather than people; adoption rather than implementation. A convergency model of communication recently emerged, in which research also focused on the way participants share information to reach a mutual understanding.

He defined diffusion as a two-way communication of new ideas in a social system. New ideas bring uncertainty; uncertainty can be reduced by feeding information. The main elements of diffusion are:

1) the innovation; which is
2) communicated through channels; over
3) time; within
4) a social system.

From an analysis of empirical studies, he identified five stages in the process of deciding to adopt an innovation:

1) acquiring knowledge;

2) being persuaded;

3) making decisions;

4) implementing;

5) confirming (reinforcing).

Rogers[40] argued that the rate of adoption is influenced by a number of factors, one of these being the personality and background of the adopter. Thus: early "knowers of an innovation, when compared to late knowers, are characterised by more education, higher social status, greater exposure to mass media channels of communication, greater exposure to interpersonal channels of communication, greater change agent contact, greater social participation and more cosmopolitaness"[41].

Rogers[42] also showed that the attributes of innovations also affected their rate of adoption. Below are five attributes; the figures in brackets show the percentage of studies conducted which support the assertion that the attributes influence the rate of adoption of innovations:

1) perceived advantage relative to the idea it supercedes (67%);

2) compatibility with the experiences, values and needs of adopters (67%)

3) complexity as perceived by the adopters (56%);

4) trialability; or the degree to which experimentation is possible (69%);

5) observability, or the degree to which the innovation can be seen in operation elsewhere (78%).

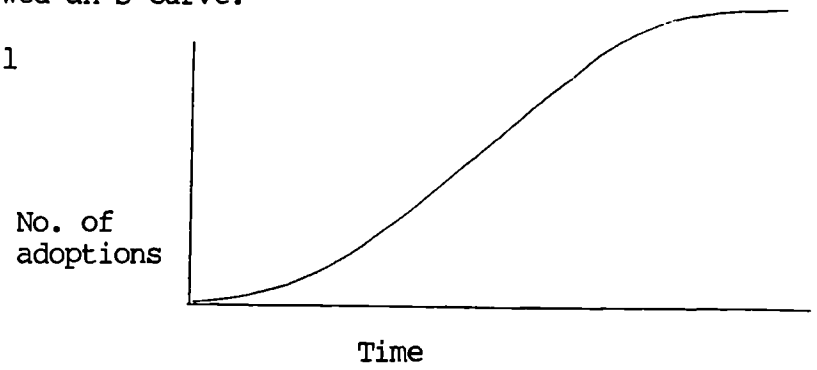
100% of studies also showed that the adoption rate was positively related to the degree of interconnectedness in the social system. This is fundamental to the idea of diffusion networks: "the heart of the diffusion process is the modelling and initiation by potential adopters of their near-peers who have previously adopted a new idea"[43]. Interpersonal networks are the main channels for this flow: they are invisible routes to make events happen.

He defined a communication network as " interconnected individuals who are linked by patterned flows of information ... have a certain degree of structure, of stability ... provide predictability to human behaviour ... Communication structure ... consists of the cliques and their interconnections (through liaisons and bridges)."[44] Meetings with relative outsiders who have been exposed to other sources of information are much more information-rich than meetings with close friends. Rogers argued that networks form best between people who are geographically close and similar in characteristics; but the richest exchange of information happens between rather than within such 'cliques'.

This is underpinned by a relatively new research area - social learning theory. Its central idea is that we learn from others by observational modelling. This is not mimicry but a distillation of the essence of the behaviour of others and the use of this to form one's own. The basic perspective is that we can learn from others by observation, without verbal exchange.

Another area of interest in networks is the role played by opinion leaders. A study by Carlson[45] showed that the diffusion of a modern maths scheme through Pennsylvania and West Virginia followed an S-Curve:

Fig. 1

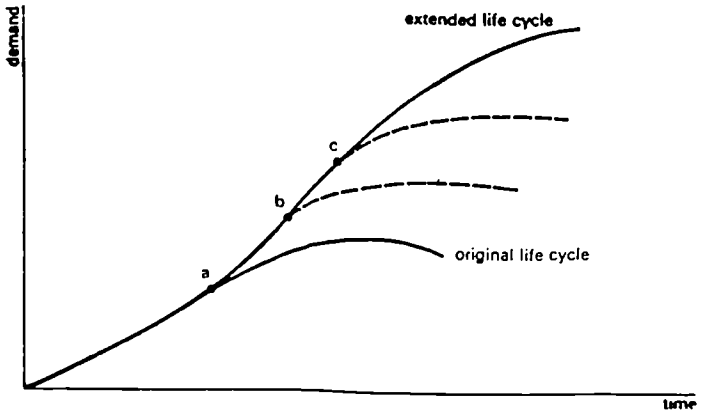


At first the innovation was adopted by one superintendent and then remained static for some time. It took nearly two years for the S-curve to 'take off': Carlson attributed this acceleration to the adoption by a number of main opinion leaders in the system. The first adopter was relatively isolated and his decision to adopt had little influence on others in the network. Rogers showed that the S-curve rate of adoption is common in innovation diffusion, and that the role of opinion leaders in networks is critical. It must be remembered, however, that developments characterised by the S-curve eventually tail off.

This potential tail-off can be deferred however. Thus, according to Ansoff[46] in "many industries demand can be stimulated and life cycle effectively expanded through a combination of three types of strategic change: gaining an increasing share of the market, introducing improved products which create a replacement demand, and introducing the product to markets not previously involved"[47]. These methods of expanding a product life cycle, shown in Figure 2, are arguably similar to methods of creating

constant development within schools: Hoyle[27] referred to this as the school being a learning system; incremental change was also a major feature in Taba's approach, described in Section 3.3.

Fig. 2



"Expanded Life Cycles" taken from Ansoff[47], page 29.

"The product-market changes introduced as points A, B, C have a very strong synergy with the original product market. They address the same type of demand, the same type of customer, they use familiar product technology and rely on the existing organisational capabilities. Thus, this expansion type of strategic change is a part of the natural dynamics of the firm"[48]. In theoretical terms, expanding the life cycle of an innovation could be a potentially significant tactic to adopt within the development of school technology.

Finally, the role played by the change agent is important in innovation diffusion. Rogers[49] identified seven roles of a change agent:

1) develop an awareness of the need for change in clients;

2) set up a relationship of information exchange;

3) diagnose clients' problems;

4) develop an intent to change in clients;

5) transform this intent into action;

6) consolidate adoption;

7) terminate the relationship.

Change agents confront two major problems, however. (1) They are socially marginal and (2) they suffer from information overload. According to Rogers, research suggests that their role can be aided by:

1) effort in contacting clients;

2) orientation towards clients;

3) using a diffusion pattern acceptable to clients;

4) being similar in characteristics to their clients;

5) having credibility with clients;

6) making use of opinion leaders;

7) increasing a client's ability to evaluate innovations.

3.5.3 Conclusions From Innovation Theory

Innovation theory is clearly a vast field; hence the use of major analyses of research in this section, rather than a first-hand study of the overwhelmingly numerous pieces of individual research. In the context of the present study, the following conclusions can be drawn from this review:

1) technological change is inevitable;

2) change, including innovation, threatens and gives rise to resistance;

3) centralised innovation strategies are problematic and often fail;

4) the evolution of managed learning systems and networks is necessary;

5) innovation diffuses through social systems in stages;

6) the S-rate of adoption is influenced by the nature of the adopting system, the attributes of the innovation, and the flow of communication within the system; by expansion based on existing innovations the S-curve growth cycle can be lengthened;

7) networks are the complex channels through which communication flows;

8) cliques form within networks;

9) members of cliques communicate with members of other cliques by chance, and this communication is infomation-rich compared with intra-clique communication;

10) opinion leaders and change agents play critical, though difficult, roles in networks;

11) the success of change agents will be linked to their credibility in the eyes of those with whom they are trying to effect change.

3.6 MANAGING INNOVATION IN INDUSTRY

Industry was described in section 1.3 of the present study as a systematic way of amplifying the human capability to meet needs. As such it is a massive international enterprise which grapples with advancing technology and constant competition. In doing so, industry has devised various methods of managing innovation, some

of which are relevant to developments in the education service. It is to a selection of these methods which the study now turns: in particular the focus will move to excellence in American firms and strategic planning.

3.6.1 Analysing Excellent American Companies

There is a vast literature of industrial management, but much of this, according to Handy[50], focuses not on holistic analyses of why certain companies are successful, but on teasing out the effects of one particular variable such as structure, size or style. In 1982, however, Peters and Waterman produced a seminal text[51] based on extensive research, which identified some major attributes of effective and excellent American businesses. As management consultants, both authors had repeatedly encountered a small number of extraordinarily successful companies, whose employees were extremely committed. This experience underscored their investigative research project. A varied sample of sixty-two large and successful companies was subjected to six measures of long-term superiority: three of these assessed wealth creation between 1961 and 1980, and three assessed return on capital. A final criterion - the rate of flow of new products and services - was judged by recognised experts from within the particular industry. After this initial study, nineteen companies were jettisoned for not meeting the researchers' criteria. Of the remaining forty-three, in-depth interviews were held in twenty-one companies, and shallower interviews were held in twenty-two. The results were codified and Peters and Waterman identified eight attributes which accompanied managerial excellence.

3.6.2 Individuals, Motivation and Leadership

Although Peters and Waterman stressed the importance of rational and analytical management strategies[52], they argued that such strategies overly pre-occupied many American managers. They concluded that this prevailing approach missed a great deal, particularly in connection with the intangible drives of motivated people, the value of experimentation and the making of mistakes, and informal approaches to problem solving. They found that successful companies took account of the following human characteristics[53]:

1) we are self-centred and want to be 'winners';

2) our imaginative symbolic right brain is as important as the rational deductive left;

3) at a conscious level, we can only cope with a few facts simultaneously, yet we have a vast unconscious store of patterns derived from our experience which enable us to cope with complexity;

4) we respond to our environment yet we are internally motivated;

5) our actions are judged more than our stated beliefs;

6) we need meaning in our lives and will give up a lot to an institution from which we can draw such meaning.

They recognised Skinner's[54] view of educational development and structural learning, that positive reinforcement, or reward, is more likely to produce intended change than negative reinforcement, or punishment. Skinner's method of positively reinforcing behaviour was: specific; immediate; achievement-

focused; based on rapid feedback; and most effective when fed back intermittently, in an unpredictable fashion. However, they also recognised that intrinsic motivation stemming from within the individual's personality, was the broader context of successful positive reinforcement.

They noted two schools of thought on how action leading to change is engendered. On the one hand, attitudes are claimed to precede actions, expressed simply as first believing in the importance of a certain course of action then carrying out the action. On the other hand, they noted research which suggested that "there is often little relationship between explicitly stated belief and mundane action"[55]. Frequently, individuals would change a belief having carried out certain actions which conflicted with that belief. They argued that what is "called 'foot-in-the-door research' demonstrates the importance of incrementally acting our way into major commitment. For instance, in one experiment ... most subjects who initially agreed to put a tiny sign in their front window supporting a cause (traffic safety) subsequently agreed to display a billboard in their front yard, which required letting outsiders dig sizable holes in the lawn. On the other hand, those not asked to take the first small step turned down the larger one in ninety-five cases out of a hundred".[56]

Peters and Waterman inferred from this line of approach that "only if you get people acting, even in small ways, the way you want them to, will they come to believe in what they are doing. Moreover, the process of enlistment is enhanced by explicit management of the after-the-act labeling process - in other words, publicly and ceaselessly lauding the small wins on the

way. 'Doing things' (lots of experiments, tries) leads to rapid and effective learning, adaptation, diffusion and commitment; it is the hallmark of the well-run company".[56] As such, it is analagous to Taba's rationale for experiential learning, described in section 1.5.3. of the present study.

Excellent companies were found also to act themselves into new strategies, on the basis of such experimentation. Quinn's research into the ways in which companies formulated strategies suggested that the role of leadership was crucial in "amplifying, understanding, building awareness, changing symbols, legitimizing new viewpoints, making tactical shifts and testing partial solutions, broadening political support, overcoming opposition, inducing and structuring flexibility, launching trial balloons and engaging in systematic wanting, creating pockets of commitment, crystalising focus, managing coalitions, and formalizing commitment (eg. empowering 'champions')".[57] The leader thus orchestrated action and forged it into commitment to (belief in) new strategies.

They found that some companies were able to reduce the threat inherent in change because of their strong company cultures with which employees readily identified and which supported rather than opposed company activities. They argued that companies, where change threatened their employees, did "not have strong notions of themselves, as reflected in their values, stories, myths and legends, people's only security comes from where they live on the organization chart"[58]; thus change which threatens to alter people's locations will generate resistance.

However, the demands made on employees by excellent companies can deter many. Also, a strong culture can be abused, as individuals surrender themselves to its security. Such surrender may also inhibit movement from the culture of one company to the different culture of another.

Peters and Waterman identified 'transforming leadership' as a powerful way of appealing to the unconscious needs of the led and noted that the most effective company leaders possessed two capabilities; to be credible with employees by being part of their technical culture; and to generate excitement. They quoted Selznicks definition of such leadership[59]:

"The inbuilding of purpose is a challenge to creativity because it involves transforming men and groups from neutral, technical units into participants who have a particular stamp, sensitivity, and commitment. This is ultimately an education process. It has been well said that the effective leader must know the meaning and master the technique of the educator... The art of the creative leader is the art of institution building, the reworking of human and technological materials to fashion an organism that embodies new and enduring values... To institutionalize is to infuse with value beyond the technical requirements of the task at hand. The prizing of social machinery beyond its technical role is largely a reflection of the unique way it fulfills personal or group needs. Whenever individuals become attached to an organization or a way of doing things as persons rather than as technicians, the result is a prizing of the device for its own sake. From the standpoint of the committed person, the organization is changed from an expendable tool into a valued

source of personal satisfaction... The institutional leader, then, is primarily an expert in the promotion and protection of values."

Finally, they noted that excellent companies were learning systems, continuously experimenting, permitting failures, and encouraging 'product champions', in close collaboration with their customers. Their research demonstrated that "innovative companies not only are unusually good at producing commercially viable new widgets; innovative companies are especially adroit at continually responding to change of any sort in their environment"[60]. On the other hand, many companies learned and adapted slowly; they enshrined hidden assumptions and values which were often outdated yet remained influential; often such organisations held on to outdated views of the world for up to a decade.

3.6.3 Eight Attributes of Excellent American Companies

A Bias for Action

Successful companies used collections of distinctly individual devices to ensure that large company size did not lead to overcomplexity and inertia. Communications were intense and informal. Large activities were frequently broken up to promote fluidity and action: 'product champions' (see page 34) and small teams were positively encouraged. In some companies, small task groups, with an optimal size of seven, consisted of volunteers, ran for limited periods, set their own goals, and were able to report directly to an appropriate level of management; their recommendations or actions were swiftly followed up, and administration and documentation were informal. For success, the

company's "climate and culture must treat ad hoc behaviour as more normal than bureaucratic behaviour"[61]. A plethora of experimentation, and specific deadlines, were found to be cheap ways of innovating, especially when ad hoc groups were able to tap into leaks from already existing resources. However, management had to be tolerant of such 'leaks', of possible failure, of constant change and, not least, of the feverish idiosyncracies of the 'product champion'. Simplicity was a fundamental concept and starting developments with their easier parts, and with the most committed people, to promote early motivating success, was a key strategy.

Handy distilled two important principles from this attribute of a bias for action. Firstly, successful companies make progress by finding and solving problems rather than through a continuation of normal practice. In this way they remain up to date. Secondly, control takes place after the event rather than before: product champions and task forces have considerable autonomy and do not need to obtain detailed approval from managers before taking action. Before-the-event control is safe and will minimise mistakes; however, it can stifle innovation. After-the-event control will render innovation more likely, but mistakes will also be more likely. Handy also stressed that bureaucracies accountable to the public such as education authorities and schools may be too heavily biased towards before-the-event control and concomitantly away from "action and any chance of excellence"[62].

Close to the Customer

Excellent companies were characterised by a relentless drive to meet the needs of customers: delivering an excellent product rather than profit was the primary evident consideration of people at all levels in the organisation. They were obsessed with high quality, reliable service and went to extraordinary lengths to listen to customers, especially those who were leading their field and therefore likely predictors of the future tastes of mainstream customers, and a potential source of new ideas.

Autonomy and Entrepreneurship

New ideas required effort to be implemented and could be potentially disruptive and even resisted. Peters and Waterman found that they flourished best in companies which encouraged product champions. Excellent companies tolerated overlap, administrative untidyness, and promoted costly internal competition to breed an entrepreneurial spirit. They took positive steps to enable champions with a strong belief in a new idea to emerge, grow, flourish, and in doing so, bring innovation to fruition. The best companies had rich support systems for such champions - who are vulnerable at many levels - even to the extent of allowing them to operate covertly, in temporary development.

Productivity Through People

In these companies people were highly regarded, their integrity respected and their motivation and competence trusted. They were also expected to perform well. Some companies developed such tactics as the use of language to emphasise the status of people. For example, calling workers Associates as at Wal-Mart, Cast

Member as at Disney, or Crew Member as at McDonalds, was designed to help individuals feel special at work. Similarly, many companies operated like an extended family with internal communities and clubs from which members gain satisfaction.

Success was rewarded rather than failure punished: such positive reinforcement was applied often and to everyone who performed to target rather than a small elite. As Handy pointed out, this 'expectations theory' "holds that we tend to live up to what people expect of us, or down to it. There is one qualification - the expectations must be within our capabilities and can be influenced by our action. We need standards, standards higher than we might set ourselves, but which we can attain. To be achievable and real, these standards must be precise and stated.... Hence the emphasis on specific targets, objectives and aims in the excellent companies, targets tailored to the individual or group, and frequent feedback on progress".[63]

Hands-on, Value Driven

At the intellectual core of each successful company was a strongly felt set of beliefs and values, often the creation of a previous charismatic leader. Such basic value systems frequently included beliefs in: being the 'best'; attention to detail; the importance of individuals; high quality and service; the innovative capabilities of all company members; informal communication; and the importance of profit and growth. The role of senior managers in excellent companies was to set the tone, collectively, and in an excitement-engendering way. This tone, or value system, was prominent in welding people together for the collective success of the enterprise.

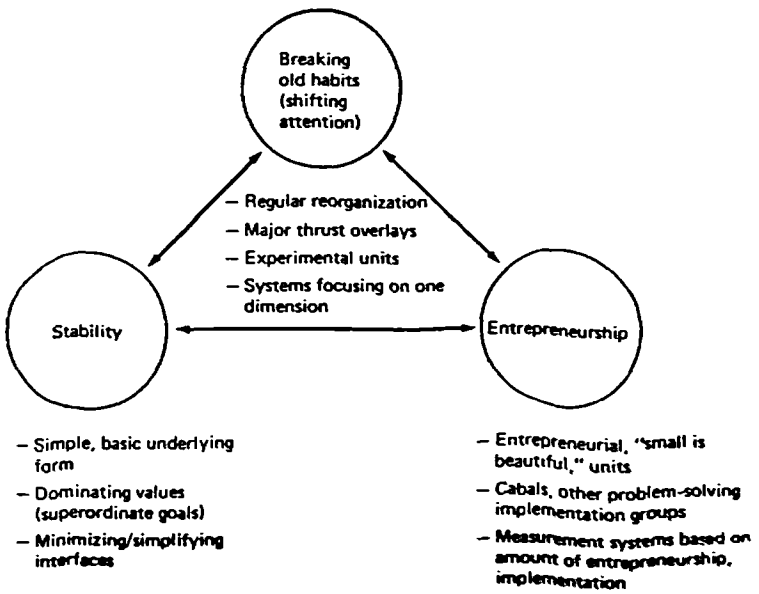
Stick to the Knitting

The best companies avoided over-diversification and concentrated on those basic activities at which they were effective.

Simple Form, Lean Staff

Large organisations often become complex: this complexity creates a need for more managers. "On the one hand, size generates legitimate complexity, and a complex systems or structural response is perfectly reasonable. On the other hand, making an organisation work has everything to do with keeping things understandable for the tens or hundreds of thousands who must make things happen. And that means keeping things simple"[64]. Successful companies have kept structures understandable, partly by having a stable and simple form, such as being split into product divisions, by having a clarity of values, by being able to respond flexibly and quickly to change. Peters and Waterman proposed a form for the future which had three features to be effective in the three basic functions of providing stability, encouraging innovation and avoiding calcification. This form is expressed diagramatically below.

THE THREE PILLARS OF THE "STRUCTURE OF THE EIGHTIES"



(reproduced from Peters and Waterman, page 316.)

Simultaneous Loose-Tight Properties

The final basic attribute of excellent companies relates to their blend of centralisation and decentralisation. Where company values were clearly understood and accepted by company members, it was possible for individuals and groups to have relatively high autonomy in setting their targets and deadlines: central management is only 'loosely coupled' with the workforce, although common acceptance of standards and values is tightly controlled. According to Handy[65] to "keep things loosely coupled, it is important to distinguish between the 'what' and the 'how' and between 'policy' and 'execution'. The centre needs to keep a close eye on the 'what', on the key objectives, the key values and the key standards of the different parts of the operation. The details of the 'how' can be delegated. As long as the key standards are maintained, the individual units should have as much freedom as possible in attaining those standards".

3.6.4 Strategic Planning

As companies emerge from recession at the time of writing, many are turning again towards long-term strategic planning, given that their managers are decreasingly preoccupied with short-term crisis management. Anthony[66] differentiated between three major types of management control system. Management control enabled managers to obtain and use resources to achieve objectives efficiently. Operational control was concerned with day to day operations. Subsuming and superior to both systems, however, was strategic planning which he defined as "the process of deciding on the objectives of the organisation, on changes in these objectives, on the resources used to attain these objectives, and on the policies that are to govern the acquisition, use and

disposition of these resources"[67].

He wrote that strategic planning was characterised by:

1) a normal focus on part of an organisation rather than the whole;

2) an essential irregularity governed by responding to problems, opportunities and new ideas as they arose;

3) dependence on estimates, imprecise information and being uncertain;

4) relying heavily on information from outside the organisation, for example, the clients and new technologies;

5) simple and often secret communications;

6) more of a senior management than middle management activity;

7) competing for time with management control functions.

Ansoff[68] alerted managers to the essential difficulty in strategic planning: "strategic decisions are not self-regenerative; they make no automatic claims on top management attention. Unless actively pursued, they may remain hidden behind the operations problems. Firms are generally very slow in recognizing conditions under which concern with the operating problem must give way to a concern with the stratetic .... The immediate demands on management time and effort raised by .... operating problems can readily obscure the fact that the basic ills lie not in the firm but in its environment .... Since strategic problems are harder to pinpoint, they require special

attention".

Although the education service is influenced much more by local and national politics and bureaucracy than many companies, there are arguably strong analogies between the value of strategic planning in business and in education.

Significantly, Demetrius Comino, formerly an industrialist, set up a foundation, in conjunction with the Department of Trade and Industry, with the primary aim of enhancing the strategic problem solving capabilities of pupils, teachers and managers in the education system. Comino[69] outlined a strategy for effective change management. The key underlying principle was the distinction between doing and achieving: in the day-to-day turbulence of organisational life, Comino argued that we tend to do a great deal without making the time to consider what we are trying to achieve. Individuals and groups could increase their effectiveness by adopting a four stage strategy.

Firstly, it is necessary to conceive, clearly define and understand the objectives. This clarification should include an appreciation of the reasons for wanting to achieve these particular objectives. It should also include an analysis of the opportunities and barriers which relate to the achievement of these objectives.

Secondly, a systematic plan should be devised to achieve the objectives. Initially, the various options should be examined, and the most effective method(s) chosen from these. Where appropriate, a trial run should be arranged. In unknown or novel

situations, planning how to actually use the method may be vital.

Thirdly, the plan should be implemented and controlled until the objectives are reached. The purpose of control is to identify and reduce the differences between what is and what is required. Observation is essential to create the necessary feedback.

Fourthly, at intervals throughout the strategy, and especially at the end, progress towards reaching the objectives should be reviewed. Again, this requires feedback.

3.6.5 Conclusions From Managing Innovation in Industry

Like curriculum development and innovation diffusion theory, the study of corporate management and excellence is extremely complex. Yet, simplicity was a central finding of Peters' and Waterman's research. They argued that "the people who lead the excellent companies are a bit simplistic. They are seemingly unjustified in what they believe the worker is capable of doing ... that every product can be of the highest quality ... that service can be maintained at a high standard for virtually every customer ... that every worker can contribute suggestions regularly. It is simplistic, but it may be the true key to inducing astonishing contributions from tens of thousands of people".[70]

They conceded however that such central values are perhaps the only areas which can be simple. Clearly the creation of excellence is otherwise complex, and in the context of the present study, the following conclusions can be drawn.

(a) Motivation

1) People need meaning, and will devote a lot to an organisation which gives it.

2) People want to belong to a successful group, yet stand out as individuals.

3) People want autonomy of action within a framework of shared values.

4) Success motivates; the key factor is the feeling of doing well.

5) Positive reinforcement is of most help when given intermittently.

6) Small groups (7) are ideal for tasks: cameraderie and productivity can be high.

7) Internal competition and peer review can motivate.

(b) Leadership

1) Leadership should lift all people in the organisation to:
   (a) higher levels of productivity;
   (b) greater feelings of satisfaction.

2) The leader's key task is to establish and spread values; when these are clear and accepted, employees can be very autonomous.

3) Imagery, metaphor, anecdote, spread values better than rational argument.

4) Leaders should be visible and accessible.

(c) Structures

Structures should be based on quantitative data but:

1) be flexible and person-centred;

2) adapt to changing environments;

3) reach outwards;

4) be responsive to people's abilities and experiences;

5) be simple and not top-heavy.

(d) Innovation

1) Successful companies develop in purposeful but specifically unpredictable ways.

2) Innovation, and learning, take place through lots of small achievable tasks.

3) Experiments give autonomy and allow the company to form its own mutations.

4) The many failures in experiments have to be tolerated.

5) Small temporary task forces are often more effective than bureaucratic and costly research and development structures.

6) Champions are sought and actively encouraged in successful companies.

7) Internal competition is encouraged, despite its waste.

8) Actions precede belief: we act or do our way into belief and strategies.

9) It is easier to persuade individuals to incrementally act their way into commitment.

10) Successful companies organise for explicit purposes, and do not over-diversify.

11) Successful companies are very close to their customers.

12) Communication networks have to be actively established and maintained: they are rarely self-sustaining.

(e) Strategies

1) Strategic planning provides a long-term tool for organisations to determine their objectives and achieve them.

2) Successful strategic planning enables an organisation to develop in response to changes in its environment.

3) A four stage strategic planning process has been identified as potentially useful in education: set objectives; create a plan; implement and control the plan; revise.

4) At the root of strategic planning is the distinction between action and achievement.

3.7 SOME UNDERLYING PRINCIPLES OF CHANGE STRATEGIES IN SCHOOL TECHNOLOGY

3.7.1 Degrees of Innovation at Various Levels of the Education Service

In Chapter one of the present study, accounts were given of the nature of school technology, of its complexity in a pluralist society with a multi-faceted education system, and of the barriers to successful innovation. Manifestations of technology

vary from school to school, and this is not surprising given the tremendous political complexity of curriculum development, and the various levels at which change takes place. Becher and Maclure[71] highlighted this complexity when they wrote:

"A serious policy of curriculum development aimed at, say, shifting the balance of secondary education away from the arts and pure sciences towards technology, would be futile if based entirely on the decisions of teachers at the school or subject level. It would need developmental decisions of a different order - for example, the designation of a few top university institutions as British M.I.T.s; a crash programme of teacher training in the applied sciences; examination reform; new salary scales for teachers of certain subjects; perhaps even a change in the student grant regulations to introduce differentials in favour of certain areas. It might involve the revival of the idea of specialist technical high schools, and the elaboration of new forms of co-operation between schools and industry .... a government which was serious about curriculum development would have to take decisions about the system, however reluctant it might be to interfere directly in the process."

As we approach the 1990's, increasing government intervention in the process is directly linked to the fact that some of these major structural proposals seem to be taking shape. The Department of Trade and Industry, for example, is mounting a campaign to accelerate the development of an enterprise culture. The Education for Capability movement reflects a growing national acceptance of a need to enhance doing, making and managing in certain compulsory subjects, including design and technology. In tandem with this unfolding definition of subject structure and

content, TVEI is now poised to extend into all areas of 14-18 education. In doing so, it offers resources, and a series of educational processes, such as active learning, to complement the content focus of a subject-based national curriculum. City Technology Colleges are being established, schools-industry links are to be boosted by a 1988 Department of Trade and Industry initiative, and the new funding system for in-service training - GRIST - is intended to enable teachers to accurately identify their training needs and seek means of meeting them.

Within this rapidly shifting context, accurately targetted strategies should enhance the capabilities of individuals and groups, at various levels of the system, to successfully innovate. The following distillation from the literature of the principles underlying change strategies is therefore presented for two purposes, to provide: (a) guidelines for such individuals and groups who are designing innovation strategies in school technology; and (b) criteria for the evaluation of proposed, existing and past change strategies.

3.7.2 The Imperative of Technological Innovation

In our present internationally competitive global industrial civilization, technological innovation must be seen as inevitable. There is no evidence to suggest that this will alter in the short term future. The United Kingdom has declined relative to its competitors in this community for at least a century and if it does not innovate successfully as a member of this competitive community, it will continue to fall behind in relative, if not absolute, terms. If present government policies of reversing this decline are to succeed, excellence in

innovation will be required in various sectors of the national structure, including the education service. Such innovation in education, and elsewhere, will require effective and co-ordinated strategic planning at all levels in order to succeed.

3.7.3 Strategic Planning

Strategic planning requires a clear distinction between action and achievement. An effective method for strategic planning embodies four elements: setting objectives; formulating a plan; implementing and controlling the plan; revision and review. Strategic planning must be rational on the one hand, yet on the other hand be carried out in full recognition of irrational behaviour, human emotions, unforeseen consequences, barriers, opportunities and serendipity.

3.7.4 Barriers to Innovation

Barriers to innovation will vary from level to level within the system, from place to place, and in time: strategic planning must be conducted on the basis of a sound analysis of such barriers. Innovations will threaten individuals, and groups, within organisations, giving rise to resistances.

Such resistances will be exacerbated by: misunderstanding; the closed horizons and skills of individuals or groups; lack of time, resources or materials; operational constraints within organisations; and clashes of values within organisations. Where innovation is imposed from above or from outside, resistance will tend to be high. Furthermore, as innovations spread outwards from their origin, they can become diluted or distorted: communication failure can be a significant barrier to innovation.

3.7.5 Tactics to Overcome Barriers to Innovation

Within the context of a strategic plan, various tactics can be deployed to overcome these barriers, including: network management; making use of the characteristics of institutions; motivating individuals; collaboration within groups; and developing sequences of action.

Networks

Resistance can be reduced by evolving learning systems and networks for innovation diffusion and the changing of skills and attitudes of individuals through peer exchange. Managing the diffusion of innovation through networks will require a clear perception of the adopting system, the innovation itself, communication flows and interpersonal relationships in the network, and the role of the change agent.

Institutions

Innovation will often require institutional change, whilst within institutions, innovation will be influenced by values, incentives and negotiations. For success, the innovation must be realistic in its institutional context, and will take place best in small increments, often unpredictably, through experimentation. Conversely, overdiversification may lead to failure. One effective way to reduce the chances of failure is for the institution to get close to its customers.

Individuals

Individuals will be motivated by meaning, autonomy within a successful and shared framework, positive reinforcement and internal competition. They will also respond to effective

leadership. Such leadership should lead to higher productivity and greater satisfaction. Leaders spread values, emotionally rather than rationally, and they should be accessible.

Individuals are best persuaded to change by action and in increments. Time must be devoted to developing skills, clear thinking, and changing attitudes. Innovations must be introduced at levels within the competence of those who will implement them: they must also be relevant to these individuals, and solve real problems. Product champions who generate change themselves should be encouraged.

Collaboration

Collaboration, in groups, if well managed, creates more than the sum of the group's parts. It also provides motivating support. However, groups must be carefully composed for maximum effectiveness. Innovation is effectively carried out by small temporary groups; internal competition between them raises productivity.

Project Sequences and Structures

Development plans should be strategically structured but should take account of experimentation and serendipity. Structures should be flexible, adaptive, outward reaching, responsive and simple. In order to promote continuous development, innovation should be phased and follow on from one another in an extended S-curve sequence.

3.7.6 Conclusion

Any planned innovation in school technology will have its chances of success enhanced if it is designed strategically, taking account of barriers and opportunities, and making use of appropriate tactics. Ultimately, it will stand or fall on the extent to which it can promote and guide people adaptability on the one hand and institutional adaptability on the other: both are required for effective educational change[72]. This kind of strategic planning is a vital tool in the journey we make from our educational intentions towards their outcomes, a journey which was introduced at the beginning of chapter one. Sections three and four examine the extent to which strategy and collaboration were effective in two case studies of innovation in school technology, one within an LEA and the other in a wider region.

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SECTION TWO: MANAGING AN INNOVATION IN THE CITY OF MANCHESTER LEA

INTRODUCTION: THE CONCEPT BASE CDT PROJECT AS ACTION RESEARCH

In section one, the evolutionary context of school Technology was analysed, and some literature of innovation management was reviewed. Action research was identified as a potentially effective way to bring about and evaluate innovation in the field. In this section, a local education authority CDT innovation is documented as a case study of the 'teacher-as- researcher' model of action research (see pages 54 - 58).

HYPOTHESIS

Within the case study the writer has attempted to test the following hypothesis, already noted on page 2:

that a concept base approach to CDT education can be developed and implemented by teachers collaborating, and being aided by the LEA CDT inspector, within the course of their professional duties, whilst insights are revealed, through systematic study, into the detailed forces impinging upon this innovation in the Manchester LEA.

CONCLUSION

Conclusions drawn from the study can be summarised in three segments:

(1) As a system for identifying and developing starting points for CDT activity, the concept base approach can be developed within the city, but future projects would need higher resourcing levels than those documented for effective implementation. Furthermore, specified barriers to progress would have to be recognised and circumvented.

(2) As CDT subject content, and also as an organiser of cross-curricular learning, the concept base approach is highly problematic in present circumstances and would require institutional adaptability of a high order within the LEA and the GCSE examination criteria.

(3) The turbulence to which the education service in Manchester has been subjected in recent years renders innovation and collaboration between teachers difficult. Under such circumstances, future innovations will benefit from more intensive strategic planning than was evidenced in this case study. In this context, promoting people adaptability was found to be possible with a small group of dedicated teachers, whereas promoting adaptability with less dedicated teachers was not attempted. This will be an essential pre-condition for widespread adoption of the innovation.

STRATEGIES EMPLOYED IN THE ACTION RESEARCH PROJECT

The project was conceived as a means to begin a process of reorienting the teaching of CDT within the LEA's schools. It is documented here as an example of the 'teacher-as-researcher' model of action research. Stenhouse identified this model as a way in which teachers could become 'extended professionals': "the outstanding characteristic of the extended professional is a capacity for autonomous professional self-development through systematic self-study, through the study of the work of other teachers and through the testing of ideas by classroom research procedures"[1].

Stenhouse identified three research strategies which such teachers might employ: (1) interaction analysis, in which behaviour is observed, coded and analysed; (2) logical analysis of teacher behaviour; and (3) a

'sociological anthropological' approach which "has used direct observation of classroom events as a starting point in the development of theory [and] ... [which] rather shies away from quantification and uses only detailed field notes as a means of recording"[2].

Broadly within the latter approach, the case study was documented by the writer from his dual perspective of 'director' of the project, and 'participant observer' within. It fell into the action research category of 'teacher-as-researcher' because it involved teachers who developed teaching materials and curriculum models, and evaluated their outcomes, with support from each other and from beyond schools. The latter form of support was provided notably by the LEA CDT inspector acting as a 'product champion'. Given the drawbacks of action research discussed in chapter two, and in particular the wide ranging nature of the action element of the concept base innovation, it must be recognised that the project's results need very careful analysis: such an interpretation will be an aid to future decision-making, but will not necessarily possess high predictive validity.

The writer directed events during the pilot phase of the project whilst observing and documenting outcomes; thereafter he acted as participant observer, only directing events when these related specifically to research, for example in day three of the conference described in Chapter six. Research methods were selected on the basis of their potential effectiveness in the attempt to achieve the following objective:

<u>to use and evaluate strategies to bring about a concept base approach to CDT in Manchester.</u>

Principles of managing innovation, outlined in chapter three, were used; also data was gathered for evaluation, using a variety of methods including: participant observation; the documentation of meetings; structured interviews; questionnaires; and structured brainstorming meetings, with participants recording their observations.

In April 1984, the newly appointed inspector with responsibility for CDT in the City of Manchester education authority - Rogers - portrayed his vision of the future of CDT to an open meeting of Manchester CDT teachers. After this meeting, a development project was established to consider and plan for this future. The project which formed the basis of section two of the present study, and in which Rogers played a key role as 'product champion', was named the 'Concept Base Pilot Study', and was directed by the writer from its start in September 1985 until July 1986. It was followed during the next academic year by a further project which operated in two distinct sections: one continued with the development work of the previous year; the other created a GCSE syllabus (see section 7.3) for proposed external validation by the Northern Examining Association (NEA). The development work of the group was increasingly hindered by the teacher industrial action and was eventually abandoned, along with most other out-of-hours INSET in the city, during the Spring term of 1987. The examination group continued beyond this, but it also abandoned work in March 1987 because the NEA insisted on changes to the proposal which the group found unacceptable.

The innovation is placed in its wider context in the next chapter. In chapter five, its early operations are documented and in chapters six and seven, barriers raised against it, together with its later operations, are described. Chapter eight concludes the section with an appraisal of the innovation and an examination of issues to consider for

further action research.

REFERENCES

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CHAPTER 4 : THE INNOVATION IN CONTEXT

4.1 SUMMARY

This chapter locates the Manchester Concept Base CDT Project within its context as a local education authority development, established and overseen by the LEA CDT inspector. Relationships between politicians, officers and inspectors of the LEA are examined in order to highlight the powerful role this authority's inspectors enjoyed at the time vis-a-vis subject-based curriculum and staff development initiatives. This role was underpinned by a relatively sophisticated system for INSET within the LEA. The project began shortly after the LEA had re-organised its secondary schools. This reorganisation, arguably, had two effects. Firstly, it created stress amongst teachers. Secondly, it promoted an unprecedented local discussion of curriculum issues. Within this climate, CDT in the city was some way behind the most progressive current national practice. A new CDT inspector took up post in 1984 and attempted to modernise this practice. He had a strongly felt stance towards designing and making in the curriculum. He also believed fundamentally in the importance of helping teachers to feel ownership of developments to encourage them to maximise their professional progress.

4.2 LOCAL EDUCATION AUTHORITIES (LEAs)

At the time of writing, the role of LEAs is being reviewed by central government. However, during the life cycle of the concept base innovation, LEAs, and in particular the City of Manchester LEA, functioned in accordance with the 1944 Education Act and the 1972 Local Government Act[1]. Broad aspects of the relationships between local and central government are examined in section three.

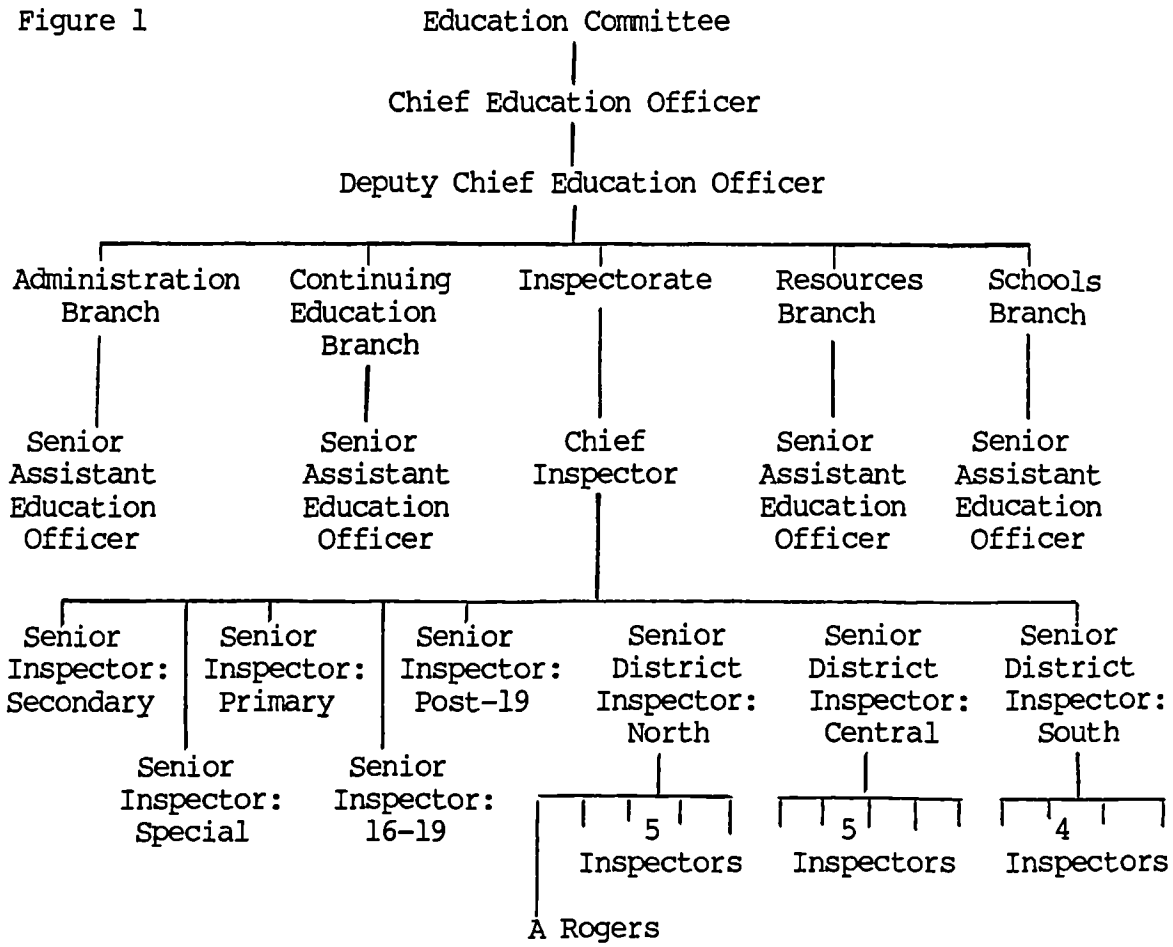
For the purpose of the more locally-focused section two, however, LEAs must be seen as part of the overall shire county or metropolitan borough administration, with responsibility for such functions as housing, roads, transport and social services. Each county or borough is administered by a council, consisting of elected members, together with appointed administrators. Councillors (members) are "politicians serving a four-year term of office, and vulnerable to all the pressures associated with re-election"[2]. Administrators (officers), on the other hand, are full-time, permanent and professional.

During, and prior to, the period under scrutiny, councils had become increasingly politicised, according to Jennings[3]. In particular, he noted the growing influence of national party politics on councils and their sub-committees, and that decision making became more centralised and concentrated within the orbit of the majority party group. During the concept base pilot study, Manchester continued to have a large labour party majority which had previously moved steadily to the left, along with other similar city councils. The influence of this trend on the school curriculum was evident (see section 4.3). In particular, the influence of the council's financial confrontation with central government, which culminated in major financial cutbacks from 1987 onwards, on the potential for this innovation to be effected was also evident, as will be shown in Chapter 8.

Within this political context, the council education department was led by a chief education officer whose role included: giving specialist advice to committees and elected members; implementing their decisions; and promoting the education service within the

local authority. The chief officer operated as the leader of "a team of officers and advisers supported by administrative and clerical staff ... [and had] ... one or two deputies, and ... a number of senior education officers responsible for each sector of education ... and also often for general planning and development ... There ... [were] ... also, generally, education officers responsible for the geographical divisions into which the authority may be split, and the chief adviser or chief inspector, supported by a team of advisers ... [played] ... a major role in both formulating education policy and reporting on its implementation"[4]. During this project, the Manchester LEA was structured as follows[5]:

Figure 1



Of particular interest is the designation of the inspectorate as a branch of the administration with the chief inspector as branch

head. According to Winkley[6] this kind of integration of the inspectorate and administration helps to ensure that the inspectorate influences events in an LEA. This, together with the high salaries of Manchester district inspectors (group ten headteacher scale) relative to those in most other LEAs (group eight headteacher scale) would indicate that Manchester inspectors were potentially influential in bringing about change because of structural factors and high personal calibre.

Inspectors are appointed as professional and specialist educational advisers to administrators, and through them, to local politicians. They have a dual role: on the one hand they act as the 'eyes and ears' of the LEA as they inspect schools; on the other they advise teachers and headteachers and support them with curriculum development and training initiatives. This role is considered in more detail in section 4.4.1.

Prior to the changes brought about by central government in the provision for the in-service education and training of teachers (INSET) during 1986-87, outlined in section three of the present study, provision for INSET varied considerably between LEAs. The provision in Manchester was relatively sophisticated and extensive during this period (1984-86). This was evidenced by: a large teachers' centre at Didsbury and other specialist centres such as that for urban studies at Castlefields; the strong and highly paid inspectorate was very active in INSET provision, and INSET activity was co-ordinated by a senior inspector paid at a group eleven headteacher level; the mounting of a comprehensive range of courses; the funding of secondment for advanced study for up to fifty-five teachers per year; and latterly, the creation of a large

education development service with three geographical divisions and one hundred and twenty full-time teachers seconded to bring about changes in schools.

As with other LEAs, this activity was financed from three sources: central government grant; the levy of a local rate; and charges for services[7]. The resulting budget process was very complex but within the context of this project, two sub-processes were important: the INSET budget; and the inspector's 'estimate' budget. The project staffing, travel and subsistence costs were met from the former, and a grant of £1000 from the latter was used for the purchase of experimental and teaching materials.

4.3 THE CITY OF MANCHESTER LEA

4.3.1 Secondary Reorganisation

During the late 1970s, severe falling rolls brought about by inner-city depopulation and an earlier national fall in the birth rate, began to affect Manchester secondary schools. In 1980, the education committee authorised planning and consultation for a major reorganisation of secondary education[8]. This created a significant opportunity to review the secondary curriculum in the light of various central government policy statements. The review was "launched in two conferences for the senior management teams of high schools in November 1980 and January 1981. The main aims of the conferences were to bring Manchester's knowledge of current secondary curriculum thinking up to date and to launch a major curriculum review. The endeavour was to re-think current practices and to design curricula for the new high schools which would help them to meet the needs of their pupils up to the late 1980s"[8].

Eight curriculum review groups comprising four hundred and fifty teachers operated in 1981 and 1982 to publish documents in Spring 1982. "These became key elements in the curricular planning which followed the Secretary of State's approval of the authority's modified proposal for the reorganisation of its secondary schools on 11 March 1982"[9]. The establishments created by this reorganisation are shown below.

ESTABLISHMENTS CREATED BY THE 1982 REORGANISATION OF MANCHESTER SECONDARY SCHOOLS

SIXTH FORM COLLEGES

Margaret Ashton Sixth Form College
Shena Simon Sixth Form College
Arden Sixth Form College

SECONDARY SCHOOLS

Abraham Moss Centre
Brookway High School
Burley High School
Burnage High School for Boys
Ducie Central High School for Boys
Ellen Wilkinson High School
Levenshulme High School for Girls
Moston Brook High School
Newall Green High School
North Manchester High School for Boys
North Manchester High School for Girls
Oakwood High School
Parrs Wood High School
Plant Hill High School
Poundswick High School
South Manchester High School
Spurley Hey High School
Whalley Range High School for Girls
Wright Robinson High School

The Concept Base project drew largely from this group of schools, but also from the voluntary sector (which was reorganised two years later), from the primary and tertiary sectors, and from various support services in the city.

The main impact of this reorganisation on the project derived from its major rationalisation of secondary curricula across the city, and also, arguably, on the raised level of curricular awareness of the teaching force after such a major exercise in institutional reorganisation. Less directly, the Manchester curriculum document[10], published after wide consultation and reflecting city council curricular policy, clearly embodied a curriculum framework espousing whole school strategies for equal opportunities in race, class and gender, and adequate provision for pupils with special educational needs. This was highly compatible with the concept base approach to CDT (see Section 5.3) with its focus on people and their needs.

4.3.2 CDT in the Manchester LEA

Within this LEA context, there had been a long tradition of technical education at secondary level, dating back to the establishment of "Manual Training" in two elementary schools in 1883[11]. At the start of the project in September 1984, most secondary level CDT was embodied in traditional courses of metalwork, technical drawing and woodwork, and was arguably fifteen years behind contemporary best practice. CDT departments were in the main well equipped to teach these craft-based courses; some, often in conjunction with science departments, were also equipped to teach control technology. Very few primary schools embraced CDT in a significant way, and its impact on the

sixth-form and further education colleges was highlighted by their collective failure to recruit more than twenty students per year to study GCE Advanced Level CDT courses[12].

A Schools Council funded Manchester Assessment Project[13] emerged from the curricular review exercise noted above. Within this project, groups of subject specialists were convened to make curricular and assessment recommendations for dissemination. The CDT group, which consisted of three heads of department, a senior lecturer from the polytechnic, and a deputy headteacher, reported in 1982[14]. The group had inherited a curricular model for CDT from a group previously working within the secondary curriculum review. This was based on the identification of learning objectives under the headings of concepts, skills and attitudes, and is reproduced in Figure 2. Despite the confusions enshrined in this model, especially in what is meant by the word 'concept', and its patchy coverage of objectives, the new group adopted that model as its starting point.

The group's report noted that many Manchester CDT teachers had, in 1982, still to adopt a modern English design-based approach to the subject. It also stressed their perception of the value of discussion in this situation: "We spent a number of weeks, often in quite deep debate, on the relevance of each objective and just how realistic it would be to attempt to assess it over the limited time available. Before we chose the problems we intended to pose to the pupils, each member of the working party brought a number of suitable first-year projects to the meetings and exchanged ideas on how best to motivate pupils. This cross-fertilisation within the group, plus the trialling of the design

CDT CONCEPTS, SKILLS AND ATTITUDES LIST ADOPTED BY THE MAP-CDT GROUP

Figure 2.

CONCEPTS	SKILLS	ATTITUDES
To provide intellectual challenge. To foster an understanding of the design process. To appreciate and practise good craftsmanship. To understand the need for a systematic approach to work. To appreciate the limitations and potential of materials. To develop an awareness of and encourage a positive attitude of mind towards technological innovation. To develop a sense of aesthetic appreciation. To increase a knowledge of tools, materials and processes. To understand forms of graphical communication. To develop visual imagery.	The practical application of the design process. The correct use and care of tools, machines and equipment normally associated with school and home situations. The development of communication skills especially verbal, graphical and three-dimensional. The identification of natural and man-made materials commonly used in school workshops and the home. The development of dexterity, accuracy and neatness in workmanship. The development of skills related to control techniques or systems, materials, energy and communications.	To display responsible behaviour towards equipment, one's fellows and the environment and a willingness to accept reasonable supervision and control. To develop confidence and self-reliance through enquiry, flexibility and analysis. To foster a spirit of co-operation. To practise ongoing evaluation at all stages and finally assess success/failure. To display safe working practices towards oneself and others. To foster a spirit of perseverance where the solution to problems requires persistence. To foster an awareness of the need to conserve natural resources. To recognise their own strengths, weaknesses and aspirations. To encourage a constructive use of leisure time. To recognise the applicable constraints problems.

problems within schools, may well have helped enliven and stimulate a design-based approach towards craftwork in Manchester schools"[15].

The general state of CDT in Manchester, and the CDT proposals emanating from the Manchester Assessment Project, however, failed to impress the CDT inspector, Rogers, who took up post in 1984. He saw current "practice in CDT ... based on a set of criteria that have been contrived to include specific skills and processes and fit the confines of a subject and, sometimes, a single material; all of which limits the creative potential for the teacher and pupil"[16]. In an interview with the writer[17] *, Rogers portrayed the group's report as a recipe for conflict and compromise, given that the group had sought to reflect the views of traditional and progressive teachers. He advised the Manchester Assessment Project director not to publish the report and the advice was heeded.

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* Footnote: The Structured Interview

Yin+ identified six sources of evidence for case studies: documents, archival records, interviews, direct observation, participant-observation and physical artefacts. He also drew attention to three guiding principles in the conduct of case studies: firstly, multiple sources of evidence relating to the same phenomena will generally give more reliability than a single source, as cross-checking can be carried out. Secondly, a case study data base in which evidence is assembled, should form the basis of the case study report. And thirdly, a chain of evidence linking the questions, data, and conclusions will also help increase reliability.

+ Yin, RK, 1984, 'Case Study Research: Design and Methods', Beverley Hills: Sage Publications, Chapter 4.

Footnote: The Structured Interview (continued)....

In this study generally, the first five of Yin's means of evidence collection have been used. Similarly, the writer has attempted to use multiple sources of evidence, assemble documentation and establish chains of evidence.

In the quest to use multiple evidence sources, the writer has used focused interviews, generally to cross check evidence already in his possession. According to Yin: "a major purpose of such an interview might be simply to corroborate certain facts that the investigator already thinks have been established ... In this situation, the specific questions must be carefully worded, so that the investigator appears naive about the topic and allows the respondent to provide a fresh commentary about it ..." (page 83).

In this particular interview the writer had asked Rogers the following questions:

1. After your first term as a Manchester inspector, how did you view the state of CDT education in its schools?

2. What were your views, then, of the previous attempts at curriculum development which were embodied in the report produced by the Manchester Assessment Project CDT working party?

3. What use did you make of this report in your own CDT curriculum planning?

His answers were recorded by hand by the writer in summarised form and used to cross check evidence from other sources, in this case the writer's study of the document in question, and a discussion with its author - Goulden - to corroborate Rogers' views. Goulden agreed with Rogers on this point in a discussion which took place at Salford University on 11 April 1988.

Given that the district inspector's vision of practical education was, in his view, ahead even of the more progressive national manifestations of CDT, and that the vision of CDT embodied in the Manchester Assessment Project report clearly lagged behind these manifestations, he chose to move rapidly to pilot the concept base innovation and, in doing so, attempt to update CDT's contribution to the Manchester Assessment Project[18].

This was clearly a bold move in 1984. Drives towards equal opportunities for boys and girls, the development of a curriculum suitable for a multi-ethnic society, falling rolls, financial cutbacks, inner-city decay, the pedagogical problems of low pupil achievement and industrial action by teachers contributed to an ambience within which Manchester schools were then operating. Within recent years, the major reorganisations which had been necessary in the secondary sector had precipitated change in management structures, staffing, curriculum frameworks and teaching methods. The new concept base CDT initiative clearly had to be sensitive to this comtemporary and pervasive turbulence.

4.4 THE ROLE OF THE LEA INSPECTOR

4.4.1 Overview

Most LEAs employ professionals to offer specialised and general support to schools, as was noted in section 4.2. The dual role played by these professionals, highlighted by Holt[19], is reflected in a dual naming: some LEAs use the term adviser, some use inspector; in the interests of clarity, the term inspector is used wherever possible throughout the rest of this section.

Inspectors initiate developments and advise teachers on the one hand, and monitor teacher and school performance on the other. In recent years, in the face of increasing external demands for accountability, the latter role has been strengthened at the expense of the former.

Bolam et al[20] researched the role of the LEA inspector and found a clear preference for curriculum development and INSET duties rather than for evaluation; they also found that most inspectors offered help based on their own diagnosis of a problem rather than helping schools to formulate their own problem solving processes. This orientation may be linked to the specialist subject background of the inspector and, according to Holt, probably reduced their capacity to be involved in system-based, rather than subject-based, change. Significantly, the role of LEA inspectors is changing in the late 1980s: in Manchester, a review of the role has reduced the advisory and subject function in order to increase the inspectorial and generalist function (see section 8.5.4). Bolam et al[20] discovered that inspectors spent 63% of their time in meetings, working parties and engaged in administration, and only 25% inside schools and colleges. This lack of time for schools, their association, in the eyes of teachers, with external authority, and their two-way orientation towards schools on the one hand and LEA officers on the other, limited their power to effect change in schools.

Nevertheless, Owen[21] from his broad perspective as a chief education officer, illustrated a vision of inspectors which teachers had. Teachers clearly believed that inspectors exercised power in the education service, through their influence

on appointments, promotions, financial support and the awarding of release from teaching for INSET; they also often controlled the flow of information about new developments into schools. For Owen, the most successful inspectors were sensitive to this situation, realistic and practicable. Also, according to Cave[22], there was "considerable evidence that it is through the local authority and its advisory services that the opportunities open to schools and teachers are created, defined and negotiated".

Winkley's[23] more recent research revealed an expansion in the inspectorial services. In the 1970s, extra appointments were made to cope with increasing INSET demands, changes in teaching and school organisation and new policies to support socially deprived pupils, all in the face of a shrinkage in the national inspection duties of Her Majesty's Inspectorate. In the 1980s, school reorganisation for falling rolls, redeployment and accountability *further increased the demands on inspection* services.

Although Winkley detected a marked trend towards inspecting and away from advising, he concluded from his research that the advisory role is vital, and that there was abundant evidence to suggest that such an activity influences events. "As a step forward in this professional development of teachers - and their development of an advisory role - there seems every reason why advisers should, ... progressively draw teachers into self-support and self-development groups. There seems every reason for exploiting the talents of the best teachers on a wide scale. Teachers, in particular, need to consider how to achieve a more developed understanding of teaching: we need to know more

about the skills involved in professional self-analysis and research activity, the meaning of institutional consultation, the kind of advice-in-depth that will sharpen personal service and institutional vision. Consultation, advice and research appear on the evidence to need to be based on (i) a hermeneutic receptive process of listening, (ii) accurate observation, (iii) honest and precise criticism. These relatively simple ideas (but complex practices) need to form the basis of an informed and persistent dialogue between practitioners inside and outside schools"[23]. The concept base innovation was, to an extent, managed along these lines, as will be shown in the next chapter.

4.4.2 The Manchester CDT Inspector

The inspector, Rogers, took up appointment in April 1984. He had a background in: training CDT teachers at Liverpool Polytechnic; as head of a large art and design faculty in a Cheshire comprehensive school; as tutor in a Cheshire art college; and as a technical studies teacher in a Midlands comprehensive school. His initial qualifications were in art and design, specialising in silversmithing, and he had acquired a national reputation in CDT circles for graphics.

Three aspects of his background and working style heavily influenced his role within the concept base project. Firstly, he contrasted sharply in background with his predecessor, who had been a design engineer by training and had injected considerable resources into the development of control technology. Many Manchester teachers were suspicious of the new inspector's aesthetic background, child-centred educational philosophy and flamboyant style. The inspector had been warned by a teacher

colleague in 1985 that some teachers who had enjoyed influence within the previous inspector's INSET activity and who rejected elements of Rogers' CDT philosophy were covertly resisting his new ideas.

Secondly, whilst working as a teacher trainer, Rogers[24] had tackled a problem which his retrainee students had faced in developing schemes of work for school teaching. Basically, in their transition from handicraft to CDT, they had experienced difficulty in identifying suitable project activities for pupils. He developed a method of deriving such activities from a study of people and their needs and aspirations. This evolved into his child-centred concept-base philosophy.

Thirdly, he actively encouraged teachers to take risks and gain new experience as part of a policy of staff development interlinked with curriculum development: for Rogers, this meant teachers "working harder, taking responsibility and making mistakes. This is always the case when involved in curriculum innovation at the sharp end of change"[25]. In 1984, the concept base project was one of twelve which he financed from his inspector's estimate (see page 130) within the LEA. The others are shown overleaf.

Rogers' predecessor had retired eighteen months earlier and the LEA had experienced difficulty in appointing a suitable replacement: three rounds of advertising and interviewing were held and the two candidates chosen in rounds one and two both turned down the offer of the post, which is perhaps a reflection of the great deal of development required to bring CDT up to date

Figure 3: Curriculum Projects Established by the Manchester CDT Inspector for the Academic Year 1984-85

I/TR/0016a

The following Curriculum Studies are now being planned:

These are special Research and Development programmes being undertaken on behalf of the Inspectorate: Co-ordinator: Tony Rogers: District Inspectors.

Plastics Technology	:	Brookway School
	:	St Joseph's RC Girls' School
	:	Moston Brook
Computer Aid to Graphics	:	North Manchester High School
Graphic Communication	:	Burnage High School for Boys
Equal Opportunities (CDT)	:	Poundswick High School
Safety in a Multi Media Environment	:	Wright Robinson High School
Consumer Education in a CDT Context	:	Ellen Wilkinson High School
Micro Computers in CDT	:	Ducie Central High School
	:	St Thomas Aquinas RC High School
Resource Centres in a Multi Media Environment	:	Abraham Moss Centre
Drawing in a Multi Media Design Studio	:	St Thomas Aquinas RC High School
Experimental Media in an Art and CDT Area	:	Ducie Central High School
Imagineering and Flights of Fancy	:	Newall Green High School
Integrated Studies in the Lower School CDT Area	:	Cardinal Newman Upper (St Paul's)

Tony Rogers
District Inspector

in the city. There was thus a considerable backlog of inspectorial duties to attend to as a result of this interval.

His perception of this backlog, disclosed in an interview with the writer[17], can be summarised as follows. The 'inspector's estimate' budget controlled by his predecessor had been administered in the interim by a group of other inspectors. They had simply responded to the CDT funding requests made by schools. Rogers reversed this on his arrival: he observed CDT in schools to determine the directions of development and invested money in those where modern approaches to CDT were being attempted; he refused to invest in departments which continued exclusively to teach separate metalwork, technical drawing and woodwork courses. For example, he was invited into one school by its senior management with a view to financing the updating of workshop facilities. He visited the school to find very traditional craft courses in operation and refused to invest in updating facilities for these; however, he was impressed by the work being carried out by one young teacher, whose background was in theatre design, and whose efforts were being met with hostility from the very traditional head of department. Rogers allocated £2000 for the development of this work, to be used in the one room only, and to be controlled by this particular teacher. In two other schools, he refused requests for investment in CDT departments because they were making no attempts to modernise. However, in both schools, new young heads of department were subsequently appointed with briefs to bring about rapid change. In both cases, the inspector responded by investing significant sums to aid in their development process.

Finally, Rogers' view of INSET can be summarised as:

"In-service is planned to improve the quality of the education service and provide teachers with an opportunity to update skills and come to terms with other manifestations of change. Teachers must feel the need for change, know that something has to be done and perhaps have some ideas as to what is needed; but they may also need help to identify the need and then provide the access to time, resources and introduction to like-minded colleagues to give them confidence"[26]. In an interview with the writer[17], Rogers explained his belief that imposing change on teachers from above would usually be counterproductive unless they fundamentally changed their attitudes. He preferred not to so impose, but to state his own belief and leave the teachers to make up their own mind: he would then fully support them if and when they asked for help to develop in his preferred direction. He also cited the large amounts of self-help departmental development work being carried out. He drew attention to HMI comments about the impressive extent to which this was observed during the 1987 inspection of CDT in the city, as evidence that teachers will go to great lengths to bring about improvements if they feel that they 'own' them. This methodology thus clearly resembles that noted on page 34 of the present study, in which successful companies found ways to support product champions, even tolerating a degree of failure. It also highlights the role Rogers himself played as product champion in the concept base project, the operation of which is described in the next chapter.

4.5 CONCLUSIONS

The general context within which the innovation was attempted, and some of the forces impinging on it from LEA management sources can

thus be seen. Also, this chapter has introduced the innovation's 'product champion' and outlined some aspects of his background and educational philosophy which informed his stance towards the project. The next chapter describes how the project grew from this context, and in particular examines the work of the pilot study working party which was directed by the writer from September 1984 to July 1985.

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17. A focused interview between the writer and inspector held at Salford University on 30th March 1988.

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23. Winkley, David, 1985, Ibid, page 223.

24. Rogers, Tony, 1986, Ibid, (printed in Heywood, J, and Matthews P, 1986, Ibid, page 167.

25. Rogers, Tony, 1986, Ibid, (printed in Heywood, J, and Matthews P, 1986, Ibid, page 178.

26. Rogers, Tony, 1986, Ibid, (printed in Heywood, J, and Matthews P, 1986, Ibid, page 162.

CHAPTER 5: THE INNOVATION - PILOT PHASE

5.1 SUMMARY

The project was established within the Manchester LEA by the CDT inspector, who appointed the writer to direct the pilot phase in the academic year 1984-85. The underlying philosophy was the inspector's: he acted throughout as mentor to the project working party, and as product champion. He believed that 'making' should hold a wider place in the school curriculum than was held by the manifestations of CDT prevailing at the time, which were, in his view, too heavily product and process dominated. Making, rather, should be fundamentally concerned with (1) meeting human needs and (2) furnishing experiential learning in pupils' exploration of the "human condition". Accordingly, he had identified a number of categories, or concept bases, through which pupils could mount this exploration.

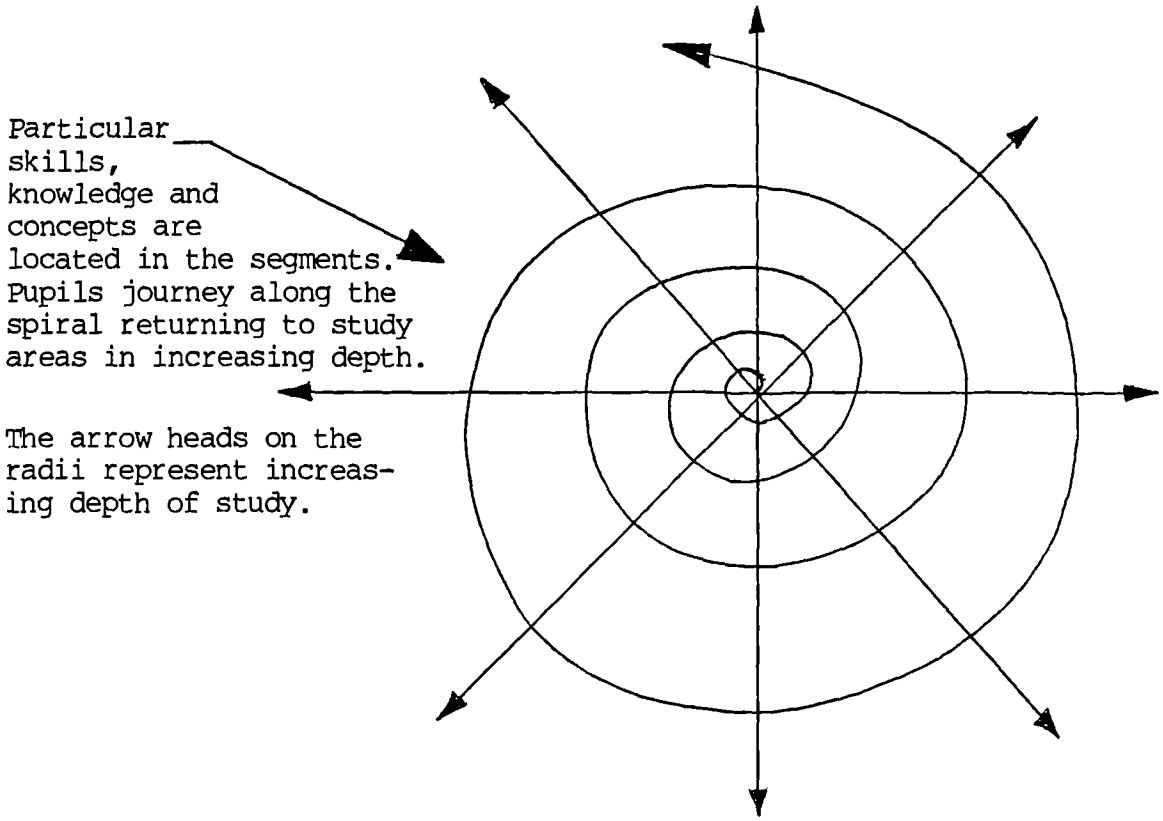
The writer led a working party of teachers which was charged by the inspector to develop and trial teaching materials to reflect this philosophy. In a parallel but independent development, a whole school CDT department was supported by the inspector to develop schemes of work along the same lines as the working party.

At the end of this academic year, a proposed expansion of the pilot phase was abandoned in the face of mounting teacher industrial action, and this part of the innovation ceased. The innovation is evaluated from the perspectives of: external individuals; the working party; and the inspector. It includes an identification of the major problems, or barriers, revealed by the pilot project, including industrial action.

5.2 ESTABLISHING THE PROJECT

As described in the introduction to section two, Rogers introduced his views on the future of CDT to a meeting of Manchester CDT teachers in April 1984. The writer listened to this address and noted a degree of congruency with a curriculum development project he was already engaged in at the Abraham Moss Centre[1] in the city. The Abraham Moss Centre was a large community education complex with various functions. A major constituent was a combined 11-16 high school and college of further education. The writer was Head of the Creative Arts Faculty in this combined school and college. In the academic year preceding the concept base project he had been allocated £500 for materials plus two hours per week teaching remission by the Assistant Principal (Research and Development) to direct a curriculum development project in the 11-13 sector of the CDT department in his faculty. In this he had attempted to develop a CDT foundation course in which selected skills, knowledge and concepts would form the basis of a pupil's progression through a course of study. He believed that progression was not sufficiently considered in the development of CDT schemes of work, a view which was endorsed in 1987 by HMI[2]. The cornerstone of his approach to progression was based on Bruner's[3] notion of a 'spiral curriculum' in which particular skills, areas of knowledge and concepts are repeatedly returned to, and tackled at increasingly greater depths, as a pupil progresses through a course. The spiral, in Figure 1, plots a pupil's path through such a course. Time is represented by the extending radii in the diagram, and the various segments represent coherent academic strands of the course.

Figure 1: WRITER'S CONCEPTION OF BRUNER'S SPIRAL CURRICULUM



The writer wrote to the inspector on the 11th April to request a meeting. The writer intended that at this meeting the new inspector would review the origins and nature of the Abraham Moss curriculum development, and consider a proposal for "a pilot curriculum based on Bruner's[3] notion of the sequential development of concepts (relating to our 'material culture') within a spiral curriculum"[4]. He also proposed a joint school-based activity which might, if successful, form the core of an LEA-based INSET programme.

Rogers replied on the 19th April expressing great interest in the work being carried out at the school, and in meeting to discuss it, arguing that "it could be a possible in-service programme and ... even more important as a contribution to national developments"[5]. At a subsequent meeting on the 11th June, a pilot research and development project was discussed, and on June 21st the writer

received written confirmation that he had been appointed by the inspector to direct the concept base pilot study, initially from September 1984 to April 1985, at the Abraham Moss Centre. An allowance of £1000 was allocated from the inspector's CDT 'estimate' budget to "set up resources and prepare stimulus materials"[6].

In an interview with the writer nearly four years later[7], Rogers reiterated the intentions behind his establishment of this project. Firstly, he believed that CDT, locked into subject-specific skills and processes, did not have a long-term future unless it was oriented more towards human needs. Secondly, he wanted an effective method of integrating CDT with other areas of the curriculum. Thirdly, he recognised a need for external certification and some form of 'mode three' GCSE examination, ie. formulated and assessed by teachers, but validated by an external examination board. He wanted the project to begin to realise these aims, with teachers developing, trialling and evaluating strategies for a concept base CDT curriculum; in this sense he wanted the CDT teachers to enhance their professionalism by following the path of 'Teacher as Researcher' identified by Stenhouse.[8] The project, initially a working party of teachers directed by the writer and meeting weekly after school hours, was charged to develop and trial concept base CDT teaching materials. Its detailed operations are described in section 5.4, but first an examination of the underlying philosophy of the approach is necessary.

5.3 THE NATURE OF THE CONCEPT BASE APPROACH TO CDT

The philosophical basis of this approach to CDT was introduced to the working party by the inspector at the start of the project and

was adopted and adapted by this group throughout the year. This basis was considered by Rogers to be fully in tune with the city council's educational policies (see section 4.3). It drew heavily on the philosophy espoused in 'Design in General Education', a DES-funded development project led from the Royal College of Art in the early 1970s, in which Rogers participated[9]. It was also similar to the approach proposed by Grant[10] in the 'Girls and Technology Education' project which reported in 1982. Grant articulated the belief, backed by some research evidence from the physical sciences, that girls and boys will more readily engage in design and technological activity if that activity is set within a consideration of important social issues. An illustration of how Grant believed problem solving could arise from a consideration of the issue of 'burglary' is shown in Appendix 1. The philosophical core of concept base CDT can be expressed as follows.

Making, doing and using action should form significant and legitimate elements of the whole curriculum, as well as being the cornerstones of Craft, Design and Technology. When the curriculum is penetrated in this way, pupils should develop capability to improve the quality of life and, it is argued, are stimulated to make meaningful enquiries into the human condition. The mode of learning is active rather than passive; this stems from a widely held belief, deriving partly from Dewey (see pages 23-25), that most children respond more positively to an education which is active: they also learn more effectively. Flexibility, ease of response to developing situations, negotiation between teacher and pupil, and collaboration between pupils are key features of the approach. It is concerned with children rather than miniature adults, and is for both sexes, the whole primary and secondary age

range, and all levels of ability, social and ethnic background. Pupils' activity will not be confined to a limited range of media, skills and thought processes; media and skills will be selected according to the criteria of appropriateness and practicability; thought processes will embrace intuitive responses to situations as well as logical problem-solving. The approach is essentially a counterbalance to the bookish and academic forms of learning which prevail in schools, and is offered as an evolutionary step beyond what is currently entitled CDT.

The starting points are located within a cluster of ten 'concept bases'. These represent Rogers' attempt to categorise features of the 'human condition': as such, they are not offered as absolute and timeless fiats but as a system of currently useful starting points. The ten original 'concept bases' were[11]:

1. Images of self
2. Reaching out to people
3. Awareness of places
4. Cultural identity
5. Owning
6. Motives for action
7. The human capacity to take action
8. Ways of taking action
9. Change and control
10. Audience reaction

During the course of the project, Rogers, who operated as a 'mentor' to the working party, reduced the ten to a group of six after discussions with group members; and he removed the numbers as he believed that working party members had interpreted these as conferring a priority on the bases:

Images of self

Reaching out to others

Awareness of time and place

Motives for action

Human capacity to take action

Ways of taking and directing action

Each base subsumes a wealth of concepts, knowledge and sources of cultural attitudes from which potential starting points for learning and teaching can be derived. An example of how one teacher derived and developed a major GCSE teaching package from 'motives for action' is shown in Appendix 2.

The concept base approach to CDT was thus not a fully developed, trialled and packaged innovation ready for diffusion throughout the city schools. Being new to most Manchester teachers, it was potentially innovatory; but it was also undeveloped and open-ended. This lack of central development was a fundamental tenet of the approach: development was expected to unfold in each school to suit the people and conditions found therein. However, although teachers who would adopt this innovation would have considerable scope for autonomous curriculum development, they were expected to assimilate the following:

1) values which recognise the potential capability of <u>every</u> pupil;

2) a belief in the importance of doing, making and using action in the curriculum;

3) an acceptance of interdisciplinarity and collaboration with colleagues;

4) a child-centred teaching style;

5) acceptance of uncertainty, fluidity and the role of co-learner

in the classroom;

6) the concomitant willingness to reorganise logistical and pedagogic systems where necessary; and

7) willingness to experiment, develop and share new teaching materials.

Although the innovation was deliberately introduced in undeveloped form so that teachers could develop it to match their specific professional circumstances, a concomitant vagueness of definition, with hindsight, clearly generated tensions within the pilot phase. These are described in section 5.6.3, and they reflect the conclusions relating to the literature on innovation described in section one.

5.4 THE CONCEPT BASE WORKING PARTY

5.4.1 Establishment, Brief and Composition

Towards the end of the summer term, all Manchester CDT teachers were alerted, in writing, to the six CDT INSET programmes to be offered in September 1984 (see Appendix 3). In this circular, the concept base pilot study was described as an "In-Service/ Working Party which will explore the potential of a practical approach to teaching and learning in a future curriculum".

On September 4th, Rogers again wrote to all CDT teachers to remind them of the pilot study, and its launch on September 12th. He also circulated a description of the proposed activity to emphasise the importance he, as inspector (and product champion), was giving to the activity. He did not circulate similarly full descriptions of the five other INSET programmes.

His description, which formed the brief for the working party, is reproduced below.

"In April 1984 a lecture≠ was arranged for all CDT teachers with the title 'Future Predictions'. This presentation outlined a positive method of anticipating a future for children around which we could build a contemporary and future role for making, doing and using action across the curriculum. One prediction was based on a new approach to action based teaching and learning which was introduced as 'the concept base'. A very brief description of 'the base' was given and in the short time devoted to the session, little could be done to provide a more detailed and graphic insight into this approach. Generally, early 'field trials' have been considered by HMI and inspectors and teachers, and their responses have been very encouraging. Evidence of improved teaching performance and positive pupil response has been clearly illustrated in the new curriculum packs prepared by teachers and in examples of children's work."

"This pilot study will develop from a more comprehensive description of developments of the concept base to date, and then the group will begin to explore this approach by developing and testing curriculum packs."

"Assessment and evaluation of teacher and pupil performance will be an important aspect of the study, and it is hoped to link the CDT/MAP* study to 'the concept base' and complete a new working document on the role of CDT in the school curriculum."

* Manchester Assessment Project

≠ Which Rogers gave.

"Applicants for this programme will be engaged in a study which will require them to develop projects for field trials in their own teaching timetable and some time will have to be devoted to lesson planning - the development of new resources and evaluation schemes, etc. The activity will be based on initiative - personal research and some original thinking. Report back sessions may require course members to 'lead sessions' or 'write papers'. Those who apply to join this group will be involved in activity which in these circumstances would be equivalent to degree level study and much of the course content has derived from recent programmes of in-service at B.Ed (Hons) and M.Ed levels."

"Teachers are agents for change - I hope that you will consider this in-service course as an opportunity and a challenge."

This statement was circulated to raise the profile of the activity in the eyes of CDT teachers. Its stress on undergraduate and postgraduate 'equivalence' arguably signalled a message to Manchester CDT teachers, most of whom were not graduates, that the activity was a challenge for the more committed and talented. The choice of the Abraham Moss Centre, with its sophisticated in-plant facilities[12] for the production of teaching materials, including the services of a graphic designer and access to off-set litho printing equipment, also proved to be significant in enabling the group to produce teaching materials to a level of quality then unattainable in other Manchester secondary schools.

The working party was first convened on September 11th 1984, and met regularly on one evening per week after school throughout the

1984-85 academic year. Although group composition changed slightly during the year, the average attendance was fourteen members, with a total membership during the year of seventeen. The membership pattern is shown in the chart below.

Figure 2

Composition of the Concept Base CDT Pilot Working Party

Code No	Gender	Age Range at Start	Teaching Specialism	Role	Institution
1	F	C	CDT	Teacher	Special School
2	M	B	CDT	HOD	Secondary:Voluntary
3	M	B	CDT	HOD	Secondary
4	M	A	Science	Teacher	Secondary
5	F	B	Art	Support Teacher	LEA Support Services
6	M	B	CDT	HOF	Secondary:Voluntary
7	F	D	Art/CDT	HOD	Secondary:Voluntary
8	M	C	CDT	HOD	Secondary
9 =	M	B	CDT	HOD	Secondary
10 *	M	A	CDT	Teacher	Secondary
11	M	C	CDT	Inspector	LEA
12 +	F	B	Science	DH	Secondary
13	M	B	CDT	HOD	Secondary
14	M	A	CDT	Teacher	Secondary
15	M	B	CDT	HOF	Secondary/Tertiary
16 **	M	B	CDT	Teacher	Secondary
17 *	M	A	Architec-ture/CDT	Teacher	Secondary

KEY

(1) Age Range	(2) Roles	(3) Membership Time
A = 21-25 years	HOD: Head of Dept.	* From Easter 1985
B = 26-35 years	HOF: Head of Faculty	** Until Easter 1985
C = 36-45 years	DH: Deputy Headteacher	+ Until January 1985
D = 46-50 years		= From January 1985

Of particular importance in the group's composition were age, gender and role of members. A breakdown for each is shown below:

Figure 3

AGE			GENDER			ROLE		
Age Range	Number	%age	Gender	Number	%age	Role	Number	%age
21-25	4	24%	Female	4	24%	Teacher	7	41%
26-35	9	52%	Male	13	76%	HOD/HOF	8	48%
36-45	3	18%				Dep/Head	1	6%
46-50	1	6%				Inspector	1	6%

48% of group members were heads of department or faculty. Given the prevailing ratio in the city of one such person to between three and eight assistant teachers in any one school, this high percentage is significant. As the group developed, the influence of these individuals was far greater than their numerical status of 48% would suggest. 24% of group members were women, compared with an LEA proportion of CDT teachers of less than 1% in 1984[7]. Also of significance is that 76% of the group were below the age of 35, which needs to be viewed against the older age-profile of the city's CDT teachers, many of whom were close to retirement[7]. The group, therefore, arguably represented a self-selecting 'new wave' of teachers within the LEA.

5.4.2 Activities

The working party carried out its activities on a regular basis, meeting together at the Abraham Moss Centre as a whole, according to the diary shown below. Certain members also held additional informal meetings. Members 1, 2, 3, 4, 7, 9, 10, 13, 14, 15 and 17 also trialled teaching materials in their own establishments and reported back regularly to the whole group.

Diary

12/9/84 Introduction to the idea of Action Based Learning: Tony Rogers

19/9/84 Starting Point Search: Tony Rogers

3/10/84 A practical example from Knowsley: Neil Nuckley

10/10/84 Group Work initiated by Neil Nuckley

17/10/84 Review: Barriers to Curriculum Development: Peter Toft. Group target setting

7/11/84 }
} Exploration, in two groups, of TERRITORIALITY and TIME
14/11/84}
} as starting points for learning. Production of outlines
21/11/84}
} for curriculum packs
28/11/84}

14/12/84 Review of Progress

9/1/85 A Curriculum Model for the concept base: Peter Toft. Group target setting

16/1/85 Analysis of barriers; group discussion on way forward

23/1/85 }
} Brainstorming in three groups, for ideas for project
30/1/85 }
} development within each of the 10 concept bases
6/2/85 }

27/2/85 } Began development of two curriculum packs: CHANGE &
}
6/3/85 } CONTROL: AWARENESS OF SPACE
}
13/3/85 }
} Continued development
20/3/85 }

11 & 12/4/85 Holiday workshop

17/4/85 }
}
17/4/85 }
}
24/4/85 }
} Continued development (Review of Shrewsbury Conference)
1/5/85 }
}
8/5/85 }
}
15/5/85 }

22/5/85 General Assessment Principles for GCSE: Jill Saunders (Assessment Development Unit)

5/6/85 } } Editing of Curriculum Packs 12/6/86 }

19/6/85 Exibition and Review

26/6/85 Editing

9/7/85 Editing sub-committee at Greenheys

5.4.3 Achievements

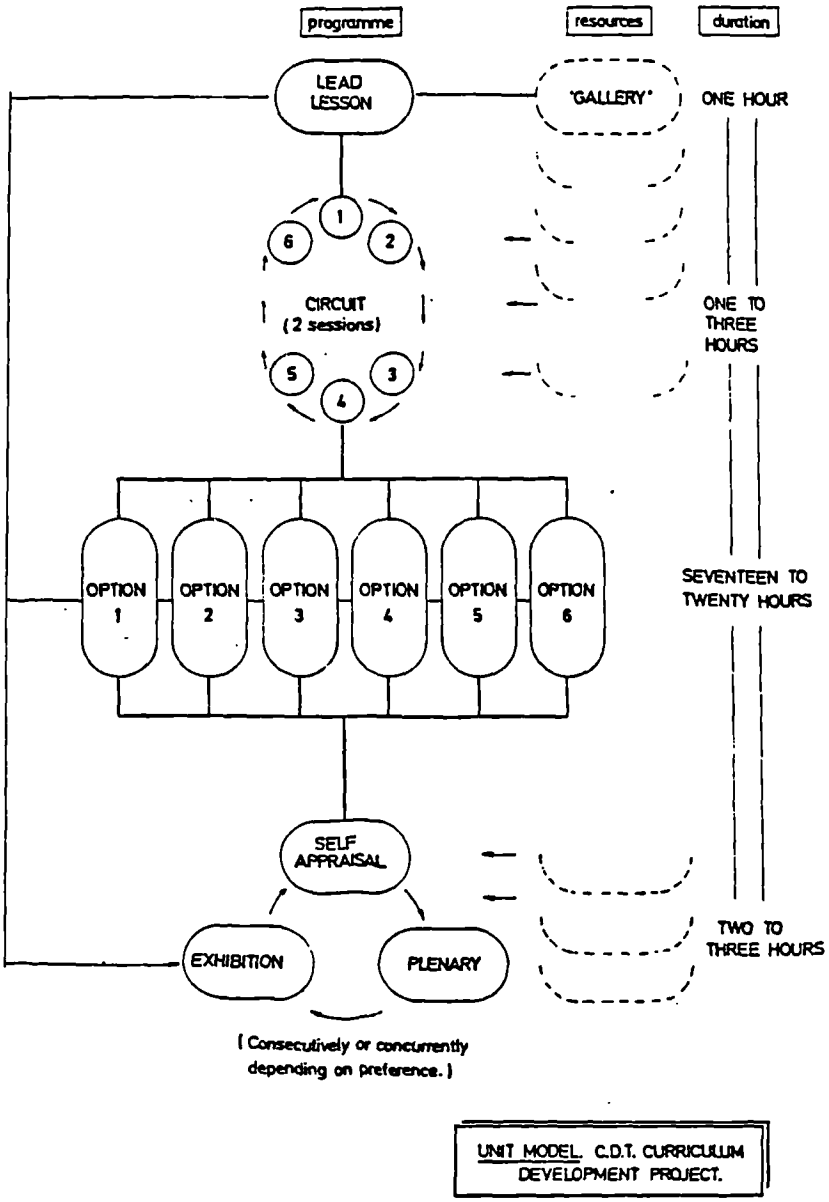
The group produced a range of curriculum materials which were exhibited at the Abraham Moss Centre on 19th June 1985 and more widely at a large LEA teacher's conference held in a Shrewsbury hotel between 13th and 15th February 1985 (see Chapter 6). Two major 'curriculum packages' are described below.

A) Awareness of Space

This unit was produced with the concept base Mode 3 GCSE proposal in mind. Intended to cover an introductory half term for fourth year pupils embarking on such a course, its aims included: to motivate and stimulate a desire to do and make; to increase awareness of the effects of spaces on the way we live, of the effects of the way we live on the environment, and of the way we organise space. A comprehensive curriculum model (see below) formed the basis for a wide range of activities and variety of pace to suit particular pupils, teachers and schools. The unit began with a lead lesson to focus pupils' attention on space and to stimulate interest using a variety of exciting demonstrations. Phase two - circuit - consisted of a selection of short activities designed to reinforce the major points covered in the lead

lesson, and to engage pupils in discovery learning within elements of space, ranging in scope from small containers to large environmental spaces. Following the initial orientation of phases one and two, pupils were able to select 'design-make-test' project options, which were structured to develop ideas introduced in phase two. The whole unit was supported by a gallery of photographs for visual stimulus. The self-appraisal, plenary, evaluation and exhibition of project work were not developed, but the intended curriculum structure is shown below.

Figure 4.



(Drawn by D Dickinson)

B) Change and Control

By contrast, this pack was produced for pupils in the lower secondary age range, with sufficient flexibility to be adaptable for use in both special and comprehensive schools. Also, much of the project work was successfully trialled in a special school, girls high school and mixed high school. Its prime aim was to cause pupils to discover that they can change and control, to varying degrees, their own surroundings. It began with lead lessons derived from the general teacher notes, took pupils through a varied sampling of control, eq. in the areas of materials processing, machine control, product design, and culminated in major design and make projects; these were based on the themes of time, and motorway transport. The pack was provisionally presented as a teachers' booklet, and a pupils' booklet. It was essentially a topic for individual schools to adapt to their own circumstances.

5.5 PARALLEL DEVELOPMENTS IN A SINGLE SCHOOL

The Design and Technology department of St Mark's RC High School engaged in similar developments at this time, but operated independently of the working party. This boys' school had a favoured catchment area with a large number of pupils from middle class homes. Its large and successful Design and Technology Department was headed by Astin, who was a regular INSET tutor in the LEA and beyond. The school was earmarked in March 1985, by HMI, as one of the more effective modern Design and Technology departments in the North West, to be visited by a delegation from East China University, Shanghai[13]. Members of the department had for some time been developing an approach to CDT which resembled

that of the working party and a limited exchange of ideas took place between the groups. Rogers encouraged this, by convening and chairing a meeting between the working party director and the school's CDT staff at the school on 5th December 1984. At this meeting, the project director outlined the nature and achievements of the project, and the school's head of department outlined developments taking place in the school which had begun before the party convened. The inspector had intended the meeting to precipitate collaboration between the two groups. However, the department's teachers made it clear at this meeting that they preferred to continue independently to develop an approach which they had pioneered before the concept base working party started; although they were prepared to pass new ideas and teaching materials on to the working party, they were not convinced that the working party's products would be of sufficiently high standards and only agreed to examine them, not necessarily to trial them. The strength of the notion of 'ownership' was clearly demonstrated in this intercourse.

This department was able to engage in precisely-focussed curriculum developments during the normal timetable, whereas the concept base working party was hindered by its part-time mode and by general teacher industrial action (see section 5.8). The department subsequently expanded in a school merger and its philosophy, and practice, were later outlined in public by Astin[14]. A core element of this important statement is reproduced below.

"SOCIAL ISSUES AS STARTING POINTS FOR CDT: David Astin

Craft, Design and Technology courses have, to date, purported to meet the needs of the pupil but have failed by divorcing themselves from the true context and, as a result, have borne little resemblance to the real needs of the individual pupil. This failure has been illustrated by projects like the designing and making of a tea-caddy spoon when most, if not all, pupils use tea bags, or the tap lever/door handle for disabled or arthritic people without any research being given to the physical limitations caused by being disabled or arthritic.

Both the 'design brief' and 'problem-solving' approaches have been tried, usually unsuccessfully, to redresss this area of concern. The lack of success being due to the common practice of basing the brief or problem on such things as an artbitrary theme, a surplus of a given material, a process or a technique.

These approaches have ignored the needs of the individual and the human context and, as a result, have not provided meaningful experiences for the majority of pupils.

If the potential of doing and making as powerful ways of learning is to be realised, and if doing and making are to have any relevance for the individual pupil, then these activities must relate to all pupils, their needs and to the context within which they live.

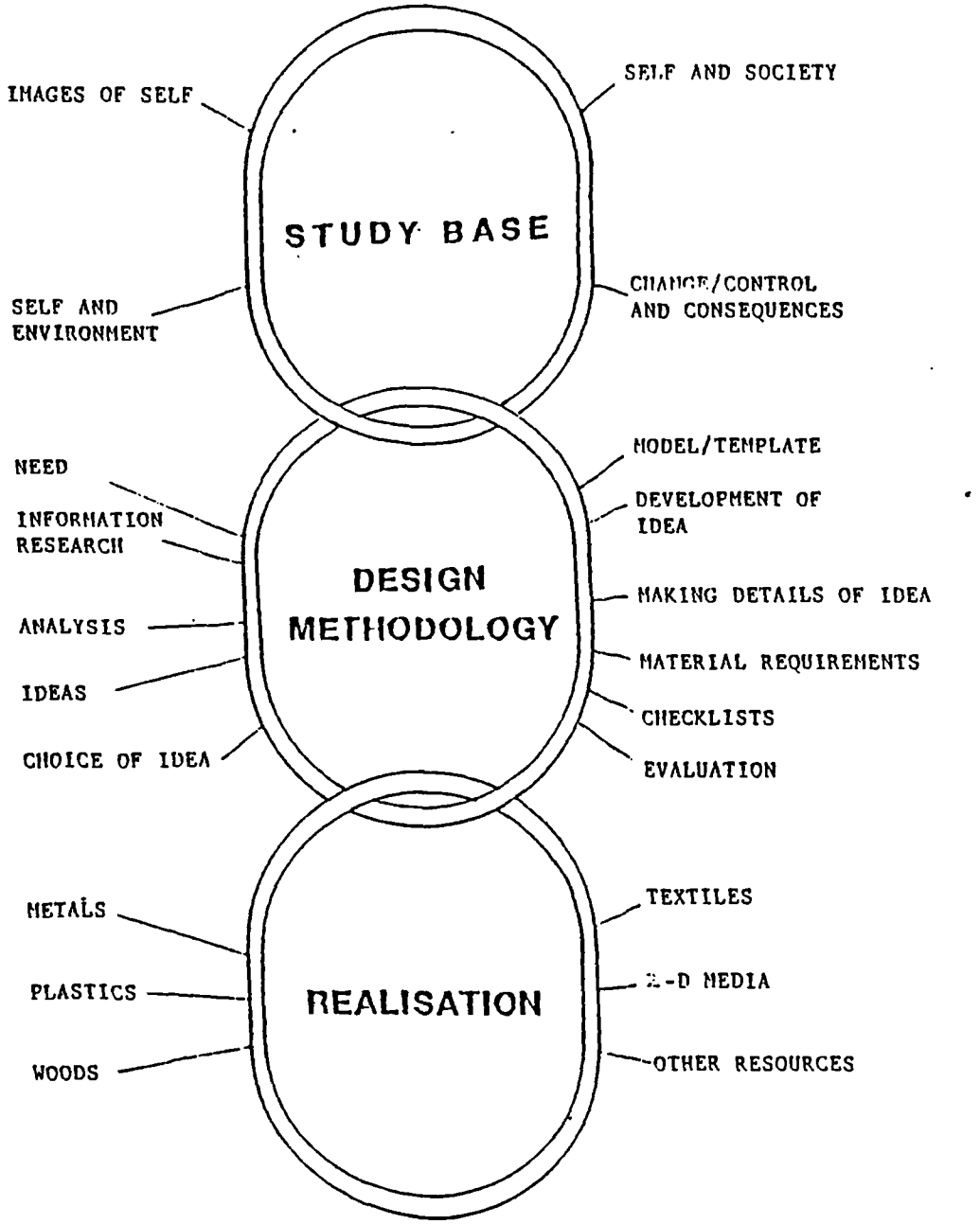
These aims are met at Barlow RC High School by creating areas of experience for the pupils, which underpin the human condition by putting doing and making into context.

The individual, his/her identity, needs, motivations, attitudes, values, emotions and expressions are central to this and form the first study base - IMAGES OF SELF. People are part of a larger human unit, whether it be the family or the community (local, national, European, social, religious) which forms the second study base - SELF AND SOCIETY. Humans, both singularly or collectively, live and move within a space or setting identified as environment and the third study base - SELF AND ENVIRONMENT.

The three study bases identified so far are all affected by change, for example, people grow older, society and cultures develop, and environments are altered by man or natural elements. We, as humans, have an inherent need to try and control such changes which, in turn, lead to certain consequences and the fourth study base - CHANGE/CONTROL and their CONSEQUENCES.

Each base should be considered as a source from which numerous STARTING POINTS can be generated for doing and making."

The school's study bases, and methodology for teaching design and realisation are summarised in the diagram below[14].



Whilst the concept-base pilot project was exploring such ideas for two hours per week, this department was developing and testing curriculum materials on a full-time and collaborative basis. The department thus developed the concept-base approach to CDT more rapidly and coherently than the working party. The reasons for this would obviously include: its full-time preoccupation with the approach; the favoured catchment area of the school; and its talented, cohesive and well-led CDT department. In addition,

however, this phenonenon parallels the findings of Peters and Waterman (see page 99) indicating that in some excellent companies, innovation was brought about by small goal-directed task groups, often of the size of a school department, consisting of volunteers, running for limited periods, and setting their own targets.

One clear implication for future development would be for the inspector to seek out similar departments and support them, and simultaneously bring them together to share ideas from time to time. This could create a diffusion network with a richness of information exchange between the various departments or 'cliques' (see page 89). If managed well, this would also stimulate the kind of in-house competition found by Peters and Waterman also to promote continuing innovation.

5.6 AN EVALUATION OF THE PILOT PROJECT

No formal external evaluation was scheduled and therefore the writer carried out an internal review. The inspector also communicated with outside individuals throughout the pilot project's life cycle and some responses are summarised below. Section 5.6 also draws on a questionnaire administered by the writer to working party members at the end of the project, together with notes recording the proceedings of working party meetings, and a final structured interview with the inspector.

5.6.1 External Responses

After an introductory period heavily directed by the inspector, working party members wanted to place Rogers' 'concept-base' philosophy in a wider context by eliciting comments from distinguished educational figures. At the group's request,

Rogers circulated a document about the concept-base project to such figures. Two such responses are summarised below.

Hicks[15], the DES/HMI staff inspector with responsibility for CDT, wrote that "it all depends on what you mean by 'concepts'. Whilst I would agree that most of those listed ... [are] ... worthwhile subjectives (sic) for any teaching programme, I would find them extremely difficult as educational concepts that could be used in the planning of courses." He believed that teachers would need a great deal of support in coming to use the concept bases effectively, a view which became increasingly apparent to the working party as it strove to develop course materials. Nevertheless, Hicks' response spurred the group on to demonstrate that it did have the necessary ability to use the bases effectively.

Secondly, Eggleston, a prominent professor of education with an interest and track-record in CDT, wrote[16], "I found them interesting and even exciting. I'm not sure I would see your 10 bases as 'concepts' in any technical sense, and they are by no means exhaustive - but they are certainly key and relevant themes and lead to some very sound ideas."

Such messages had two effects on the group other than the one inspired by Hicks' letter (see above). The first, and intended, effect was to broaden members' vision and enable them to evaluate their developing thoughts more critically. Secondly, Rogers took the group's request to elicit such comments as an opportunity to generate a "Hawthorne effect": in this way, he raised excitement and morale within the group, strengthening members' view that

they were engaged in a significant and worthwhile endeavour, and arguably increased productivity by the exercise of positive reinforcement (see section 3.6.3).

5.6.2 Formative Group Self-Evaluation

The group engaged in much discussion of its aims and activities, particularly in the exploratory first term, attempting to resolve problems as they arose. In doing so, members became 'reflective practitioners' as they eased themselves into Stenhouse's 'teacher-as-researcher' mode (see page 56). They also confirmed Taba's claim (see page 73) that working in groups can release intelligence, raise the dynamism of thinking as associations are triggered, and give moral support to teachers who are normally isolated in their innovative activity.

During week five, the group attempted to review its progress. Previously, it had asked the inspector not to attend this review session, because members wanted to discuss progress uninhibited by a senior management presence, and also wanted more scope to express their own partially-formed ideas which some had found difficult in the presence of the inspector. Reflecting his belief in the importance of 'ownership' (see page 144), Rogers stayed away during week five. The group reviewed its progress and eventually agreed to issue the statement, reproduced below.

"REVIEW 17 October 1984

This in-service course was originally described as an "In-Service/Working Party which will explore the potential of a practical approach to teaching and learning in a future

curriculum".

The first four sessions have been offered to 'set the scene'. In the first week Tony Rogers described his ideas and their origins in: (a) the proposition that we are primarily educators of children and that subjects, eg CDT, are simply means to achieve this education; and (b) that the contributions CDT may make to this derives from our capacity to take action by 'modelling'. He offered ten fundamental concept bases which lie at the root of human experience and argued that they should form the starting points for pupil learning. When pupils are set (and set themselves) tasks which stem from the context of these bases, the purpose of school CDT activities to pupils should be clearer, motivations should be enhanced, and learning should be deepened.

In week 2 - "Starting Point Search" - Tony Rogers outlined a method of developing pupils' activities from Concept Base 1: "Images of Self", in particular .. "Human Needs and Motivations". Brainstorming sessions within such a base would generate an explosion of ideas for teaching and that these would be whittled down to ideas which would fit the criteria of MODELLING and ACTION BASED LEARNING. With the resulting large number of ideas, teachers would be able to use different aspects of the same concept base with different groups within any one year, using common 'lead lectures', booklets, resources, etc.

In week 3, Neil Nuckley outlined his own approach to concept-based CDT and described a project which he developed

whilst studying for a B.Ed degree. In week 4, he engaged the group in a practical design project linked to his presentation the week before.

Session 5 marks the transition from an INSET course to a Manchester Education Department working party, and from now onwards we will begin to experiment with the concept bases by developing and testing curriculum packs, trialling these in our own schools, and devising appropriate assessment and evaluation procedures. By the end of the two term project, future developments will have to be planned. We will also need to discuss ways in which suitable packs might be published. From time to time, as the need arises, we will invite 'experts' in to support the work of the group, in such areas as assessment, the production of learning materials, etc."

Week five thus marked the transition from an INSET course to a working party. The director drew the group's attention to the barriers that CDT curriculum developers would face and to some possible ways of overcoming them. Five problem areas were considered: staffing; resistances to change in schools; pedagogical problems in the teaching of practical subjects; the philosophy of knowledge; and the cultural barriers to practical education. The group then formulated four objectives for the rest of the year, and charged the director to present them to the inspector. The objectives were to:

(a) attempt to influence the primary and secondary curriculum of Manchester (and other) LEA schools;

(b) develop or seek nationally acceptable means of accrediting pupil achievement;

(c) critically accept Rogers' concept bases as starting points;

(d) and work collaboratively in the development and dissemination of curriculum packs and to seek effective ways of communicating their underlying rationale to different audiences.

The director presented these objectives to the inspector in a formal meeting held in the education offices on the 18th October and asked him to elicit the views of prominent educationalists (see above) to enable the group to acquire a wider perspective.

Thereafter, the group began seriously to develop and test teaching materials and whilst critical analysis continued, much of the previous heartsearching created by insecurity vanished as tangible products began to emerge. This production was considerably aided by the time deadlines, and the need to communicate ideas to outsiders, which were furnished by the displays mounted at the February 1985 Shrewsbury conference (see Chapter 6), and the June 1985 working party exhibition.

5.6.3 Summative Group Self Evaluation: A Questionnaire From The Director

On the 25th June 1985, the director prepared and issued a questionnaire to the nine remaining working party members, excluding himself and the inspector. The questionnaire was answered unanimously, and its format is reproduced in Figure 5.

Its results are discussed below.

Figure 5: Questionnaire Prepared and Issued by the Writer to Aid Summative Group Evaluation of the Pilot Study

MEC CONCEPT BASE CDT PILOT STUDY 1984-85

EVALUATION QUESTIONNAIRE Peter Toft, 25.6.85

1. After this year's work, how far do you accept the 10 concept bases as the foundation for future curriculum development?
2. Please comment on the year's work under the following headings:
   a) How it has changed your own views/skills/knowledge?
   b) How successful the group has been in curriculum development?
   c) Feedback you have had from people in the LEA who are not members of our group.
3. How could the presentation of the course have been improved?
4. How could the leadership of the working party have been improved?
5. Any comments on domestic or administrative arrangements?
6. Was it worth the effort?
7. What targets should next year's three groups aim at?

NB Each question was followed by a space for answers measuring 210mm across and 50mm down.

(1) All respondents felt that the ten concept bases were effective starting points for designing and making, although some overlap was perceived and a more concise and compressed version was suggested. Rogers responded by reducing the number from ten to six (see page 153). One pertinent view related to progression: "I feel the 10 concept bases are a foundation for curriculum development providing each is

broken down to age/ability and each is given a realistic progression with an obvious cross-curricular approach."

(2) All respondents registered a change in their own views over the year. In some cases, they also had previously held, but rarely articulated, views on active learning confirmed, for example: the pilot study "confirmed the belief that the primary approach is necessary for extension into the secondary age range. I am more aware that the development of the environment can be used to increase the self-concept of pupils."

(3) Given the time it took for the group to form easy working relationships, the limited time for development and the radical, experimental ideas being considered, a majority felt that the group was successful in curriculum development. Views included "it cleared the paths for future work" but also "we have not really completed our brief - but so far we are enthusiastic and concerned". The imposition of various deadlines hindered flow for some, but for others it acted as a spur to action. A minority view held that too much time was wasted discussing topics of only fringe relevance.

(4) Feedback from outside the group was mixed, with a tendency towards the negative. Generally, the more negative responses had come from people not fully aware of the group's goals, such as "they are aware, worried, consider it high philosophy" and "some teachers in special schools did not like the printed sheet showing the circuit (figure 4)

... thought it was too academic and rejected it on sight". This had implications for future presentation.

(5) When the group split into sub-groups there was a general feeling that keeping all in touch with the work of each sub-group was important and more time should have been devoted to the exchange of ideas, for example one respondent wrote "Leadership and direction has been sound. Sub-leadership requires more thought and consultation".

(6) Proposed targets for 1985-86 should include:
start with precise aims;
produce more curriculum packs to cover all bases;
stimulate cross-curriculum links;
involve outside agencies where appropriate;
develop sophisticated presentation techniques for materials;
develop assessment methods;
disseminate using INSET and good publicity;
determine the reaction of pupils to the whole approach.

(7) The director's personal view at the end of the year was that the group had made some inroads into an exciting but difficult and very large field. The major spur to accelerate future development would be to enhance group dynamics. CDT teachers in the city were experiencing a major drive from the Inspectorate, one aspect of which was to bring them together to talk. The concept base group had benefitted in some intangible way from the increased sense of community felt by Manchester CDT teachers over the year. It would help to encourage this in the future: the idea of

'Networks' was identified as an essential prerequisite of healthy growth needed.

5.6.4 The Inspector's Evaluation

In an interview with the writer in 1988[7], Rogers retrospectively outlined the success and failures of the pilot project from his perspective.

Even though the group had only met for two hours per week, after a working day, he believed that it had succeeded in generating commitment and in meeting deadlines for the production of certain materials and conducting certain investigations. On the other hand, four major barriers stood in the way of the successes he had anticipated. Firstly, as a minor part-time activity, it never had the resources required for progress within the LEA; secondment of teachers to full-time development was required. Secondly, it had never possessed that external prominence, conferred on LEA-backed projects such as the Manchester Assessment Project, or national schemes such as TVEI. Thirdly, it lacked external validation by examination (see chapter 7). And finally, the teachers' industrial action began to reduce the working party's potential in year one; in year two, a re-formed working party was severely hindered by industrial action as attendance became very erratic, commitment declined, and operations ceased in the spring term of 1986.

5.6.5 Problems Revealed by the Pilot Project

(1) There was a tendency in this approach to confuse two quite distinct and in some ways mis-matching ideas; child-centred education is essentially 'reflexive', in Eggleston's sense

of the word (see page 18), whereas making children increasingly aware of the human condition was by contrast more 'received'. These two fundamental ideological stances can be reconciled, as shown in section 1.5.2) to an extent within teaching programmes, but unless this is done carefully, tensions will arise, eg. within a child-centred approach children may simply reject teacher guidance to make a considered appraisal of specified elements of the 'human condition'.

(2) Managing complex "making" processes with large groups of children is logistically difficult. This more open approach would exacerbate the problem unless practitioners simultaneously raised the sophistication of their classroom management.

(3) In using 'Starting Point Search' to generate ideas for projects, the means by which children learn must not be ignored; in particular, the need to structure courses for progression in learning was seen to be vital. Working party members engaged in intense debate in term one about ways of ensuring that pupils learned progressively within concept base CDT. Initially this focused on progression through the concept bases as bodies of knowledge, which needs to be distinguished from the concept bases as simple starting points for projects: such projects in this latter case would draw on bodies of knowledge related more to the acts of designing, making and testing than on the concept bases. These two interpretations of the innovation were not reconciled in the pilot phase (see section 8.2.5). The former

required an approach to progression through potentially vast bodies of knowledge; although the working party began to tackle progression from this perspective, it quickly abandoned the attempt because of its required scope, and focused instead on the production of unrelated teaching 'packages'. At this stage, strategic planning necessarily gave way to incremental and small-scale experimentation (see section 3.6). This was necessarily so given the time scale and conditions under which the group operated. However, with hindsight, the group's deliberations would have been clarified by Taba's views[17]. Taba identified four levels of content, each with its own function. They are set out below.

(a) Specific facts, processes and skills in themselves have limited use, but they "constitute the raw material for the development of ideas".[18]

(b) Basic ideas and principles constitute the "structure" of a discipline and are used to give meaning to and organise facts; they "thereby provide the context for insight and understanding".[19]

(c) Concepts "are complex systems of highly abstract ideas which can be built only by successive experiences in a variety of contexts".[20]

(d) Thought systems, for example the academic disciplines, "are composed of propositions and concepts which direct the flow of inquiry and thought".[21]

In the writer's view, Rogers' concept bases, when used as bodies of knowledge, fall midway between Taba's concepts and thought systems. As categories, they are similar to concepts because they are potentially complex systems of abstract ideas as can be seen in Appendix 4, which is an interpretation of the concept base. On the other hand, they resemble academic disciplines in the sense that they can, potentially, be "composed of propositions and concepts which direct the flow of inquiry and thought."[21] In either case, if the writer's view is true, the negative reaction embodied in Hick's letter (see section 5.6.1.) is rendered null. Further research, informed by a detailed logical analysis, is indicated.

(4) The approach required a breadth of knowledge and skills which few individual teachers could be expected to possess. It was essentially collaborative. Participants need to reach out to other parts of the school (beyond CDT), and beyond the boundaries of the school, to develop coherent interdisciplinary approaches. Moreover, there was such a lot to do, and potentially so many teachers in the city who could do it, that a network system of support and sharing was seen to be essential. This would evolve on an informal piecemeal basis, but for maximum effect it would need some form of central stimulation, support and possibly co-ordination.

(5) There were institutional barriers to change in all schools which curriculum developers in this field could not afford to ignore. Managing innovation in such circumstances

required a more coherent strategy than was used. This is discussed in section 8.3.1.

(6) Assessment, including pupil self-assessment, peer assessment and recording techniques needed careful consideration. Criterion referencing, (ie. assessing pupils in relation to objective standards or criteria, rather than in relation to their peers), particularly in relation to the proposed Mode 3 GCSE, would be a particularly difficult task in the context of concept-based CDT. The wide ranging scope of concept bases would render criterion referencing even more difficult.

5.7 ATTEMPTS TO BUILD ON THE ACHIEVEMENTS OF THE PILOT PHASE

After requests made by CDT teachers at the Manchester INSET conference in February (see Chapter 6), Rogers decided to expand the pilot activity into three groups during the following academic year. The three groups were to be based one in each educational division of the city to facilitate teacher access. Accordingly, in letters dated May 20th 1985, Rogers invited six teachers from the pilot group to form pairs to lead the three new groups. He had previously consulted with the pilot study director to compose this new leadership group and "intended that the district group leaders will meet regularly and that all members of the working group ... also get together particularly at the beginning and end of term or year programmes - it is now time to expand the programme and also to target more effectively on developing practical work with the children ... and assessment".[22]

On July 16th, the three groups were advertised in a letter sent to:

"All Primary-Secondary and Special Schools and Colleges for Particular Attention of Heads of CDT, Art, Home Economics, Nursery, Infants and Junior Teachers ...
Who have interests in practical direct experience in Learning Situations".[23]

The letter also alerted teachers to a regional conference to be jointly organised by Manchester LEA and the University of Salford, to consider a Manchester CDT manifesto on 27th November 1985. The latter was never organised due to industrial action.

To help Rogers prepare for the expansion of the scheme, the pilot phase director wrote confidentially on 13th July 1985 of factors he believed would need to be considered in promoting its success. These are reproduced here verbatim:[24]

"(1) We have been lucky this year in gaining the services of a highly intelligent group and as more people are recruited we may, or may not, be as lucky. For example, the recently-produced pack 'Awareness of Space' was produced by: * 9, 2, 3, 17, 4, 13, 10, 14, 5 and 15. Most of these are good honours graduates, young and 'fresh' from some kind of Design Education training, and highly ambitious. A rich diversity of experience (including 13's mountain rescue expertise, 2's counselling/social psychology interest, 9's work on space at your polytechnic, 17's architectural knowledge, 15's curriculum background) was vital to the production of the

* Code numbers taken from page 158 are used to depict individual working party members

pack. We must not overestimate this in the future - other groups of teachers might have needed much more support. Above all else, the approach requires intellect, wide reading and a sound education, and as we spread the message, we will have to find ways of actively and productively involving the 'not so talented'.

(2) Leadership is vital, as I am constantly aware of when I look at the difference between the rationale produced by the two groups (Awareness of Space/Change & Control). I neglected the latter, initially, underestimating the inability of groups to move without positive leadership: it has taken a lot of effort to get this group to produce a pack as, at one stage, they were almost on the verge of quitting. This is also tied up with the lack of accountability we can expect from volunteer members of a working party: the only way to jolly people along in this context is by good leadership, praise and recognition. I wonder whether it would save problems next year if group leaders were alerted to this.

(3) I have been able to 'pull rank' at Abraham Moss this year and use my senior management position to get resources produced far more quickly than is normal. Also, the in-plant facilities are pretty good. The south and central groups next year might need extra support in this direction.

(4) As in any group, there was some inter-personal rivalry which (I think) I managed to channel productively. Next year there may develop a similar atmosphere between the six group leaders unless they are regularly brought together under a single

leader. If you are unable to do this all of the time, I will help out."

5.8 CONCLUSION

As events unfolded, however, three groups were not convened. Increasingly bitter industrial action infected schools during the academic year of the pilot project, and gradually three members left the group in the summer term under pressure from their teacher associations. Largely because of this action, in-service activity out of school hours dwindled rapidly. By September 1985, only enough teachers to compose one group had responded to LEA advertisement. This group met at Trinity High School under the direction of Dickinson, a prominent member of the pilot working party. The group rapidly split into two: one half to work on the preparation of a Mode 3 examination proposal for GCSE (recounted in chapter 7), and including members of the pilot project of the school department noted in section 5.5; the other half, consisting mainly of inexperienced members, continued to discuss concept-base CDT in general terms, failing according to Dickinson[25] to get beyond the discussion of generalities. No curriculum materials were produced.

During this year, all forms of out-of-school-hours INSET activity gradually ceased because of worsening industrial action, and the concept base project was finally terminated at Easter 1986. Individual members agreed to continue in their own schools: it is doubtful, however, whether such fragmented growth could bring about the radical changes required to develop concept base approaches to practical education throughout the city's schools. This point is re-considered in Chapter 7. Before this, however, it is necessary

to examine the concept of barriers to this innovation in some detail: this is the subject of Chapter 6.

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20. Taba, H, 1962, Ibid, page 178.

21. Taba, H, 1962, Ibid, page 178.

22. Rogers, AE, 20/5/85, Circular letter to six Manchester teachers.

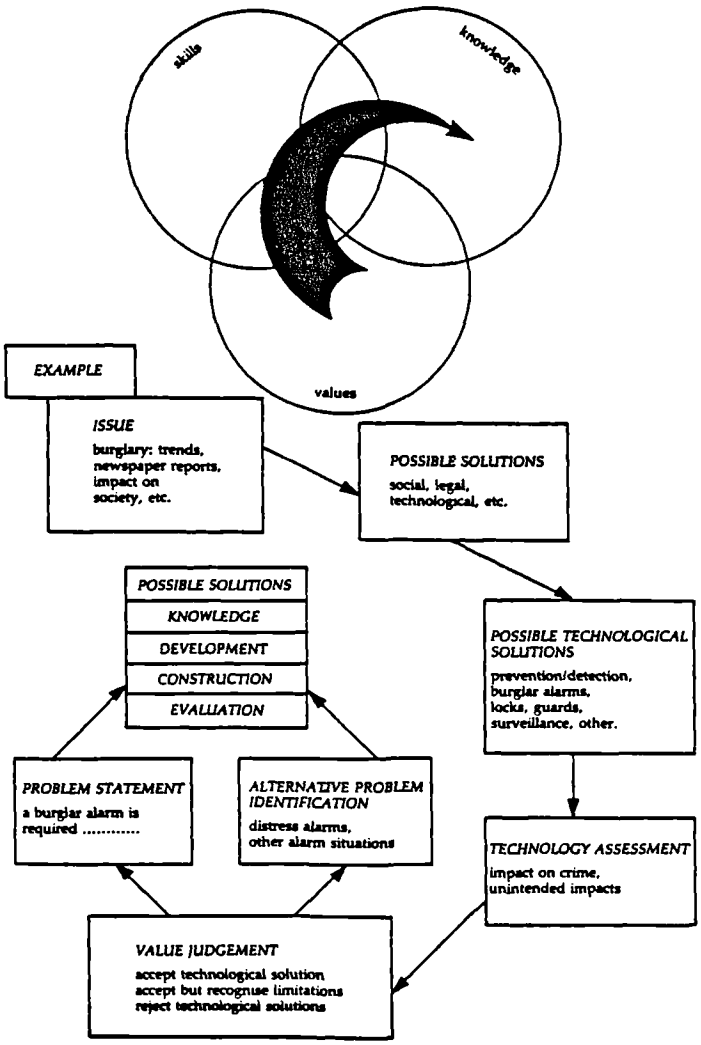
23. Rogers, AE, 16/7/85, Circular letter to Manchester schools.

24. Toft, P, 13/7/85, Personal letter to the Manchester inspector.

25. Focused interview between the writer and Dickinson held at Salford University on 30th March 1988.

APPENDIX 1

An illustration of Deriving Problem Solving CDT Activity from a Consideration of Issues



(Diagram taken from: Grant, M, 1982, 'Starting Points', printed in Cross, Anita and McCornick, Robert, 1986, 'Technology in Schools'. Milton Keynes: Open University Press, page 347).

APPENDIX 2

A PROJECT THAT DERIVES FROM THE CONCEPT BASE:

MOTIVES FOR ACTION.

+ it also links with the Concept Base – Images of Self.

subset: Human needs + motivations and also within these – the need for comfort + convenience + the need to avoid pain + discomfort.

two interactive concept bases!

Then we can review the hazards that we seek to avoid – thus we do a starting point search which will identify Car Safety – we review the dangers and how they are avoided – by action based design decisions.

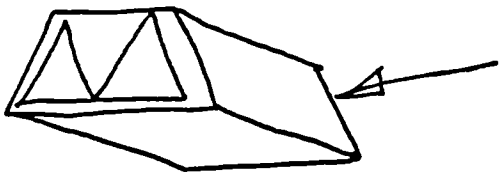
Film – Car Safety/Cars Crashing/Crumple Zones/Safety Belts. The outcome of accidents and injuries to those who do not wear the belts or have a car with crumple zone and safety cages – and seat belts.

How do we make children more aware of this – in a school 'workshop' situation?

PROJECT IDEA – First Sketch Proposal

CRUMPLE ZONE + SAFETY CAGE (Structures) { Here we can compare + exploit structures that are intended to withstand any impact + Remain Rigid + structures meant to collapse progressively when involved in specific impacts.

On – Standard chassis and wheels – with standard passenger – Egg?!! – Standard speed and impact

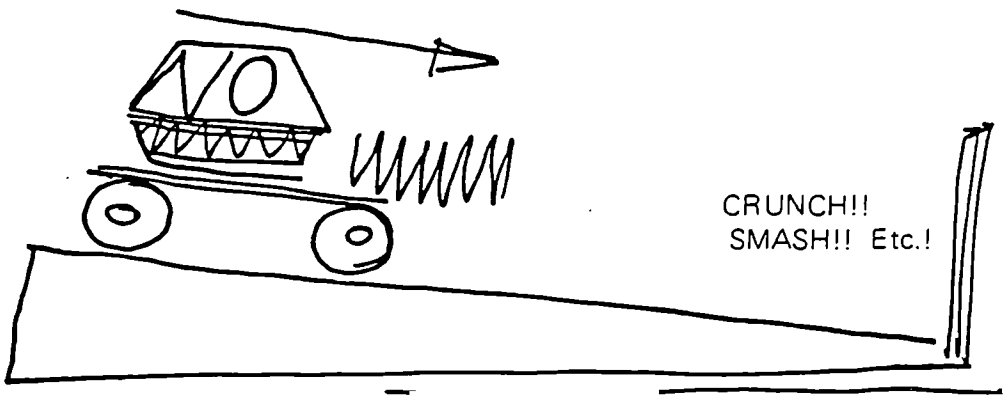


(1) Safety Cage Tests – modified

Resulting product given a 'Cosmetic' package on theme of 'speed' or 'Rugged Reliability' or: ?

(2) Protection of egg in cage – or is that too difficult? – Lightly boiled egg?

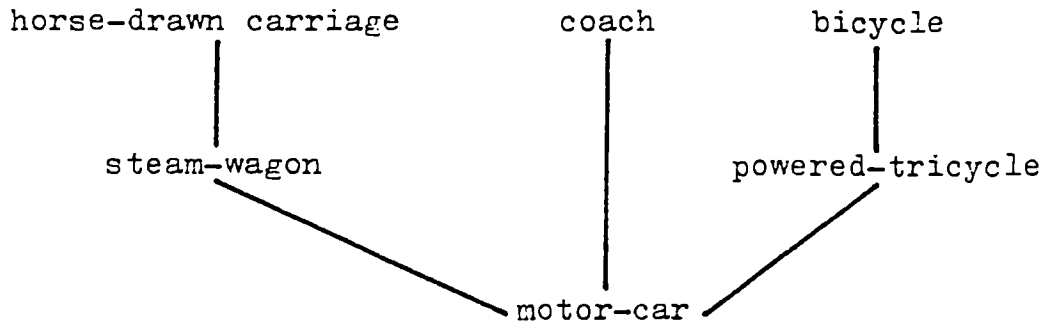
(3) Applied to chassis and crumple zone added and tested



A Crumple zone project carried out by Mr. Neil Nuckley. Plant Hill High School, Manchester.

Stage One:

Stimulus material showing how early vehicles developed - i.e. no one invented the motor-car, like mankind, it evolved.



Briefly outline significant milestones - Lenoir's engine 1860 - fundamental principles arrived at 1860's - powered cart in 1874 by Siegfried Markus - first successful 4-stroke Nicholas Otto 1876 - improved by Daimler and Maybach - Daimler/Benz association - Levassor scrapped belt-drive for clutch and gearbox - accommodation open to the elements at this stage although seats would be fairly comfortable - 1895 Panhard-Levassor first saloon car - 4 m.p.h. speed limit until 1898(red-flag Act) - safety factors of a fairly low order, vehicles open-sided as well as open-topped - interiors usually very opulent in good coach-building tradition - early 20th C. body 'style' begins to develop to give more protection from the elements and as a symbol of life-style or 'image' - remained until very recently that style was of utmost importance - racing brought most changes - style was seen as other things i.e. streamlining and strength - carried over into production cars - examples:- streamlining - 1913 Castagna-bodied Alfa.

unitary construction - 1922 Lancia Lambda.

styling now is seen as many compromises - economy v. 'style' v. function v. safety v. technology etc. - should a designers job be solely concerned with making a car 'safe'? - is 'style' as important? - are the two inextricably linked? - can a stylish car be safe?

Show film 'Impact' (RoSPA Film Library) or 'Broken Glass'

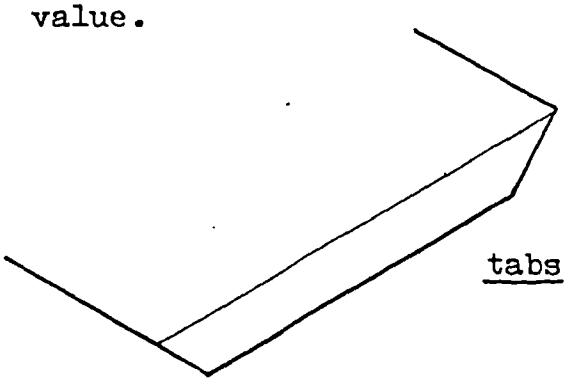
What questions arise from this? - techniques employed in testing, nature of collapse of structure, does the safety cage remain intact? - introduce concept of 'crumple-zones' surrounding safety-cage

Explain about different body configurations i.e. 'three-box', 'hatch-back', 'notch-back', 'coupe', 'sports' and 'sports-coupe'.

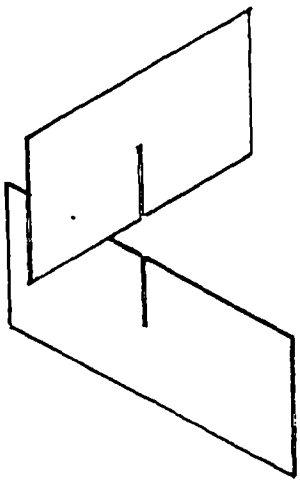
Homework - Draw one example of each body style giving possible reasons why each style is different from the next. The examples should be taken from actual cars e.g. 'three-box' - Ford Cortina.

Stage Two.

Introduce design brief - outline testing procedures to be employed and general nature of the problem relating it to the material presented in the previous lesson.
Everyone is to make the standardised safety-cage 'CRUZON' to which they may add their own front and rear crumple-zones(see plan)
Show how strength can be imparted by folding,box-structures,etc. but also how these can be weakened to give progressive collapse.
Show limited techniques of construction(see below) which must only be used. General nature of shape and configuration is left to individual.
Suggest that some intermediate testing and evaluation may be of value.



tabs



halving-joint

DESIGN BRIEF

To build, from the materials provided, a car body shell which will perform in a similar way, under head-on crash conditions, to a full size car body i.e. the front and rear ends will act as 'crumble-zones' whilst the passenger compartment remains relatively intact. The model should not exceed 350mm in length and 120mm in width and should be as realistic as possible in as much as it should have open-space:-

a) where the engine should be
b) in the passenger compartment
c) in the luggage compartment

At the end of the construction period the work will be recorded and the shell will then be tested on the test-rig shown below. Each vehicle will then be assessed on how well the contents of the passenger compartment survive the impact. It will only be tested for front and rear, not side impact.

Stage Three.

Continuation from previous lesson with a view completion and photographic record being made towards the end of the period.
As the photographic record will be the only evidence of the pupils complete work this is a crucial part of the project.

Stage Four.

Evaluation and Testing.

By testing one of the standard safety-cages on the inclined test-rig some measure as to what force is required to inflict serious damage on the cage(sufficient to cause injury to the occupants) will be obtained. Using this as a basic measure other body shells can be tested. Their relative success will be seen as to which absorbs the energy in the most efficient way ∴ inflicting least damage on the safety cage. As a further measure the % reduction in the length of the crumple-zones can be calculated i.e. very little shortening would indicate that the occupants of the car would come to an extremely rapid stop thereby absorbing most of the energy of the crash. Assuming no damage to the safety-cage the reverse would be true.

Force of impact is measured in pounds and is determined by:
(a) the speed of the moving object
(b) the distance within which the object is stopped after impact
(c) the weight of the object
As an equation this would be: $\frac{MV\ sq.}{2S}$ where M equals mass, V equals velocity in feet per second and S equals stopping distance.
e.g. in our model if the bodyshell where to be hit on the test-rig by a weighing 0.5lbs. at a velocity of 1.25 feet per second and brought to a stop within 2" and we then compared it with a similar test where the object was brought to stop within ½" we would get the following results:

$\frac{0.5 \times 1.25\ sq.}{2 \times 0.16}$ =2.44lbs compared to $\frac{0.5 \times 1.25\ sq.}{2 \times 0.04}$ = 9.76lbs

This shows that the severity of impact increases either as speed increases, mass increases or stopping distance reduces.
Each child at the end of the project should then have as evidence of his/her work:
(a) a photograph of the car before testing
(b) a photograph of the car after testing
(c) one crumpled car
(d) calculations as to the force of impact on his car
(e) a short written evaluation of the relative merits of his work
Comparitive results of the whole group will also be displayed as a graph. Each model will also be assessed as to the accuracy of safety cage and general standard of construction.

NB: Appendix 2 is an extract from: Rogers, AR, 1986, "The Potential for Action Based Teaching and Learning Across the Curriculum - Second Edition', Manchester Education Department.

APPENDIX 3

I/TR/0016a/AG

To All CDT Teachers in: 6th Form Colleges
Secondary Schools
Special Schools
and other interested colleagues

This is an early 'Alert' to give you opportunity to plan your in-service programme in 1984-85.

In the Autumn Term there will be three courses:

On Tuesday evenings : New Procedures in CDT
4.30 - 6.30 pm

Course Leader: Mr Blackwell
Venue: Central College, Manchester

'Hands on' experience of new Technologies:
Robotics: Computer Aid to Engineering, etc.

This course will repeat in the Spring

On Wednesday evenings : Craft Design and Technology
4.30 - 6.30 pm Concept Base (Pilot Study)

Course Leader: Mr Toft
Venue: Abraham Moss Centre

An In-Service/Working Party which will explore the potential of a practical approach to teaching and learning in a future curriculum

This course will continue into the Spring term

On Thursday evenings : Drawing for Making
4.30 - 6.30 pm

Course Leader: Mr P Goulden
Tutor: Mr A Rogers
Venue: Arden 6th Form College

A practical exploration of image making in a CDT context

This course will continue into the Spring Term

Please note: We intend to 'start' courses in the second week of the Autumn Term - Enquiries in the first instance to Course Leaders noted above.

If your application is accepted and you agree to attend these sessions, it will be assumed that this is an undertaking to complete the full course of study.

Courses now being proposed for Spring Term:

O and A Level Design

Tutors: Mr S Owen and Mr P Howard
Venue: Margaret Ashton 6th Form College

Tuesday evenings

This will continue into the Spring Term

Craft:Design and Technology - Field Work

Tutor: Mr A Jones
Venue: Abraham Moss Centre and various Field Visits

Dates and programme to be announced - this will be offered in Spring and Summer

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Special Needs in CDT - A Pilot Study

Tutors: Mrs N Comer and Mr R Hunt
Venue: Cardinal Newman Lower School

Wednesday evenings

This may be repeated in the Summer Term or extended into that Term

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Safety courses are being negotiated and planned to start in the new year.

Meetings will be announced at the Teachers' Centre in due course.

Tony Rogers
District Inspector

APPENDIX 4

STARTING POINT SEARCH IN ASPECTS OF:

CONCEPT BASE: 7

THE HUMAN CAPACITY TO TAKE ACTION

ERGONOMICS

HISTORY : EXTENDING HUMAN ACTION

Using tools process and equipment

Light : Space
Noise : Vision
Colour : Temperature
Boredom

SAFETY

Repair : maintenance
Storage :
LIFE HISTORY

Time : Motion efficiency
WORK

CONFLICTING INTERESTS

BUILT IN OBSOLESCENCE

MAN v NATURE v MAN

ULTIMATE COMFORT AND CONVENIENCE

REALIZATION OF THE (NEEDS AND MOTIVATIONS OF OTHERS – includes children)
(ATTENTION SPAN AND WORK RATE OF OTHERS)

HUMANIZING TECHNOLOGY

USING OBJECTS IN SPACE

OVERLAPPING WORK SPACES

EFFECT OF TOO MANY OBJECTS AND TOO FEW

MOVEMENT IN SPACE
C. Jones

THE DIGNITY OF WORK

HUMAN RELATIONSHIPS AND WORK ETHIC

PHYSICAL)
+) 'WORK'
MENTAL)

RESPONSIBILITY
LEVELS OF INITIATIVE
LEVELS OF AUTHORITY
PRODUCTIVITY AS
SALES : MAKING : OFFICE

ACCESS TO LEISURE & PLAY

CHILDREN : CONFRONTING THE PHYSICAL WORLD

MODELLING
MAKING
DESTROYING

What is change how is it manifested within us and around us? How is 'change' brought about? IS IT BY DEFINITION 'GOOD'? How can 'it' be influenced and controlled?

Supposing you cannot 'do anything' to control events and influence your destiny.

Can you 'imagine' that!!? What would you think is the RESULT??

THE HUMAN CAPACITY TO TAKE ACTION

What is change, how is it manifested within us and around us? How is 'change' brought about? IS IT BY DEFINITION 'GOOD'? How can 'it' be influenced and controlled?

Supposing you cannot 'do anything' to control events and influence your destiny.

Can you 'imagine' that!!!? What would you think is the RESULT??

Contrived needs: Subliminal suggestion: Remote control – (what are the implications!?)

'How much' effort is required to *gain* 'how much' recognition and respect.

IS IT WORTH IT!!?

1% inspiration – 99% perspiration – (was the idea really 'inspired' and 'good')

What is a 'good' idea – how do we have a 'good' idea??

How can children learn to *have ideas* and develop them and observe the outcome!!?

How do you reward the efforts of others – if 'they' are not *useful* – how do you react!!?

In our culture how do we treat – the 'don't knows' – 'have nots' and 'not usefuls'

How do we define – not *useful* – OLD? INFANTILE! ILL!
DISRUPTIVE – DULL –
DESTRUCTIVE – THE DIFFERENT!! ETC.

How do you react to images – objects and situations and why!!?

Is it possible to teach (the child) (people) to achieve specific audience reaction?

THROUGH IMAGES AND OBJECTS OR SITUATIONS

CAN CHILDREN NATURALLY MANIPULATE PEOPLE AND EVENTS!!

HOW – CAN THIS BE CHANNELLED!!?

DOES ANY OF THIS MATTER!? IS IT DESIGN EDUCATION?

IS IT *YOUR* RESPONSIBILITY – IF NOT WHOSE!! – AND ARE YOU SURE *'THEY'* ARE PREPARED TO ACCEPT *RESPONSIBILITY*?

IS IT POSSIBLE THAT IMPORTANT AND FUNDAMENTAL MATTERS ARE LEFT OUT OF THE CURRICULUM!?

Source: Rogers, Tony, January 1985, "The Potential For Action Based Teaching And Learning Across The Curriculum", Manchester Education Department, pages 34-35.

CHAPTER 6 : BARRIERS TO THE CONCEPT BASE CDT INNOVATION: GENERAL

6.1 SUMMARY

A residential conference of Manchester teachers was partially organised by the writer to gain the perceptions of a significant body of CDT teachers, relating to barriers to concept base CDT in the city. The concept of barriers to innovation is fundamental and is examined in the chapter through relevant literature. From this review, the writer constructed a classification of barriers to innovation in school technology. The classification was used to derive four barriers which the writer believed fell within the daily professional experience of CDT teachers and within which they would be able to articulate insights. These are: teaching methods; school organisation; resources; and personal resistances. The teachers were placed in a structured situation in order to promote a release of their perceptions: these are analysed in this chapter, the analyses being set against evidence of a wider nature derived from literature.

6.2 BACKGROUND

In February 1986, Rogers and the writer organised a residential conference for Manchester teachers and inspectors, with the theme 'Making Changes'. Funding was obtained from the LEA's allocation for 'TVEI-Related INSET' and the conference was attended by fifty-two teachers and two inspectors. Of these, thirteen teachers and one inspector had been part of the original concept-base CDT pilot working party. The other forty non-involved individuals were regarded as a potential sounding board from which to develop a broader teacher perspective on the innovation and the last half day of the conference was therefore devoted to gathering their views,

together with those of the original working party members, of barriers to the innovation in Manchester, and methods of overcoming them. The methodology for this research is described in section 6.4 below, but first its broader context needs to be made explicit.

6.3 THE CONCEPT OF BARRIERS TO EDUCATIONAL INNOVATION

In sections 1.4-1.6 of Chapter one, three contextual sub-systems in which school technology is evolving were identified: the cultural; epistemological; and professional. The chapter concluded in 1.7 with a brief statement of some of the barriers to innovation raised within these sub-systems. In Chapter three, section 3.7.4, the concept of barriers to innovation was again briefly discussed. This concept, however, is very complex, subject as it is to the 'Rashoman effect' identified by Schon (see page 7), and needs further elaboration.

Drawing upon his research within the International Movement Towards Educational Change (IMTEC), an organisation established by the Organisation for Economic Co-operation and Development, Dalin[1] concluded that educational change was a complex issue with three facets. Firstly, it was a process phenomenon, taking place over time under many influences and in need of a management process for maximum effect. Secondly, it was a systemic phenomenon, bringing about chain reactions within social systems, the nature of which crucially influences the change process. Thirdly, it is a multi-dimensional phenomenon: for clear understanding, various disciplines need to be used, including anthropology, economics, organisational science, psychology and sociology.

Dalin noted that considerable research into why attempts to

precipitate educational change fail had been conducted from a psychological or rural sociological perspective, and from these traditions researchers had derived "the concept of the 'resistor' as the defender of the 'status quo', usually with a negative connotation"[2]. He argued that this led to an incomplete way of understanding change failure because it overlooked "the basic problem of political forces and values in a social system, defining 'resistance' as unwanted, and as something to be overcome due to the inherent qualities of the innovation ... the theory of 'resistance' takes the values of the innovation for granted, because the innovation is defined in technical terms as 'better' and overlooks the characteristics, impacts and dynamics of innovation in social systems."[3]

He argued that the concept of barriers to innovation was more comprehensively useful, in that it promoted a holistic view of innovation within complex systems. Any significant innovation, for Dalin, would face barriers: these may indicate flaws in the innovation itself; assuming that the innovation was not flawed, however, strategies would be required to surmount the raised barriers.

One of the objectives of the research outlined in this chapter was the development of a theoretical framework from which tools for the diagnosis of barriers to innovation in school technology could be constructed. School technology faces barriers of a general and a specific nature, but as was implied in Chapter one, each will tend to be manifest in one of the three interlocking contextual sub-systems of culture, epistemology and the education profession. After a review of the various barriers outlined in pertinent

literature, a classification of barriers to innovation in school technology is presented in the next section as a basis for such diagnostic tools.

6.4 BARRIERS TO INNOVATION IN SCHOOL TECHNOLOGY

6.4.1 General Barriers

Various curriculum writers have analysed and classified their perceptions of barriers to general educational change. Gross et al[4] highlighted four barriers:

(1) a lack of clarity of the innovation in the receiving organisation;
(2) lack of teacher skill and knowledge for implementation;
(3) lack of equipment and materials required for implementation;
(4) pre-existing and incompatible organisational structure.

In an earlier study, Jung had elaborated on teacher skills. He[5] focused on gaps between the teachers who wanted to innovate and the resources they needed for successful innovation. He suggested that such teachers may lack: (1) expertise; (2) an adequate awareness of related theory; (3) sufficient knowledge of other related areas; (4) access to efficient administration; (5) confidence in their pupils; (6) motivation to apply the skills they possessed; and (7) a commonality of teaching approaches within the school.

At a higher level of abstraction, Dalin[6] highlighted four general barriers:

(1) conflicts of <u>value</u> between the innovation and the receiving organisation;

(2) conflicts emanating from the redistribution of power implied by the innovation;

(3) conflicts arising from resistance to the implementation of 'inferior' innovations;

(4) and psychological conflicts stemming from personal needs for stability.

6.4.2 Barriers Specific to School Technology

In an analysis[7] of changing conceptions of craft education over the last century of English schooling, the writer identified five barriers to the spread of CDT education (see page 36):

(1) forces within our culture, which are antagonistic to practical activity per se (see section 1.4);

(2) predominant theories of knowledge, based on academic disciplines, used to legitimise a curriculum oriented away from practical activity (see section 1.5);

(3) the lack of effective teaching methods which enable the 'average' teacher to induce consistently successful learning in interdisciplinary, active, design and technology courses;

(4) a failure to recruit sufficient specialist teachers of the required calibre;

(5) the organisational and personal resistances to curriculum development in the school.

Even more specifically, Craven[8] attempted to explain the failure of the Advanced Level GCE syllabus in Engineering Science of the Northern Universities Joint Matriculation Board, to emerge as a formidable alternative to Physics. He identified five external

and four institutional factors checking the growth of syllabus adoption in schools and colleges. His external factors were:

(1) national economic crises;

(2) falling school rolls;

(3) small comprehensive school sixth forms;

(4) a core curriulum movement towards traditional physics;

(5) inaccurate manpower forecasting claims about an alleged national shortage of qualified engineers, scientists and technologists.

The first three factors relate to the difficulties faced by schools in running and staffing minority courses with small student group numbers.

Craven's institutional factors were:

(1) the failure of the chosen dissemination strategies ('centre-to-periphery' and 'proliferation-of-centres' - see pages 84-85);

(2) the excessive demands made by the syllabus on the teachers;

(3) the low status of applied subjects in our culture;

(4) the vested interests and power bases of established school subjects.

Arguably, factor three is more of an external factor than one specific to the institutions of the school, but is nevertheless

powerful. In a more detailed case study of the same Engineering Science scheme, Carter et al[9] identified three specific barriers which prevented growth:

(1) the large demands made on teachers;
(2) strong traditional competition from Physics syllabuses;
(3) and the fate of minority subjects in times of economic crisis.

Each of these barriers was derived from observation of innovation in action. Clearly there is some overlap between writers as they have identified similar barriers in different situations and at different levels of abstraction. The purpose of this chapter is to clarify the nature of those barriers which currently stand in the way of (a) the Manchester concept-base CDT innovation in particular and (b) the evolution of school technology in general. For this purpose, the barriers noted above and those outlined in Chapter one, are classified below under the headings of the three contextual sub-systems discussed in Chapter one. It must be recognised, however, that such a classification does not imply any quantification, or even prioritisation, for reasons elaborated by Kirst and Walker (see page 28).

6.4.3 A Classification of Barriers to Innovation in School Technology

Within the cultural context, barriers to innovation in school technology may prevail under the following headings.

(1) English cultural bias away from manufacturing (see Chapter 1).

(2) Economic crisis and financial restraint.

(3) Population growth retardation and falling school rolls.

(4) Unemployment.

(5) Inaccurate manpower needs forecasting.

(6) Admission requirements for entry to further and higher education, and to employment.

(7) Demands for accountability and higher standards of pupil achievement.

Within the epistemological context, barriers to innovation in school technology may prevail under the following headings.

(1) The high status of propositional knowledge relative to capability.

(2) The strength of established disciplines and subjects, reinforced by vested interests.

Within the professional context, barriers to innovation in school technology may prevail under the following headings.

(1) The Innovation: its perceived quality;
its clarity;
the effectiveness of the strategy employed.

(2) The Organisation: the structure of the organisation;
the compatibility of the values of the innovation with those of the organisation;
the power relationships implied by the innovation, eg. conflict between CDT and

Science teachers over 'ownership' of technology;

external examinations;

pressures from outside agencies.

(3) The Teachers: motivation or resistance to innovation;
teaching expertise;
background theoretical knowledge;
management skills;
demands on teacher time;
access to adequate resources;
access to appropriate teaching materials;
access to administrative support;
appropriate teaching methods;
adequate teacher supply.

(4) The Pupils motivation to learn;
self-discipline in open-ended situations;
ability.

Such barriers will manifest themselves at different levels in the education system. The cultural and epistemological barriers are of long term national status, and as such are not readily open to change by educational personnel such as teachers, lecturers and inspectors. On the other hand, the professional barriers are open, to varying extents, to the influence of such personnel. Accordingly, the barriers examined at the teachers conference were selected from this context.

6.5 THE MANCHESTER TEACHERS' CONFERENCE

The detailed programme from the conference is shown in Appendix 1. The conference was generally organised by the inspector, with the assistance of the writer, but the writer was responsible for the last day and its focus on 'barriers', together with ensuring that participants were prepared for this session by their scrutiny of the exhibition of the concept base working party's produce on day two. Participants were introduced to the concept-base approach to CDT during the 'Making Changes' session on day one, and to the LEA's proposed mode of examining it during the evening session of the same day. During day two, a large exhibition of Manchester CDT work was mounted and participants were particularly asked to examine work produced under the concept-base banner.

The Barriers to Change session took place on day three. Beforehand, groups had been formed by the writer, to ensure, as far as was possible, that peers or people with similar types of job were placed together. Two groups - syndicate A and B (see Appendix 2) - consisted of experienced heads of CDT department, senior teachers and an inspector. Syndicate C was made up of teachers with an art background. Four other groups consisted of assistant CDT teachers from comprehensive and special education. A final group - syndicate H - led by the CDT inspector, gathered in teachers from other backgrounds, notably home economics.

No attempt was made to quantify this distribution of teachers, or to determine any difference in orientation of the barriers identified between the groups. The sole reason for the writer establishing this mode of distributing participants in groups was to create, as far as was possible, homogeneous groups of peers in

which discussion would be maximised, and failure to contribute due to ignorance, embarrassment or feelings of isolation, would be minimised.

Each group leader was given written instructions as shown in figure 1, which directed attention to the purpose of the seminars, ie. to release intelligence and gather ideas.

Figure 1: WRITER'S INSTRUCTIONS TO DISCUSSION GROUP LEADERS

BARRIERS TO CHANGE: Saturday, 15.2.86

NOTES FOR GROUP LEADERS

The purpose of this session is to 'release intelligence'. We are seeking as wide a range of ideas as possible. These will eventually be analysed and written up into a document which should be useful for all Manchester teachers to help them implement concept-based approaches to CDT.

Would you please ensure that:

1. Legible carbon copies are returned to me during the plenary session, one from each group member, without names.
2. Two significant barriers, with solutions if possible, are identified to relay to the plenary/report back group after morning coffee.
3. Group members focus on barriers to the transformation of CDT along concept base lines.
4. Every group member has a chance to express ideas.

Peter Toft

A twenty minute briefing lecture designed and given by the writer covered eight major points:

(1) to express confidence in the collective ability of professionals to overcome barriers to concept-base CDT in Manchester;

(2) analysis of some failures to make changes from the history of English curriculum innovation;

(3) analysis of this failure in the evolution of English craft education;

(4) the gap between intentions and outcomes;

(5) the concept of barriers;

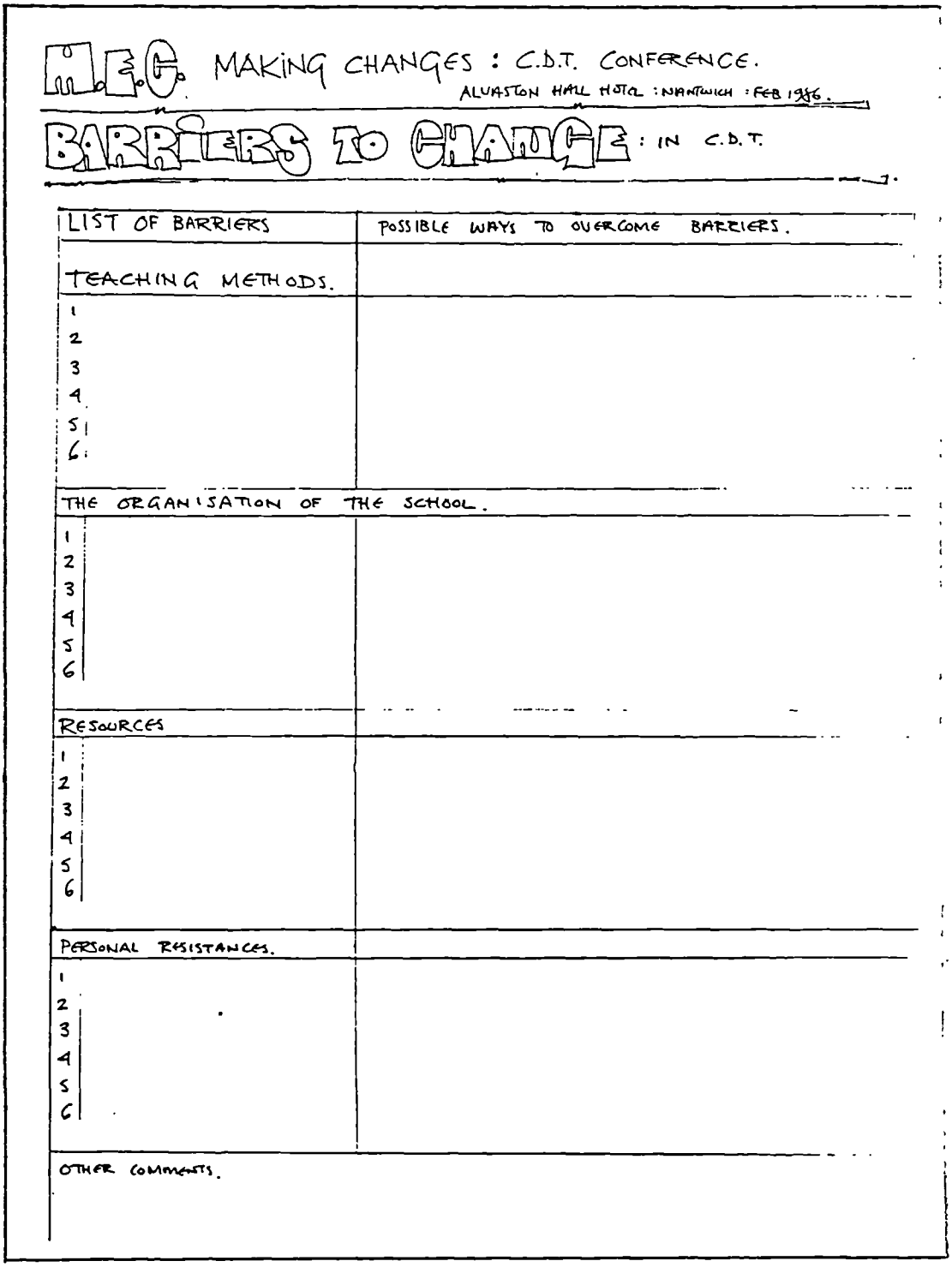
(6) cultural, epistemological and professional barriers;

(7) the four professional barriers forming the basis for discussion in the seminars - teaching methods, the organisation of the school, resources and personal resistance;

(8) a request to focus on those day-to-day barriers encountered by participants in their own schools.

Participants were asked to spend the first ten minutes of syndicate group time writing down the barriers they identified, and possible ways of overcoming them, under the four headings on the distributed sheets (see figure 2). The ensuing discussions were to develop points written down; as new ideas emerged, participants were also asked to record them. At the end, the completed record sheets were collected and analysed by the writer.

Figure 2: RECORD SHEET DESIGNED BY THE WRITER FOR USE IN DISCUSSION GROUPS



M.E.G. MAKING CHANGES : C.D.T. CONFERENCE.
ALVASTON HALL HOTEL : NANTWICH : FEB 1986.

BARRIERS TO CHANGE : IN C.D.T.

LIST OF BARRIERS	POSSIBLE WAYS TO OVERCOME BARRIERS.
TEACHING METHODS.	
1 2 3 4 5 6.	
THE ORGANISATION OF THE SCHOOL.	
1 2 3 4 5 6	
RESOURCES	
1 2 3 4 5 6	
PERSONAL RESISTANCES.	
1 2 3 4 5 6	
OTHER COMMENTS.	

The syndicate seminars had two purposes. Firstly, they were intended to focus the intention of potential innovators in Manchester onto the problems of barriers and how to overcome them. Secondly, they were to release intelligence using a creative 'brainstorming' technique: the resulting data, highly subjective as

it is, was intended to offer the collated advice of a large group of experienced teachers to schools about to embark on concept-base CDT innovation. The data is analysed in section 6.6. Appendix 3 contains copies of a selection of the respondents' report sheets. The selection has been made by the writer to show the broad range of responses made.

6.6 ANALYSIS OF TEACHER PERCEPTIONS OF BARRIERS TO CONCEPT BASE CDT

Thirty-eight participants returned their completed record sheets, a response rate of 74.5%. A visual analysis of the teacher perceptions recorded in the seminar sheets can be seen in Figures 3 to 6. No predictive validity or statistical significance can be attached to these responses and their distribution because: (a) the group was not randomly selected but self-selected by voluntary attendance at the residential conference, and therefore probably biased towards higher levels of commitment to their work; (b) the classification system is too crude to be quantified; (c) group members had varying levels of understanding of the concept-base innovation; and (d) the responses were subjected to, and presumably modified in intangible ways by, their airing in the seminar groups; and (e) the groups were too small. No attempt either was made to verify statements made by correlating them with observed behaviour. The responses are valuable, however, in revealing the perceptions of a particular group of teachers, one quarter in number of the total CDT teaching force in the LEA, at that particular time.

Some responses were also written in wrong or inappropriate categories: this probably reflects the speed at which participants would have been writing during the brainstorming activity. In this analysis, they have been placed, and commented upon, in their

appropriate categories.

6.6.1 Teaching Methods

Before looking at the teachers' perceptions, it is necessary to examine the literature relating to teaching methods in CDT. The teachers' perceptions then need to be viewed within this wider framework.

Hicks[10] outlined three phases in the evolution of CDT education: manual training; handicraft; and CDT. Whereas manual training was essentially concerned, in a prevocational way, with the transmission of craft and mechanical drawing skills, and handicraft with these supplemented by a concern to influence the emotional development of children, CDT was concerned with a wide range of activities and learning within attitudinal, creative, intellectual and physical realms.

When manual training entered the elementary school system in 1890[11], its teachers had professional practices on which to draw. Much previous craft training had taken place informally at home or at work, and the more systematic apprenticeship training had, according to Liepman[12] been conducted on a one to one basis between master and apprentice. There was thus no tradition of formal and systematic instruction of large class groups.

In response to this problem[13], "De La Vos in Moscow had analysed tool processes and constructional techniques; he reduced workshop operations to fundamental sub-processes and arranged them in a sequential order of difficulty for skill instruction. To achieve this, he had to analyse the knowledge and skills needed for

specific tasks, to be fully aware of essential procedural steps, know (to the extent that this was possible) what knowledge would effectively reinforce skills acquisition and of which teaching methods would be most appropriate. The series of exercises produced made it possible for one person to teach many pupils in a short time, with some degree of confidence in what might be learned and with the ability to assess and offer necessary remedial help. To facilitate this, each pupil had his own kit of tools and work-station".

This effectively removed barriers, relating to teaching methods, to the spread of craft instruction in the late nineteenth century. The writer has argued elsewhere[14] that the contemporary teacher faces similar, but more complex, barriers in trying to implement innovation in CDT. Not only has a wider range of materials and craft skills to be taught, but content is also considerably expanded by modern technology. The range of creative and intellectual thought processes embodied in designing also adds to the teaching load. Whereas many of the talented teacher innovators of the 1970's who paved the way for modern CDT were able to cope with this complexity, it seems likely now that if all teachers of CDT are to be effective, greater consideration will have to be given to supporting them with new teaching methods.

Despite this account of the broader framework of teaching methods for CDT, it would be unrealistic to assume that the conference participants, even the most experienced ones, would have held this kind of perspective on the barrier of teaching method. They were asked to identify the barriers as they experienced, or were

aware of, them in their day-to-day teaching. In the event, a great diversity of perceptions was released and these are recorded diagramatically in Figure 3. The boxes are stepped backwards; each step indicated a single teacher response. The links between the boxes show the writer's perception of connections between categories.

A large number of comments were levelled at traditional craft teaching methods. For the purpose of this analysis, these are assumed, in the experience of the writer, to revolve around didactic teacher instruction and demonstration to whole groups, followed by individual practice of skills and processes under teacher supervision and intervention. Twelve participants (12 - 31.6% of the total respondents) felt that traditional teaching methods focussed on a limited range of skills, this being clearly related to expressions of teacher inflexibility (4 - 10.5%) and orientation towards the production of specific products (6 - 15.8%). Ten participants (10 - 26.3%) believed that activities were too teacher-centred, and similarly nine (9 - 23.7%) felt that instruction was too didactic. A small number felt that teaching was too subject-centred and oriented too much towards the workshop. Other expressions, made by just one or two participants, for example an accusation of 'spoon-feeding' ideas, reflect the general tenor of the comments which were critical of teaching methods perceived to be too limited and restrictive for the tasks they had to achieve. This is hardly surprising given that the methods being criticised were those developed for teaching a different and more limited form of activity.

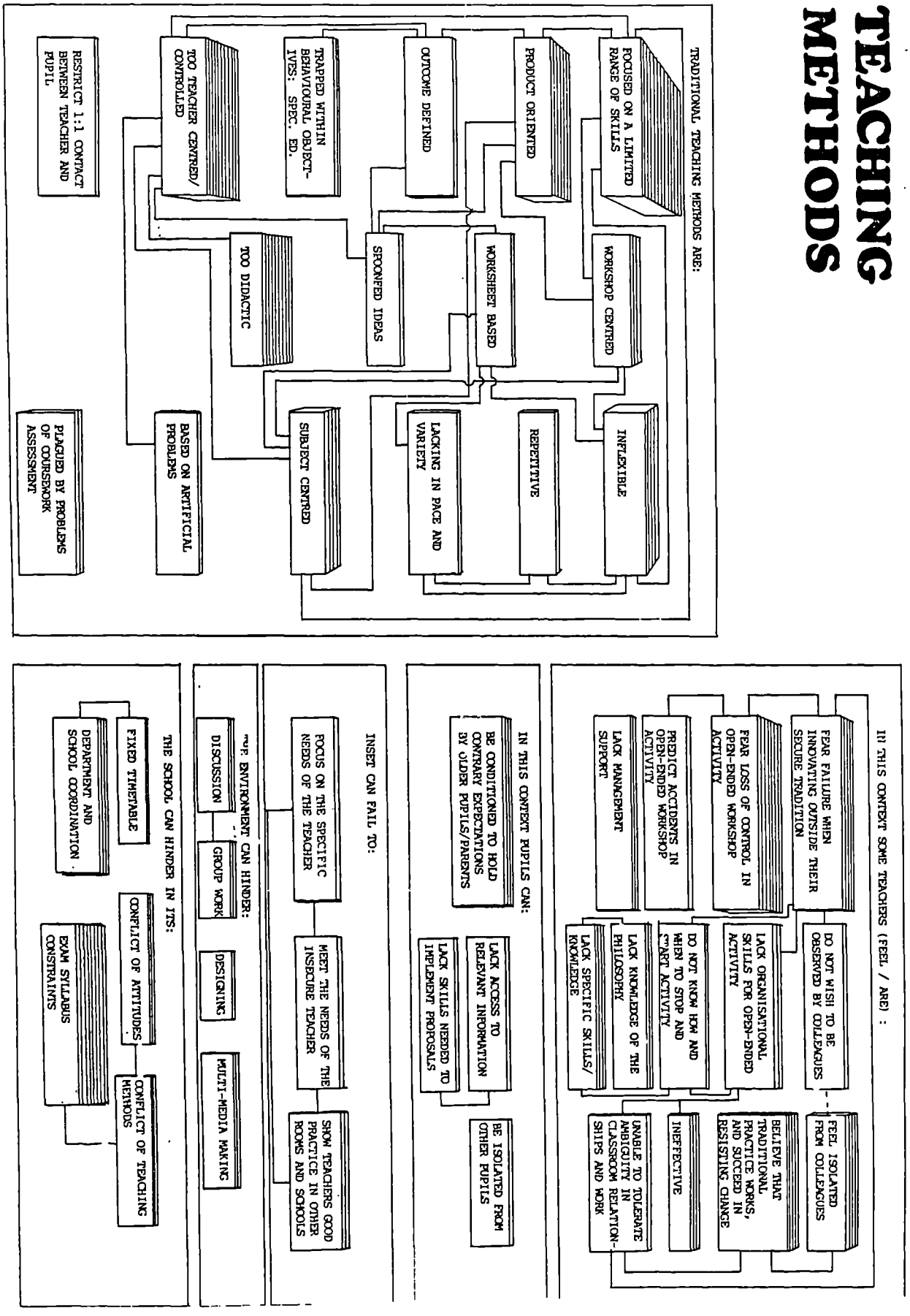

TEACHING METHODS
TRADITIONAL TEACHING METHODS ARE:
FOCUSED ON A LIMITED RANGE OF SKILLS
PRODUCT ORIENTED
OUTCOME DEFINED
TRAPPED WITHIN BEHAVIOURAL OBJECT-IVES: SPEC. ED.
TOO TEACHER CENTRED/ CONTROLLED
RESTRICT 1:1 CONTACT BETWEEN TEACHER AND PUPIL
WORKSHOP CENTRED
WORKSHEET BASED
SPOONFED IDEAS
TOO DIDACTIC
INFLEXIBLE
REPETITIVE
LACKING IN PACE AND VARIETY
SUBJECT CENTRED
BASED ON ARTIFICIAL PROBLEMS
PLAGUED BY PROBLEMS OF COURSEWORK ASSESSMENT
IN THIS CONTEXT SOME TEACHERS (FEEL / ARE) :
FEAR FAILURE WHEN INNOVATING OUTSIDE THEIR SECURE TRADITION
FEAR LOSS OF CONTROL IN OPEN-ENDED WORKSHOP ACTIVITY
PREDICT ACCIDENTS IN OPEN-ENDED WORKSHOP ACTIVITY
LACK MANAGEMENT SUPPORT
DO NOT WISH TO BE OBSERVED BY COLLEAGUES
LACK ORGANISATIONAL SKILLS FOR OPEN-ENDED ACTIVITY
DO NOT KNOW HOW AND WHEN TO STOP AND START ACTIVITY
LACK KNOWLEDGE OF THE PHILOSOPHY
LACK SPECIFIC SKILLS/ KNOWLEDGE
FEEL ISOLATED FROM COLLEAGUES
BELIEVE THAT TRADITIONAL PRACTICE WORKS, AND SUCCEED IN RESISTING CHANGE
INEFFECTIVE
UNABLE TO TOLERATE AMBIGUITY IN CLASSROOM RELATION-SHIPS AND WORK
IN THIS CONTEXT PUPILS CAN:
BE CONDITIONED TO HOLD CONTRARY EXPECTATIONS BY OLDER PUPILS/PARENTS
LACK ACCESS TO RELEVANT INFORMATION
LACK SKILLS NEEDED TO IMPLEMENT PROPOSALS
BE ISOLATED FROM OTHER PUPILS
INSET CAN FAIL TO:
FOCUS ON THE SPECIFIC NEEDS OF THE TEACHER
MEET THE NEEDS OF THE INSECURE TEACHER
SHOW TEACHERS GOOD PRACTICE IN OTHER ROOMS AND SCHOOLS
THE ENVIRONMENT CAN HINDER:
DISCUSSION
GROUP WORK
DESIGNING
MULTI-MEDIA MAKING
THE SCHOOL CAN HINDER IN ITS:
FIXED TIMETABLE
DEPARTMENT AND SCHOOL COORDINATION
CONFLICT OF ATTITUDES
EXAM SYLLABUS CONSTRAINTS
CONFLICT OF TEACHING METHODS

Figure 3

Another category of comments recorded was concerned with the teacher attitudes underlying the use of particular methods. Three clusters of comments relate to teacher insecurity when attempting to open up teaching methods by giving pupils more opportunities for decision making. Seven (7 - 18.4%) comments focused on the fear of loss of control in the classroom, which is understandable in an LEA with a large number of inner-city schools and concomitant problems in discipline; four (4 - 10.5%) referred to fear of failure when innovating outside a secure tradition, which may be a reflection of individual teacher personalities or of particular school management styles; another comment expressed an inability to tolerate ambiguity in classroom relationships. This cluster of comments must be regarded as significant in future attempts to bring about concept-base innovation: if teachers believe the innovation will undermine their position and therefore increase stress, some will be less likely to rise to the challenge it issues. Similarly, a small number of comments highlighted a lack of specific skills or understanding: again, remedial action would be in order here for future innovations. Finally, four comments (4 - 10.5%) reflected a belief that some teachers would resist this innovation because they believe their traditional methods are successful: this also points to INSET and discussion, unless these comments are about methods which really are effective across the whole range of CDT activity.

Limitations in pupil attitudes and skills, failures in INSET, inappropriate teaching environments and unhelpful school routines such as timetables, were also noted. Of particular concern were the eight (8 - 21%) comments on the constraints imposed on

teaching methods by examination syllabuses: this is unclear, however, given that external syllabuses prescribe what is to be assessed, and by implication what should be taught, rather than how syllabus content should be taught.

It can thus be seen that this group of teachers saw prevailing teaching methods to be in need of development for effective concept-base CDT programmes. They indicated that teachers need their confidence boosting by being trained to use methods which facilitate open-ended and exploratory CDT activity without precipitating a descent into undisciplined learning. Further research into the detailed classroom behaviour of CDT teachers is indicated.

6.6.2 The Organisation of the School

It was noted in section 3.4.2 that the adoption of an innovation will make demands on a school's organisation, and that even when a school agrees to such an adoption, it is likely to modify the innovation in complex and often subtle ways in order to make it compatible with the organisation of the school.

Sherry[15] portrayed secondary schools as being fragmented by subject compartmentalisation, treating pupils as subordinates, and separating learning from the outside world. There are clear organisational reasons for this, together with pedagogical reasons for simplifying and interpreting knowledge in its transmission to pupils, as Musgrove[16] has argued. Sherry, however, contrasted this with the interdisciplinary, enquiry-based realistic approach to designing which is embodied in CDT, and noted the organisational tensions which resulted.

The conference participants noted similar tensions, and these are expressed visually in Figure 4. The secondary school timetable - itself a very complex task even if carried out with the aid of computers - loomed large. Twenty-one participants (21 - 55.3%) claimed that the timetable imposed general constraints on CDT; ten (10 - 26.3%) felt that the timetable fragmented pupils' experiences and a further seven (7 - 18.4%) noted the disconnectedness of subject options in the 14-16 age range. Six (6 - 15.8%) teachers argued that timetables could prevent team teaching, three (3 - 7.9%) that they could impose inflexible pupil groupings, and a further two (2 - 5.3%) that it could restrict interdisciplinary contact. It was also felt that some timetables minimised time for teaching and planning CDT.

Similarly, the formal curriculum, expressed as it is in the school timetable, was felt by twelve (12 - 31.6%) participants to separate CDT into components. Another significant point, expressed by seven (7 - 18.4%) participants, derived from the constraining relationships between certain subjects, and divorce of other subjects, which are often embodied in the faculty structures of some schools.

School management was referred to rather negatively, not surprisingly given that few senior management personnel were at the conference to air their views. Nine participants (9 - 23.7%) claimed that management disregarded the value of CDT for more able pupils, and a range of minority comments focussed on managers' lack of awareness of developments in CDT, which arguably is in keeping with the national position as it is generally understood.

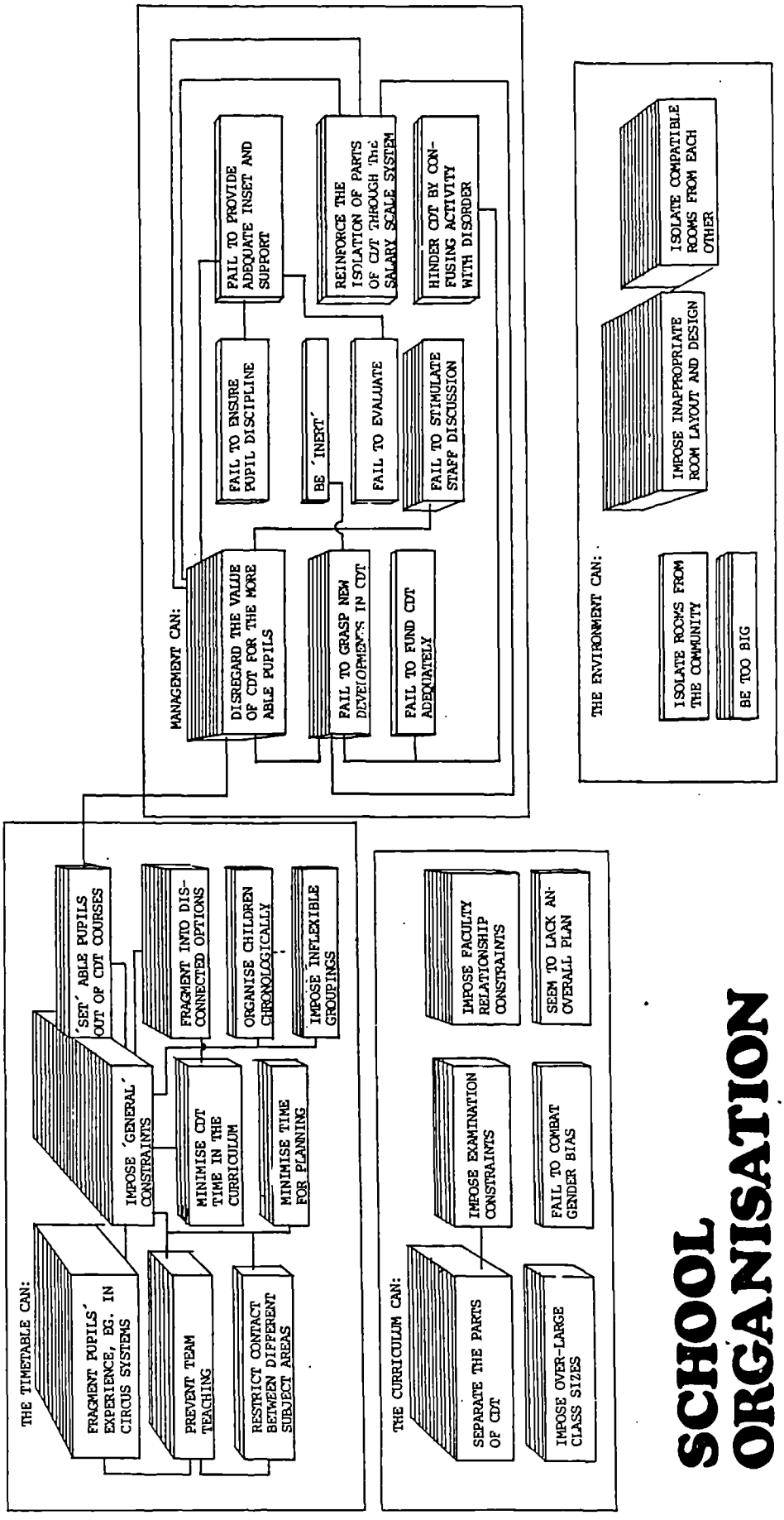

SCHOOL ORGANISATION
THE TIMETABLE CAN:
FRAGMENT PUPILS' EXPERIENCE, EG. IN CIRCUS SYSTEMS
PREVENT TEAM TEACHING
RESTRICT CONTACT BETWEEN DIFFERENT SUBJECT AREAS
IMPOSE 'GENERAL' CONSTRAINTS
'SET' ABLE PUPILS OUT OF CDT COURSES
MINIMISE CDT TIME IN THE CURRICULUM
MINIMISE TIME FOR PLANNING
FRAGMENT INTO DISCONNECTED OPTIONS
ORGANISE CHILDREN CHRONOLOGICALLY
IMPOSE INFLEXIBLE GROUPINGS
THE CURRICULUM CAN:
SEPARATE THE PARTS OF CDT
IMPOSE OVER-LARGE CLASS SIZES
IMPOSE EXAMINATION CONSTRAINTS
FAIL TO COMBAT GENDER BIAS
IMPOSE FACULTY RELATIONSHIP CONSTRAINTS
SEEM TO LACK AN OVERALL PLAN
MANAGEMENT CAN:
DISREGARD THE VALUE OF CDT FOR THE MORE ABLE PUPILS
FAIL TO GRASP NEW DEVELOPMENTS IN CDT
FAIL TO FUND CDT ADEQUATELY
FAIL TO ENSURE PUPIL DISCIPLINE
BE 'INERT'
FAIL TO EVALUATE
FAIL TO STIMULATE STAFF DISCUSSION
FAIL TO PROVIDE ADEQUATE INSET AND SUPPORT
REINFORCE THE ISOLATION OF PARTS OF CDT THROUGH THE SALARY SCALE SYSTEM
HINDER CDT BY CONFUSING ACTIVITY WITH DISORDER
THE ENVIRONMENT CAN:
ISOLATE ROOMS FROM THE COMMUNITY
BE TOO BIG
IMPOSE INAPPROPRIATE ROOM LAYOUT AND DESIGN
ISOLATE COMPATIBLE ROOMS FROM EACH OTHER

Figure 4

Finally, traditional workshop environments - costly to install and to re-model - were seen by fifteen participants (15 - 39.5%) as hindering innovation because of inappropriate layout and design, and by a further ten (10 - 26.3%) as separating CDT rooms from each other, thereby reducing interchange and easy access to different facilities by pupils.

Conference participants clearly detected barriers therefore in the structure of the school curriculum and timetable, the attitude and knowledge of senior management and in the architectural inheritance of handicraft workshops and drawing offices.

6.6.3 Resources

Like handicraft and manual training, concept-base CDT courses are active and dependent on a range of resources. Participants were asked to limit their consideration of barriers in the resources category to: equipment and materials for staff and pupil activity; and resources for teaching and learning CDT. Responses fell into four categories.

Firstly, fourteen (14 - 36.8%) comments were made about the restrictions imposed on multi-media activity by the use of traditional single-material craft rooms, and five participants (5 - 13.2%) argued that these existing facilities actually dictate the curriculum. Four participants (4 - 10.5%) believed that existing facilities give insufficient access to specialised equipment to all pupils.

RESOURCES

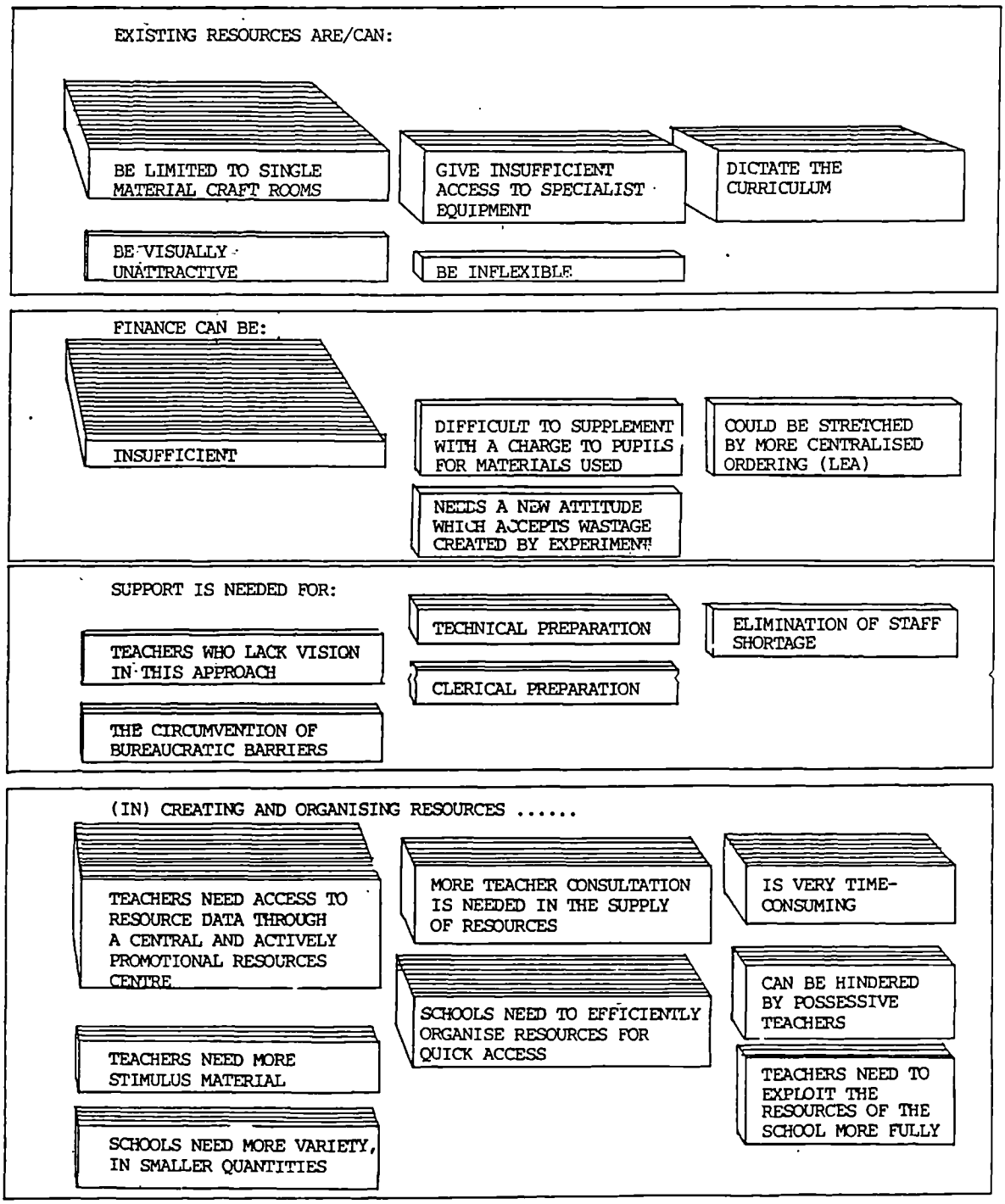


Figure 5

Secondly, and predictably in times of financial restraint, twenty-one (21 - 55.3%) highlighted an insufficiency of resources to mount concept-base approaches to CDT.

Thirdly, a number of minority expressions were made to indicate that teachers need support for technical and clerical preparation, circumvention of bureaucratic barriers and to broaden their vision in this open approach to teaching.

Finally, and more confidently, there were clusters of indications that teachers would need supporting in their creation and organisation of teaching resources. Twelve participants (12 - 31.6%) identified access to information through an actively promotional LEA resources centre as necessary. This links to the view of three participants (3 - 7.9%) that teachers needed more stimulus material and of four participants (4 - 10.5%) that greater variety of teaching materials were required. Six participants (6 - 15.8%) felt that the LEA should consult teachers more in choosing stock for its central resource stores. From an organisation viewpoint, nine participants (9 - 23.7%) felt that schools needed to organise their resources more efficiently for quick access, but seven (7 - 18.4%) noted how time consuming such organisation can be. Four responses (4 - 10.5%) noted how possessive teachers can hinder the creation and organisation of shared resources, and three (3 - 7.9%) focused on the need for teachers themselves to exploit more fully the resources already existing in their schools.

Clearly, this group had strong views about the inappropriateness of traditional craft rooms and equipment, a perceived lack of

finances and the need to improve systems and skills for the creation and organisation of more appropriate resources for the teaching and learning of concept-base CDT.

6.6.4 Personal Resistance

Nothwithstanding Dalin's[1] views, noted on page 198), that 'barriers to innovation' is a broader concept than that of 'personal resistance to innovation', personal resistance often is a real response to proposed innovation. Zander's [17] analysis of such resistance (like Schon's - see page 83), indicated that when an individual experiences change, or merely thinks he does, resistance may surface to protect him from the effects of change. However, not all opposing behaviour takes the form of such resistance: opposition may of course be a rational response to a poor or inappropriate innovation. Zander borrowed the 'hostility pattern' from psychotherapy: this described the open hostility which surfaces in a patient when the therapist gets close to that aspect of the patient's behaviour which he is trying to change. Open hostility is not the only reaction: sometimes the hostility may be concealed within, for example, careless work. The important issue is not how these hostile reactions appear, but the protective function they perform for their perpetrator.

Zander identified a number of origins of such hostility or resistance:

(1) where the nature of a proposed change is not made clear, especially to those currently dissatisfied at work;

(2) where the 'resister' perceives the proposed changes as an indirect criticism of his present performance;

PERSONAL RESISTANCES

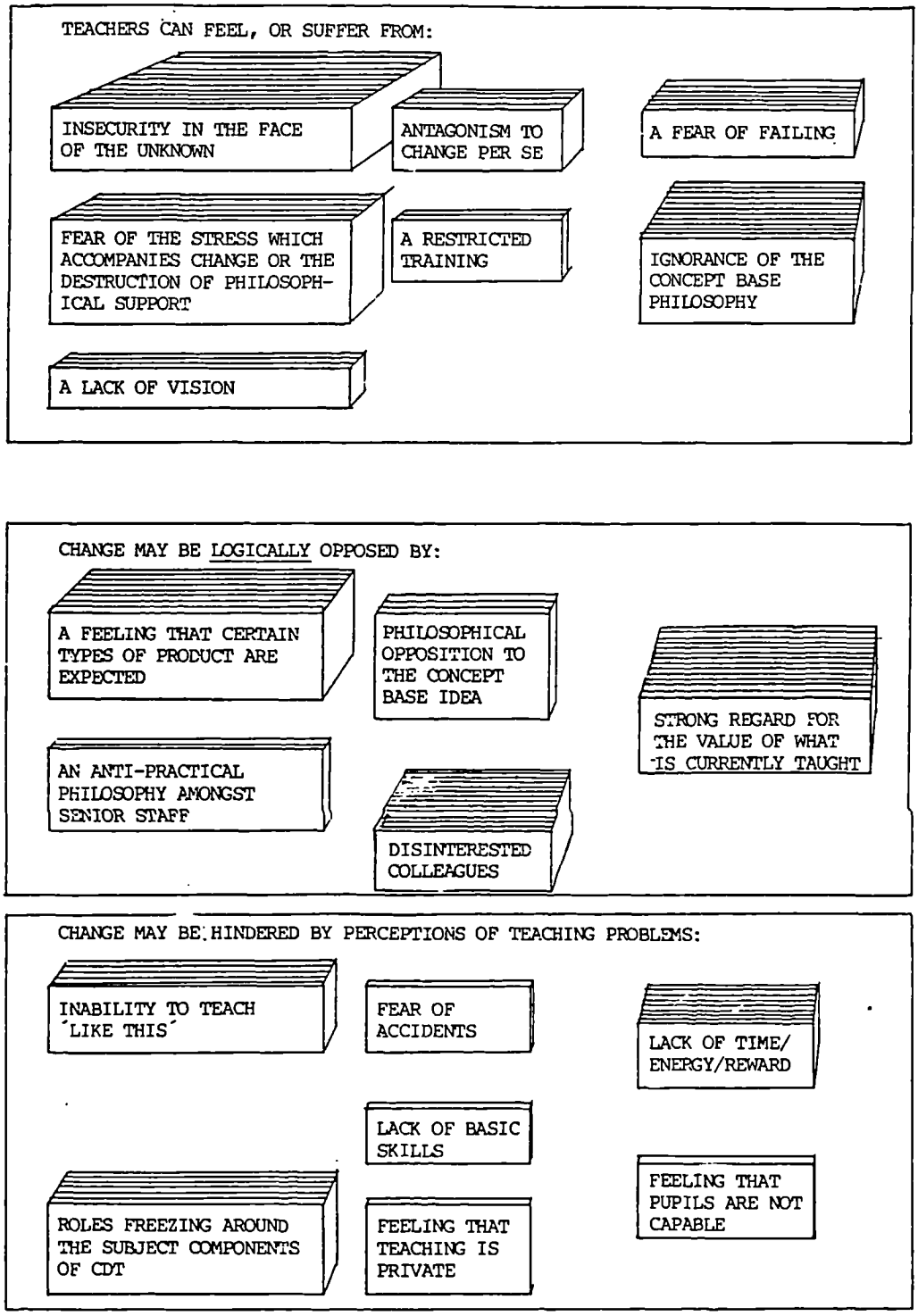


Figure 6

(3) where different pressures for and against change act on the individual;

(4) where negotiation with the individual is weak or non-existent;

(5) where the change is proposed impersonally;

(6) and where the change is contrary to present customs.

Conference participants pursued these issues in relation to the concept-base CDT innovation and their responses fall into three categories. Firstly, teachers might resist because they lack confidence, security or certain skills. Eleven participants (11 - 28.9%) noted the insecurity teachers would feel in the face of the unknown. Similarly, five participants (5 - 13.2%) noted the fear of the stress which might accompany the innovation or the destruction of their current philosophical support. Six (6 - 15.8%) identified a more general fear of failure. Other more negative comments included an expression of teacher ignorance of the concept-base CDT philosophy (11 - 28.9%), a lack of teacher vision, a restricted training, and a general antagonism to change per se.

Secondly, many comments related to the feasibility of logical opposition to the innovation. Three participants (3 - 7.9%) noted the potential philosophical opposition to concept-base CDT; this may be linked to the thirteen responses (13 - 34.2%) showing that some teachers have a strong regard for what is currently being taught. Also, thirteen participants (13 - 34.2%) noted how the innovation might be rejected in the face of lack of interest from CDT colleagues; if a team cannot be motivated to accept the

innovation and carry out the work involved thoroughly, some teachers would dismiss the innovation simply on grounds of feasibility in the circumstances. Finally, eight participants (8 - 21.1%) felt that certain kinds of end product are expected of CDT, and that this innovation could not guarantee that they would materialise given the great scope for diversification in outcomes.

Thirdly, it was felt that concept-base CDT might be hindered by teachers' perceptions of the teaching problems that the innovation would precipitate. Five participants (5 - 13.2%) simply felt that some teachers would not have the ability to teach in this way. A further eight (8 - 21.1%) lamented the lack of incentives - in the form of extra money, time or other rewards - to change in this direction. A further six (6 - 15.8%) noted the freezing of teacher roles around the three components of CDT (Design and Communication, Design and Realisation, Technology) and the restrictions this would place on teachers operating across subject boundaries.

It can thus be seen that the conference participants recognised the potential for individuals to resist the concept-base innovation because of lack of confidence, security or skill, or because of their frozen perceptions of teaching. On the other hand, the ability to oppose it on rational grounds was also highlighted.

6.7 CONCLUSION

The concept of barriers to innovation is fundamental. Just as potential innovators need to be aware of the opportunities they may sieze, they also need to be aware of the barriers to be circumvented if an innovation is to take root. This chapter has considered this issue in general terms, and has specifically examined four barriers to be faced by Manchester teachers of concept base CDT. A further barrier - relating to external examinations - is also crucially important and this is examined in the next chapter.

6.8 REFERENCES

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APPENDIX 1

'MAKING CHANGES' CONFERENCE PROGRAMME

Thursday 13th February

10.30 Registration and Coffee
11.15 'Making Changes': A Rogers
1.00 Lunch
2.30 Working Parties
7.00 Dinner
8.30 CDT Integrated Studies Mode 3 Examination: A Rogers

Friday 14th February

9.30 'Market Place' Exhibition
1.00 Lunch
2.30 'Market Place' Exhibition
4.30 Working Parties
7.00 Dinner
8.30 TVEI in Cheshire: Cheshire LEA Personnel

Saturday 15th February

9.30 Barriers to Change: P Toft
(Lecture followed by syndicate discussions)
11.30 Plenary Session: Barriers to Change
12.00 Conference Plenary Session

APPENDIX 2

BARRIERS TO CHANGE: SYNDICATE GROUPS

SYNDICATE A

Chair: Mr D Dickinson
Scribe: Mr B Norbury

Mr P Toft
Mr M Jones
Mr M Spinks
Mr J Duffy
Mrs B B Waldren

SYNDICATE B

Chair: Mr P Jones
Scribe: Mr H Jack

Mr P Howard
Mr L Smith
Mr P Davies
Miss N Stevens
Mr S Davies

SYNDICATE C

Chair: Ms A Ablay
Scribe: Mr Wynne

Miss B Heyes
Mrs A Kosopud
Mr S Williamson
Mr Dempsey
Mr G Johnson

SYNDICATE D

Chair: Mr J Fielden
Scribe: Mr D Walker

Mr J Lancaster
Mr Barton
Mr McKinstrey
Mr Burtenshawe
Mr A Johnson

SYNDICATE E

Chair: Mr N Nuckley
Scribe: Mr P Whittaker

Mr M Smythe
Mr P Lowry
Mr D Clarke
Mr Thorpe
Mr Jacques

SYNDICATE F

Chair: Mr J Hardman
Scribe: Mr G Pither

Mr P Upton
Mr K Buckley
Mr McQuade
Mr J Lennon
Mr C Brown (HMHS)

SYNDICATE G

Chair: Mr K Edmondson
Scribe: Mr J Tinker

Mr Kalynscyz
Mr M Whiteside
Mr K Keane
Mrs T Crossley
Mr G Brown (Burnage)

SYNDICATE H

Chair: Mr A Rogers
Scribe: Mr R Owen

Mr I Gwilt
Mr Sharples
Miss P Kilby
Mrs C Headsord
Glynis Whitehead
Emma Berry

APPENDIX 3

A SELECTION OF THE BARRIERS TO CHANGE IN CONCEPT BASE CDT RESPONSE SHEETS

M.E.G. MAKING CHANGES : C.D.T. CONFERENCE.
ALVASTON HALL HOTEL : NANTWICH : FEB 1986.

BARRIERS TO CHANGE : IN C.D.T.

LIST OF BARRIERS	POSSIBLE WAYS TO OVERCOME BARRIERS.
TEACHING METHODS.	
1 DEPT. POLICIES - COORDINATE	WEEKLY DEPT MEETINGS. TEAM TEACHING SESSIONS.
2 SAFETY & RESPONSIBILITY.	
3 SUBJECT/CHILD CENTREDNESS. (What's policy in whole school)	BETTER COMMUNICATION. (STAFF MEETINGS)
4 'TRAINING' FOR EXAMINATIONS'	— MORE EMPHASIS ACROSS CURRICULUM FOR CONSISTENCY (ie COURSEWORK) — PRESSURE DERIVED THROUGH WORKING TO DEADLINES.
5	
6	
THE ORGANISATION OF THE SCHOOL. (eg TIMETABLE)	
1 TIME FOR PREPARATION. —	WORK WHICH CANNOT BE DONE AT HOME
2 ROOM ALLOCATIONS. —	KIDS OPPOSED TO SKETCH/DRAWING - WITHIN A 'WORKSHOP' ∴ MORE FLEXIBILITY IN MOVING TO OTHER ROOMS.
3	
4 OPTIONS AT 3RD YEAR —	WHY SPECIALISE ? —
5	
6	
RESOURCES	
1 RANGE OF SIMILAR STIMULUS.	PROVISION OF LIBRARIES WITHIN THE WORKSHOP. MOBILE LIBRARY. ⇒ MANY VIEWPOINTS AS OPPOSED TO THE LIMITATIONS OF 'SET' BOOKS.
2 CAPITATION - ALLOCATION OF MATERIALS.	
3 SHARING EQUIPMENT	
4 DISPLAY - MARKETING	— HOW DO WE PREVENT THE BEST PIECES OF WORK BEING REMOVED FROM SCHOOL ON COMPLETION. BY PUPILS. SHOULD WE TRY TO DETER PUPILS FROM TAKING THEIR WORK HOME?
5	
6	
PERSONAL RESISTANCES.	(THREATS).
1 ADMINISTRATIVE WORK	
2 COLLEAGUES (IN DEPT).	
3 APATHY OF OTHER 'SUBJECT BASED' TEACHERS IN SCHOOL.	
4 SETTLING INTO NEW SCHOOL.	
5 'IN-SERVICE' —	TEACHERS 'PUT ON SPOT' — IE. PRESENT A COURSE TO FELLOW TEACHERS INSTEAD OF UNDERTAKING SOMEBODY ELSES COURSE. ⇒
6 PARENTS EXPECTATIONS.	

OTHER COMMENTS. — OPPOSITION TO DISPLAY WORK FOR FEAR OF VANDALISM, THEFT & GENERAL ABUSE FROM PUPILS. — HOW SAFE ARE OUR DISPLAYS — IS OUR DISPLAY UNIQUE WITHIN THE SCHOOL - ATTRACTING THE WRONG SORT OF INTEREST.

M.E.G. MAKING CHANGES : C.D.T. CONFERENCE.

ALVASTON HALL HOTEL : NANTWICH : FEB 1976.

BARRIERS TO CHANGE : IN C.D.T.

LIST OF BARRIERS	POSSIBLE WAYS TO OVERCOME BARRIERS.
TEACHING METHODS.	
1 Single Topic - closed ends	Open ended design briefs.
2 Do as I say " -"- -"-	child centred approach
3 Learning by rote -"- -"-	develope alternative reinforcement techniques.
4 Skill orientated	allow skills to develop out of requirements
5 single material orientated	self experimentation and involvement in
6	multi media work situations - Team Teaching
THE ORGANISATION OF THE SCHOOL.	
1 No Block Timetabling	Present well argued reasons.
2 "Dumping ground"	show that brighter pupils can also benefit
3 secret divisions.	show that both sexes can benefit
4 Art dept. far away from Craft.	attempt physical changes to allow
5	closer links to be forged.
6	
RESOURCES	
1 Limited time to make resources.	Seek INSET
2 inadequate craft rooms	request changes - self help projects.
3 shortage of finances.	seek alternative supplies - industrial offcuts
4 lack of Technical support	show the importance of this work
5	
6	
PERSONAL RESISTANCES.	
1 Why should I change?	In order to achieve a greater fulfilment
2 Fears of unknown	=INSET
3 Loss of individuality	Involvement will re establish "self worth"
4 Loss of craft skills	perceived loss but not actually
5 Loss of higher craft manipulations -"- -"- -"- -"-	
6	

OTHER COMMENTS.

M.E.G. MAKING CHANGES : C.D.T. CONFERENCE.

ALVASTON HALL HOTEL : NUNEATON : FEB 1986.

BARRIERS TO CHANGE : IN C.D.T.

LIST OF BARRIERS	POSSIBLE WAYS TO OVERCOME BARRIERS.
TEACHING METHODS.	
1 GROUPS / INDIVIDUALS 2 RELATIONSHIPS	VARY APPROACH, GET PUPILS OUT AND INTO VARIOUS ENVIRONMENTS
3 SEE GOOD METHODS IN PRACTICE	→ IN-SERVICE. IF THINGS ARE GOING WELL LET US KNOW!
4 5 STRUCTURE	→ TO IN SERVICE TRAIN THERE MUST BE A BETTER STRUCTURE.
6	
THE ORGANISATION OF THE SCHOOL.	
1 TIMETABLE	→ POSSIBLE START BY WORKING WITH BASE TUTOR SYSTEM
2	
3 USE OF OTHER DEPARTMENTAL STAFF	→
4 LAYOUT OF WORKS ROOMS	→ SEE WHAT OTHER DEPTS, SCHOOL DO! HOW THEY OPERATE.
5	
6 FINANCE	→ FROM THE NEEDS OF THE PUPIL NOT FROM THE RESPECT / STATUS OF THE SUBJECT WITHIN THE SCHOOL.
RESOURCES	
1 THE TEACHER	← MAKE THE TEACHER A BETTER RESOURCE FOR TOURS, INFO ETC.
2 THE SCHOOL	→ FIND OUT WHAT GOES ON IN OTHER DEPTS - SCHOOLS PRIM - TERT.
3 THE CITY	→ GET OUT, FIND OUT - SET UP RESOURCE CENTRES
4	
5	
6	
PERSONAL RESISTANCES.	
1 CHANGE (STRESS)	→ SUPPORT, COMMUNICATION, TEAM TEACHING
2	
3	
4	
5	
6	

OTHER COMMENTS.

M.E.G. MAKING CHANGES : C.D.T. CONFERENCE.

ALVASTON HALL HOTEL : NANTWICH : FEB 1986.

BARRIERS TO CHANGE : IN C.D.T.

LIST OF BARRIERS	POSSIBLE WAYS TO OVERCOME BARRIERS.
TEACHING METHODS.	
1 TEACHER CENTRED ? 2 WORKSHEET BASED 3 OUTCOME DEFINED 4 INDIVIDUAL PROJECTS 5 6.	MOVE TO STARTING POINT/RESOURCE SITUATION + BE PREPARED TO ACCEPT WIDE RANGING OUTCOMES
THE ORGANISATION OF THE SCHOOL.	
1 FUNCTIONAL INERTIA 2 PROBLEM OF SCALE 3 LACK OF COMMUNICATION 4 TRADITIONAL MANAGEMENT 5 LACK OF FLEXIBILITY 6 SUBJECT TIMETABLE CLASS SIZE	DE-SCHOOLING ? DISESTABLISH SUBJECT BASED CURRICULUM → MOVE TOWARDS PEOPLE CENTRED, AUTONOMOUS WORK-GROUPS, WHERE EXPERTISE IN OTHER GROUPS IS RECOGNIZED AND USED AS NECESSARY.
RESOURCES	
1 TIME (LACK OF) 2 SPACE 3 CASH 4 EQUIPMENT 5 PEOPLE 6 EXTERNAL INPUTS/SUPPORT	MOVE TOWARDS SCHOOL BASED RATHER THAN CENTRALIZED RESOURCING → GIVE THE MONEY TO THE ONES WHO'LL USE IT.
PERSONAL RESISTANCES.	
1 ~~NEED FOR CONTROL~~ 2 ~~NEEDS ATTACHED TO KNOWLEDGE~~ ETC 3 NONE 4 WHATSOEVER 5 6 LACK OF EXPERIENCE?	
OTHER COMMENTS. PILOT SCHOOL DEMONSTRATING GOOD PRACTICE + CURRICULUM INNOVATIONS TO WHICH STAFF + STUDENTS ARE SECONDED FOR 1 WEEK OR LONGER → EVERYBODY GOES	

M.E.G. MAKING CHANGES : C.D.T. CONFERENCE.

ALVASTON HALL HOTEL : NANTWICH : FEB 1986.

BARRIERS TO CHANGE : IN C.D.T.

LIST OF BARRIERS	POSSIBLE WAYS TO OVERCOME BARRIERS.
TEACHING METHODS.	
1 TEACHING METHOD IN OTHER SUBJECTS 2 ∴ CONFLICT OF ATTITUDE 3 4 5 6	→ WIDER, ACROSS THE CURRICULUM IN SERVICE RE-EDUCATION
THE ORGANISATION OF THE SCHOOL.	
1 TIMETABLE 2 LACK OF FORMAL TIME 3 FOR WORKING/DEVELOPMENT 4 GROUPS WITHIN THE 5 TIMETABLE 6 SUBJECT STRUCTURE TO ATTITUDE TO ORDER	LARGE TIME / FLEXITIME (CROSS CURRICULAR) and DEPARTMENTAL TIMETABLE
RESOURCES	
1 LACK OF BREADTH for STIMULUS MATERIALS 2 SPACE - WORKSHOP INFLEXIBILITY 3 ATTITUDE - MY RESOURCES, 4 NOT MEETING, 5 6	① NETWORKING WITHIN SCHOOLS ② CITYWIDE NETWORKS → RE-RESOURCE DEPARTMENTS → REALLOCATE, FUND, PROMOTE THROUGH HARD SELL THE NETWORKS. NANTWICH / STRETTSBURY
PERSONAL RESISTANCES.	
1 ATTITUDE TO CHANGE IN GENERAL 2 3 4 5 6	

OTHER COMMENTS.

BARRIERS AS OUTLINED APPLY TO ALL SUBJECT AREAS, DO WE HOPE TO INFLUENCE FROM STANDPOINT OF OUR SUBJECT OR DO WE USE OUR SUBJECT AS MODEL FOR ALL CHANGE ?

MAKING CHANGES : C.D.T. CONFERENCE.

ALVASTON HALL HOTEL : NANTWICH : FEB 1986.

BARRIERS TO CHANGE : IN C.D.T.

LIST OF BARRIERS	POSSIBLE WAYS TO OVERCOME BARRIERS.
TEACHING METHODS.	
1 INAPPROPRIATE MOSTLY :	INSET. ROLE PLAY. VIDEOS.
2 DIDACTIC /	facilitator.
3 RESTRICTIVE	shift from teaching to learning.
4 ~~CLASS~~ PRODUCT CENTRED.	Micro teaching.
5 NOT BASED ON INDIVIDUAL NEEDS / ABILITIES.	Other methods in other subjects.
6. INFLEXIBLE.	INSET not applicable - should be different ~~system~~ to tap in whenever needed.
THE ORGANISATION OF THE SCHOOL.	
1 TIMETABLE CONTRAINTS.	School ~~policies~~ review at regular intervals.
2 INFLEXIBLE GROUPINGS.	changes in timetable, school organisation
3 NOT ABLE TO WORK TOGETHER.	time tabled time for dept. work/inset
4 NOT SEEN AS OF VALUE TO ABLE PUPILS - OPTIONS.	P.R. job on value of active learning.
5 ORGANISATION OF CLASS	
6 EXPECTATION OF SCHOOL and STAFF.	
RESOURCES	
1 ACCESS - ORGANISATION	Central resource data
2 ADEQUATE : IN.	on projects, resources available
3 NUMBERS	materials available, supplies.
4 VARIETY.	issues available - shared by LEA with
5 SUITABLE TO MEET CHANGES.	each other - NETWORKING.
6	STORES SUPPLIES NEED TO CHANGE. STAFF
PERSONAL RESISTANCES.	
1 DOES NOT CONTRIBUTE TO THE NEW PHILOSOPHY.	
2 NOT ABLE TO TEACH IN	
3 THE NEW WAY. IN TERMS	
4 OF SKILLS IN ORG,	
5 DISCUSSION OR	
6 KNOWLEDGE OF	
POSSIBILITIES OR MATERIALS.	
FEELINGS OF INSECURITY AND FRUSTRATION.	

OTHER COMMENTS.

As long as inservice training and thinking / reflection time are voluntary professional development, the most insecure or least able would be unwilling to expose themselves to situations of threat.

Inservice training as it is generally provided do not meet the needs of many teachers.

CHAPTER 7: BARRIERS TO THE CONCEPT BASE CDT INNOVATION: EXTERNAL ACCREDITATION

7.1 SUMMARY

English external examinations at 16+ level were being reorganised at the time of this project - the single General Certificate of Secondary Education (GCSE) was being established to replace a dual examination structure. The working party recognised the importance of legitimising concept base CDT through the new examination structure and it therefore attempted to gain validation for its own 'mode 3' GCSE syllabus. The proposed syllabus was developed by a group from the working party and St Mark's RC High School, guided by the LEA CDT inspector. It followed the procedures laid down by the validating body, the Northern Examination Association (NEA), and submitted various drafts, amended after comments from NEA officials. In March 1987 the group abandoned the effort because it was unable, on educational grounds, to accept the modifications to its syllabus demanded by the NEA and the national criteria for GCSE.

An alternative non-CDT syllabus, run by another regional examination board was adopted. This account was written without complete access to all proceedings, some of which were held in secrecy within the NEA. However, it tentatively concludes that the proposal's failure was linked to: the general speed and turbulence of reorganisation for GCSE; increasing government control over syllabus production; the group's educational philosophy being out of line with that prevailing in the NEA; and the proposal being insensitively communicated to NEA officials.

7.2 THE GENERAL CERTIFICATE OF SECONDARY EDUCATION (GCSE)

The importance attached to the accreditation of English school teaching via external examining boards was stressed in section 1.6.2. Developing a means of legitimising concept-base approaches to CDT within the external examination system was identified as a major goal by the inspector from the outset (see page 151), by the working party as it developed a clearer perception of the tasks it had to carry out (see section 5.6.2), and by members of the conference syndicate groups. This is not surprising, given the forces operating in the education system towards the external assessment and grading of pupil performance, according to Holt[1].

Prior to GCSE, secondary schools entered pupils, usually at the age of 16, for either General Certificate of Education (GCE) examinations (for the top twenty percent of the population measured by academic ability) or for the Certificate of Secondary Education (CSE), catering for approximately the next forty percent of the population. In both cases, the majority of candidates were entered for 'mode one' examinations: these were based on syllabuses designed by the examination board, and examinations were both marked and set by the board. On the other hand, boards offered schools and school consortia the facility to design their own syllabuses, set and mark related examinations, under the scrutiny or moderation of the board. Such 'mode three' examinations were far more common at CSE level than GCE, and one of the effects of establishing GCSE as a common examination was to reduce what was widely considered to be an unwieldy proliferation of different syllabuses[2].

However, mode three examinations had been previously designed to

promote local innovation. Despite the rationalisation brought about by GCSE, and the national general and subject criteria, set by the government Secondary Examinations Council (SEC) and to which all new syllabuses had to conform, mechanisms were built into GCSE to enable local innovatory courses to be examined through the mode three route.

The Northern Examining Association (NEA) outlined its requirements for approval of proposals for mode three GCSE syllabuses in a document prefaced with its reasons for offering this facility: "The NEA provides the facility for all modes of examining in the GCSE. Although many of the Mode 1 syllabuses ... include board-assessed and teacher-assessed elements, it is recognised that centres may have particular needs that are not met by that provision. Centres may therefore wish to propose Mode 3 schemes. The syllabuses and assessment procedures proposed in Mode 3 submissions must comply with agreed national criteria of both a general and, where appropriate, a subject-specific nature, as well as with criteria established by the NEA."[3]

It is generally recognised that GCSE involved a major shift in emphasis and an extra workload for individuals involved. The first cohort of pupils was due to be examined in summer 1988, which meant that syllabuses had to be issued to schools before the end of the summer term in 1986 at the latest, to enable them to prepare two year courses for their pupils. The concept-base mode three syllabus was prepared, as outlined below, in this period, and its eventual outcome was arguably influenced in unquantifiable ways by the period's general turbulence. The writer, as a mode one chief examiner of the NEA at the time, and in a number of informal

discussions with Gray, Chairman of the NEA CDT subject committee, gleaned the following view of internal operations.

The CDT subject committee and its sub-committees consisted largely of full-time teachers and lecturers who advised the board, as representatives of the wider teaching profession, on a voluntary, unpaid, part-time basis. During the run up to GCSE, most members were severely overstretched to meet deadlines for the production of mode one syllabuses and examination papers, all of which involved considerable professional writing and revision efforts by committee members. A similar time demand was made on individuals on the national SEC, of which Gray was one. Not surprisingly, the board found it difficult to allocate time in this busy period to the consideration of mode three examinations, and this is reflected in the length of time it took the board to respond to the Manchester concept-base CDT mode three proposal.

7.3 THE MANCHESTER CONCEPT BASE CDT MODE THREE PROPOSAL

In May 1985, whilst the pilot project was working towards a conclusion, the inspector convened a group to develop a mode three proposal to examine concept-base courses at GCSE level. It met first on June 4th, under the chairmanship of Astin from St Mark's RC High School and the writer acting as group secretary. It set out a programme leading to a final submission to the NEA by the board's deadline of 31st January 1986. Rogers had, in a memo to this group dated 11th May 1985, indicated that he had been "told by Mr Gillan - Secretary to ALSEB* - that I can pass a proposal to him

* The Associated Lancashire Schools Examining Board which, as a section of the NEA, had responsibility for mode 3 proposals emanating from Manchester.

informally in advance of a formal approach to the NEA"[4]. Accordingly, the group agreed to "submit informally to Mr Gillan a proposal before the start of the autumn half-term holiday, 1985 (25th October)"[5].

The group split into sub-groups to develop: (1) aims and objectives; (2) syllabus content; (3) assessment techniques; and (4) teaching materials. A programme of meetings, leading up to the informal submission, was set for (1) 20th June; (2) 3rd July; (3) 16th September; (4) 1st October; (5) 17th October.

During the following academic year, the group joined with the second concept-base working party. A draft proposal had been submitted by Rogers on February 1st 1985; this formed a starting point for the group's production of a second draft. This second draft was submitted for informal consideration and was returned by Chicken, Gillan's deputy, on 11th December with the following comment: "Thank you for your letter and second draft of your proposal on 9 December with a note asking if we could comment at this stage. I regret that the situation within the new system is such that I am not able to give you any detailed comments other than those which we have mentioned previously, that your submission should fulfil in all respects the requirements of the NEA. Once we have received your formal proposal we will put it through the checking system as soon as possible and contact you if any modifications need to be made before it is considered formally by the relevant committee."[6] The clear discrepancy between this stance towards informal proposals and that reported previously by Rogers[4] highlights the confusion arising from the drive to bring about a mode three proposal (innovation) in times of work overload

with an examination board (turbulence), which had just been subjected to a major structural merger and reorganisation.

On December 1st, the group met to consider this position and produce a final draft, which was then submitted to the board. It was not until March 14th 1986 that the board responded. The submitting group was asked to amend the proposal by fitting it more exactly onto the proforma required by the board, within two weeks. A re-drafted version was submitted in response. The board's procedure was then to submit the proposal to a specialist "moderator and subsequently (for vetting)* by the NEA Committee responsible for this particular subject area."[7]

Comments from this mode three sub-committee, based at the North West Regional Examinations Board (NREB) in Newcastle were forwarded to ALSEB and then to the Manchester group on 31st October 1986. This communication stated that although "the integrated approach is welcomed, the Committee has many reservations, some of which are perhaps the result of the sometimes confusing presentation and language of the submission. The Sub-Committee asks that the points given below are considered by the submitting group and appropriate amendments made before the proposal is resubmitted."[8] The points made are reproduced in Appendix 1: essentially, they varied from minor problems such as the repetition of aims and objectives, to quite fundamental questioning of the reasons for submitting the mode three proposal in the first place, and implying little difference between the advantages claimed for the proposal and those the committee felt were possessed by the mode one

*my insertion

syllabus. The letter ended with a request for amendments, noting that the Secondary Examinations Council were interested in this kind of innovation, but pointing out that "The SEC will wish, however, to consider the syllabus and its title when it has been approved by the NEA".[8]

Rogers replied directly to NREB on 8th November 1986, noting the sub-committee's requirements, and defending the specialised language used in the submission; he also criticised the proforma on which the proposal had to be written and which, according to Rogers, prevented full amplification of some of the issues not understood by the sub-committee. He also reminded the board of the importance of positive, as well as negative, feedback, stressing that "it needs a great deal of determination to continue the dialogue in response to a (sic) very negative messages in the letter. We are, however, convinced of the validity of the proposal and we know that it will be seen as the test bed for future curriculum development in active learning."[9]

Representatives from the subject sub-committee and the deputy secretary of ALSEB met the group on 17th November at Barlow RC High School (formerly St Mark's RC High School, and now the nominated 'centre' for the proposed mode three syllabus). The representatives "refused to address themselves to specific points, ie. the 12 points raised in their letter. They felt that they could not represent the views of the whole NEA committee, but wished to help in an advisory capacity".[10]

The group and inspector responded to the advice given at this meeting and re-submitted the proposal. On 19th March 1987, in a

letter from ALSEB to the headteacher of Barlow RC High School[11], Chicken relayed comments of the Subject Committee on the proposal. Criticisms of language, and assessment mechanisms, predominated, but the group viewed the following statement, listed as point 5 in a 9-point letter, as fundamental:

" 5. Somewhat more than a third of the Subject Content is devoted to Knowledge (B) which concerns human needs and motivations. The comment was made that this part of the subject content was too remote and its volume too great for a CDT course. It was felt that this section represented, not an essential part of an examination syllabus, but an approach to the teaching of the subject. This view is supported by the few marks allocated to this section. A decision was made therefore that the Knowledge (B) section should be removed from the Subject content and either omitted from the syllabus or transferred to a section for the guidance of teachers."

This letter effectively signalled the end of the group's attempt to carry through its mode 3 proposal. Removal of the knowledge section relating to human needs and motivations was seen by the group and the inspector as tantamount to removing the raison d'etre for the proposal. Also, fourth year pupils at Barlow, and other schools, were then being prepared for a GCSE examination which seemed decreasingly likely to be approved. It was thus imperative to seek out an alternative and the Midland Examining Group Syllabus in Design was adopted. The aims and objectives of this syllabus, reproduced in Appendix 2, went some way towards meeting the curricular needs of the group, but at the expense of preventing pupils taught in this way from receiving a GCSE qualification

prefixed by the increasingly prestigious initials - CDT.

This case study has been written without complete access to information, given that much of the board's deliberations were conducted in secrecy and some informal dialogues were never recorded. In this case, the writer can only present a tentative analysis. It would seem that the exercise represented an attempt by a radical group to implement an innovation against the following negative forces:

(1) examination board personnel were stretched to the full by the advent of GCSE;

(2) national GCSE criteria were clearly intended to rationalise a situation characterised by the proliferation of syllabuses during a period when central government was preparing to exercise greater control over the school curriculum;

(3) the proposal was philosophically out of line with that prevailing in the Secondary Examinations Council, the NEA and NEA CDT members' perceptions of the national criteria for CDT;

(4) the language in which the proposal was expressed was not liked by committee members, many of whom felt it represented jargon; the group thus failed to communicate effectively, which was not helped by its lack of knowledge of the committee members and their particular educational views;

(5) it was increasingly important to find an examination for the first cohort of GCSE pupils and, in the end, the group looked

elsewhere for one already in existence.

Significantly, in 1987, the NEA published its own mode one integrated syllabus. This is now on offer as GCSE examination for mature students. Its subject content breaks into: (1) skills (designing, communicating, making) and (2) knowledge (design procedures, materials, components, processes, control systems and energy transformation, and communication methods). The aims and objectives closely follow those laid down by the SEC in the national criteria; human needs and motivations, a cornerstone of the Manchester mode three proposal, are not mentioned in the syllabus. The syllabus has been approved by the SEC.

7.4 CONCLUSION

It can thus be seen that innovators in this field were very closely constrained by the power of this external examination board. Furthermore, the board was acting very much in line with the GCSE national criteria laid down, on behalf of central government, by the Secondary Examinations Council. Any re-submission of this syllabus presented in the same climate must strategically take account of such powerful constraints, and also be communicated in a mode which is acceptable to those officials who make syllabus approval decisions.

7.5 REFERENCES

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2. Eggleston, John, 1988, 'CDT in Perspective: Technological Division', printed in Studies in Design Education, Craft and Technology, Vol 20 No 2, Spring 1988, page 75.

3. Northern Examining Association, 1985, 'Instructions and Guidance for Centres on The Submission of Proposals for Mode 3 GCSE Syllabuses', page 1.

4. Rogers, AE, 11.5.85, Letter to members of the mode 3 development group.

5. GCSE Mode 3 Concept Base CDT Group, 4.6.85, Notes of First Meeting held at Trinity High School.

6. Chicken, Roger, 11.12.85, Letter from the NEA to Rogers.

7. Chicken, Roger, 14.12.85, Letter from the NEA to Rogers.

8. Binks, Malcolm, 31.10.86, Letter from the secretary of NREB to the Secretary of ALSEB.

9. Rogers, AE, 8.11.86, Letter to NREB.

10. Barlow RC High School, 17.11.86, 'Notes Taken During Mode 3 Meeting'.

11. Chicken, Roger, 19.3.87, Letter from NEA to Headteacher of Barlow RC High School, Manchester.

APPENDIX 1

NORTHERN EXAMINING ASSOCIATION

The North Regional Examinations Board
Wheatfield Road
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6870B

31 October 1986

For the attention of Ms M Hutchinson

The Secretary
Associated Lancashire Schools Examining Board
12 Harter Street
MANCHESTER M1 6HL

Dear Ms Hutchinson

GCSE Mode 3 CDT: Integrated Studies Proposal
Centre No 32353: Barlow R C High School

I have received comments from the Mode 3 Sub-Committee concerning the above proposal. Although the integrated approach is welcomed, the Committee has many reservations, some of which are perhaps the result of the sometimes confusing presentation and language of the submission. The Sub-Committee asks that the points given below are considered by the submitting Group and appropriate amendments made before the proposal is resubmitted.

1 Proposal contains much jargon, parts of which were impossible to understand, for example, how does one describe and apply facts, principles and concepts related to images?

2 Additional aims appear superfluous, viz. aim 9 is largely repeating 1, aims 11 and 12 are covered in 7, aim 13 is an assessment objective.

3 Additional assessment objectives are also superfluous, viz. 18 does not add significantly to 17, 19 is partly covered in 1, 20 is also partly covered in 3, 21 is largely a repeat of 2.

4 Outline of means by which differentiation will be achieved is unconvincing in its first two reasons. "Setting" is hardly an appropriate choice of word to describe their "starting points". It is not clear how assessment procedures can make the experience of this course more positive for candidates.

5 The syllabus content is confusing (pages 9-10).

(a) What is listed as knowledge are mainly skills;

(b) Explanation of the consortium's use of the term "concept-based" is required;

(c) Is all of it to be tested, and if so, how? The specimen material is not clear on this.

6 The reasons for this submission are unconvincing. The Sub-Committee does not accept the consortium's interpretation of the Mode 1 syllabuses and sees little difference in the advantages claimed for their proposal and those which are at present on offer from the NEA.

7 Minimum requirement for the award of a grade lists three - but does not mention making.

8 It would appear that knowledge is to be given very few marks - far less than the 20% minimum prescribed by the National Criteria for CDT. Also it appears light on marks for making, with the possibility of less than 30%.

9 A bias towards realisation and communication, and a lesser demand on technology is detected. Without further clarification, it appears that the exemplar material suggests that the Mode 1 CDT: Design and Realisation would be capable of examining the areas cited.

10 Amplification of the titles given for possible "starting points" is necessary before proper commentary can be given.

11 Example 1 of the specimen examination materials seems quite inappropriate as a design-make-test exercise for full ability range at 16+ and perhaps more appropriate for post graduate research. Example 3, urban decay, is also unsuitable for a CDT examination in that making appears impossible, and modelling difficult and unlikely to be useful in subsequent appraisal exercises.

12 The "route" system or scheme of examination appears to present many problems in the moderation of candidate's work. Could the Group explain how this flexibility will work in practice?

The Committee is anxious to reconsider this proposal once suitable amendments have been made. The Group will be interested to learn that SEC are sympathetic to this area of innovation. The SEC will wish, however, to consider the syllabus and its title when it has been approved by the NEA.

Yours sincerely

Malcolm Smith

for Secretary to the Board

APPENDIX 2

AIMS AND OBJECTIVES OF GCSE DESIGN SYLLABUS ADOPTED BY CERTAIN MANCHESTER SCHOOLS FOR CONCEPT BASE CDT COURSES *

DESIGN

(Syllabus Code: 2320)

AIMS

1 To develop a critical awareness of the man made world, the environment and culture.

2 To promote an understanding of the potential of, and an expertise in those activities which are involved in designing and making.

3 To foster curiosity, ingenuity and imagination through a personal involvement with ideas and materials.

4 To encourage the special aptitudes and interests of the individual.

5 To strengthen perception of the social, economic, technical, aesthetic, historical and operational considerations underlying the form, content and appearance of the man made world.

It should be noted that not all these aims can be translated readily into assessment objectives.

ASSESSMENT OBJECTIVES

Candidates should be able to:

1 select a topic for study suitable for him or her to communicate a critical appraisal of the ideas and artefacts designed by others.

2 analyse ideas, concepts, situations or subjects and to research and coherently record the relevant information.

3 define a problem (the brief) and investigate the issues related to a realisation.

4 develop ideas, to plan and organise the activities which lead to a realisation.

5 complete a realisation by using, with sensitivity, suitable materials, skills and processes.

6 evaluate the degree of success of his or her own design studies.

The relationship between the Assessment Objectives and the components of the Scheme of Assessment is shown in the grid below.

* Reproduced from: Midland Examining Group, 1986, 'Design - General Certificate of Secondary Examination Syllabuses - 1988' - Syllabus Code: 2320 - page 1.

CHAPTER 8: AN APPRAISAL OF THE CONCEPT BASE CDT INNOVATION

8.1 SUMMARY

Reduced to bare essentials, the action studied in section two can be expressed as follows:

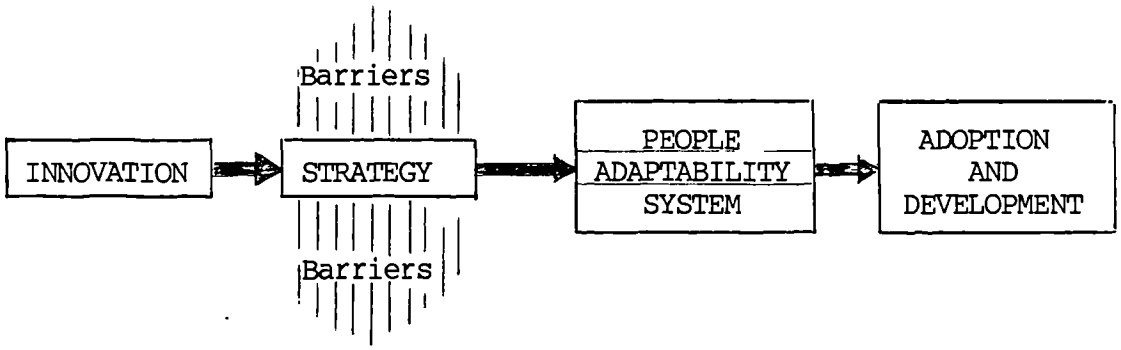

Fig. 1

Although the elements in this process are tightly interlocked, and indeed vary in relation to each other in complex and unpredictable ways, it is necessary to identify factors from each which influenced progress made in the events with which this case study is concerned. They are therefore appraised separately below. The chapter concludes with the writer's perceptions of the issues which future concept base innovators will have to attempt to resolve in order to maximise the chances of their innovation being adopted and developed.

8.2 THE INNOVATION: CHARACTERISTICS AND COHERENCE

The innovation was characterised by its:

(a) aim at all children in the city's schools, irrespective of ability, age, class and ethnic background, or gender;

(b) child-centred ideology;

(c) foundation on the assumption that doing and making are important in the school curriculum;

(d) interdisciplinary and collaborative imperative;

(e) experimental and developmental nature.

8.2.1 LEA Policy

In being aimed at all children in the city, irrespective of classification, the innovation was broadly in line with city council policy for equal opportunities and multi-cultural education. However, given the length of the communication chain between the product champion and political decision makers, and the tiers of command separating them (chief inspector, deputy chief education officer, chief education officer - see page 128), it is unlikely that members of the education committee were aware of the innovation in its pilot phase. This has implications for future developments, particularly in the light of successful LEA-based development projects elsewhere. For example, Bagshaw[1] outlined how Staffordshire councillors have sanctioned the spending of up to £500,000 per annum over six years on a programme to establish technology in the curriculum of every school: without this political support, the Staffordshire Technology Education Programme[2] would be considerably less effective. In an LEA system in which major decisions are made by politicians in consultation often with officers, it would seem essential to find ways to draw councillor and senior officer attention to the innovation, and to elicit their support.

8.2.2 Child-centred Ideology

Much of the language used by participants in this innovation implied an ideology which placed children first in the educational process. This was exemplified by such tactics as: active rather than passive learning; negotiation between teacher

and pupil; and a concern with children in their current developmental stages rather than as potential adults. However, inherent in any educational ideology, are dangers of a descent from real principles to uncriticised rhetoric. In this case study, there is evidence of confusion surrounding the concept of child-centredness. For example, Astin[3] stated "Many Craft Design and Technology courses have, to date, purported to meet the needs of the pupil but have failed by divorcing themselves from the true context and, as a result, have borne little resemblance to the real needs of the individual pupil." There is a clear and unequivocal correlation implied here between meeting pupils' needs on the one hand, and starting projects from their true contexts on the other. Astin claimed that some present CDT courses have "ignored the needs of the individual and the human context and, as a result, have not provided meaningful experiences for the majority of pupils."[4]

However, this hypothesis - that pupil motivation in CDT is necessarily linked to the origination of project work in its human context - is untenable, given the commonly observed phenomenon of motivated pupils engaged in CDT which has not sprung directly from human contexts. The hypothesis clearly derives from confusion between a reflexive child-centred stance relative to pupil-perceived relevance and a received knowledge-centred stance relating to a study of human contexts, (See section 5.6.5(1)). Pupil motivation in CDT has many tributaries including school ethos, teacher capability, cultural attitudes towards gender, intrinsic pupil interest in the activity and pupil goals. Ausubel and Robinson[5] added a useful dimension - meaning - to this conundrum and showed that

meaningful learning is not necessarily a function of child-centred discovery practices. This can be expressed, as in Figure 2.

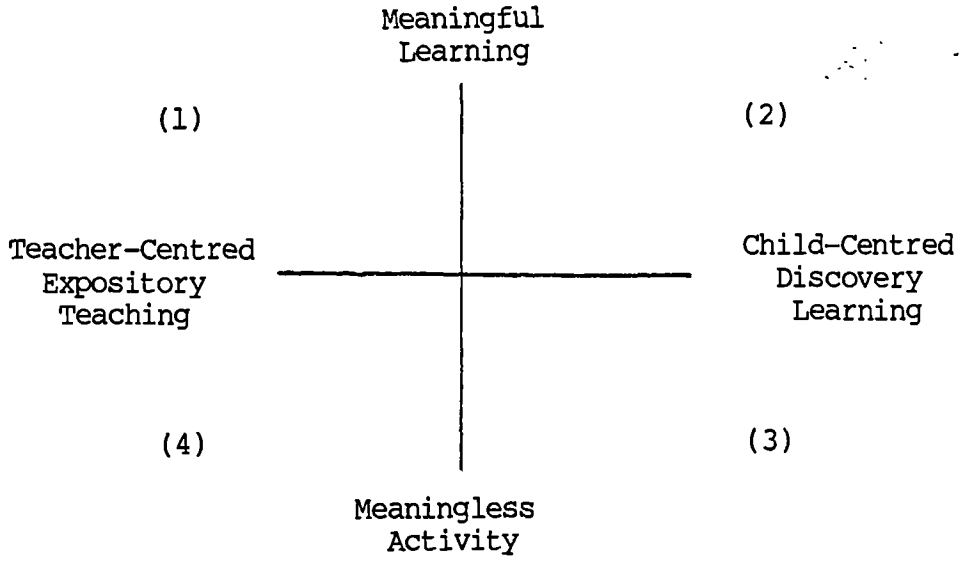

Figure 2.

Clearly, learning in (1) can be both meaningful and teacher-centred, whereas in (3) child-centred discovery learning, carried out badly, can be meaningless to the pupil. In the same way, meaningful CDT learning can, and does, take place when taught out of its human context, providing that other sources of meaning are drawn upon such as, for example, the need for pupils to understand aspects of triangulation before they can systematically design and build model cranes. Concept base approaches to CDT may or may not motivate children; the motivation will, in the writer's opinion, turn on a number of factors, and will not necessarily be linked to the origins of projects in their human contexts. The writer's resolution of this problem can be expressed as in Figure 3.

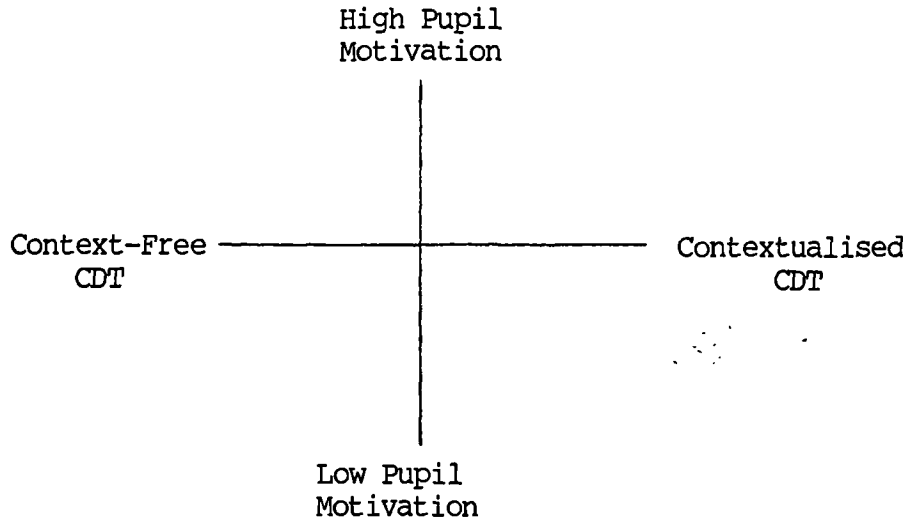

Figure 3. WRITER'S INTERPRETATION OF THE RELATIONSHIP BETWEEN MEANING AND MOTIVATION IN PUPIL LEARNING

It would be tactically unwise to ignore the interrelationships embodied in this diagram in future developments.

Similarly, it would be tactically unwise in concept base CDT to ignore Bruner's clear delineation of six features of learning which will help a student to master his studies. They are:

" 1. the organisation of learning so that the child recognises that he can go beyond the information he already has (the attitude problem);

2. the organisation of new materials so that the child is able to fit it into his own frames of reference (the compatibility problem);

3. the organisation of the problem so that the child can perceive it to be within his own capacity to solve successfully;

4. the provision of training in the skills of information acquisition and problem solving, more especially in relation to the heuristics of the subject being studied;

5. aiding the child who can do things but who cannot convert what he does into a compact notion in his mind - Bruner calls this the self-loop problem;

6. helping the child learn skills for information handling."[6]

A further aspect of this confusion might be profitably investigated in future research. In school science and mathematics, much has been written about the influence of gender on motivation to study. Kelly[7], in introducing a series of such papers, identified two broad angles to previous research: the psychologistic and the sociological. In the former, girls' documented avoidance of physical science was assumed to be a function of female personality traits, attitudes, and perceptions of science. The latter approach sought to identify faults or biases in science and our society at large. In the former, intervention strategies were pitched at changing girls' attitudes; in the latter they attempted to change systems.

Kelly herself proposed "three main reasons for girls' avoidance of science. Girls see science as a difficult subject, and have less confidence than boys in their own abilities; they see science as masculine, which conflicts with their developing sense of femininity; and they see science as impersonal, whereas their socialisation has primarily been towards care for people".[8]
Head[9] related the greater attraction of immature boys compared with girls of the same age towards science, to their perception

of science as traditionally masculine and as a source of clear answers at a developmental age at which boys required such answers. Girls, on the other hand, being more emotionally mature than boys at secondary school subject option time, were not similarly attracted. Harding and Sutaris[10] sought explanations for subject preference in early child development, and Walkerdine[11] sought them in our historically constructed conceptions of gender.

Preference for school technology is likely to be similarly influenced by such factors as gender and its relationship with child development and culture, and a limited amount of relevant action research[12] has been carried out. Arguably, well structured research into the links between child personality, our culture, the nature of concept base CDT and motivation to engage in designing and making would sharpen our understanding of the child-centredness of this innovation and promote a clarification of its ideology.

8.2.3 Doing and Making in the School Curriculum

For cultural, epistemological and professional reasons advanced in chapters one and six of the present study, the importance of doing and making in the school curriculum is clearly not self-evident. In one sense, there are strong forces operating to undermine this claim. At the conference described in the last chapter, 23.7% of those who completed barriers to concept-base CDT record sheets expressed, without solicitation, beliefs that school senior managers had low regard for CDT for able pupils, and other responses indicated a lack of senior management awareness of CDT developments (see page 217).

In contrast, the regard which some Manchester headteachers have for capability and CDT in the curriculum was expressed very strongly in an LEA seminar chaired by the writer on 5th February 1986 at the 'Education for Capability - A Network for the North West' workshop held at Salford University. The seminar attended by five headteachers and a deputy head noted that CDT and capability were already well represented in the curricula of Manchester schools, and that headteachers generally perceived advantages in curriculum development in this area. The writer expressed these perceptions in a letter to the LEA's inspector for careers and 14-19 education, for whom he was deputising at the conference. (See appendix 1). The LEA curriculum document which was prepared to guide schools in constructing their own curricula[13] made it clear that such experiences should be accessible to all pupils at primary level (paragraphs 4.6 and 4.7) and at lower secondary level (paragraph 5.19). With the possible exception of more able pupils in the upper forms of some secondary schools, it would seem that doing and making is regarded as an important part of the school curriculum in Manchester.

8.2.4 Collaboration

It was argued in section 5.6.3 that the innovation required collaboration between teachers within and between schools. The experience of the pilot phase suggests that collaboration and the crossing of subject boundaries, though difficult, can be productive providing effective leadership is brought to bear and assuming that the teachers have the intellectual capacity to cross subject boundaries in their curriculum development and teaching. Notwithstanding this, the need for collaboration to

implement this innovation within an LEA context must be seen as a burden to be shouldered, albeit one with the kind of potential which Peters and Waterman uncovered in their research into team work in successful American companies (see section 3.6.2). The need for relatively high teacher ability may also be regarded as a potential braking force, given the qualitative and quantitative shortages of CDT teachers outlined in section three of the present study.

8.2.5 Development

Chapter five outlined the experimental and developmental nature of the pilot phase of this innovation. Rogers (see page 88) showed that the rate of adoption was influenced by five features of the particular innovation, seen from the vantage point of the potential adopter:

(1) advantage relative to present practice;

(2) compatibility with experience, values and needs;

(3) simplicity;

(4) trialability;

(5) ability to observe the innovation in action.

Given the innovation's undeveloped nature, it could be argued that some teachers would not see any advantage over their own present practices, or be able to judge its compatibility with their experience, values and needs, or to observe the innovation in action. Future developments would thus be more accessible to such teachers if concrete examples of the innovation in action could be established and demonstrated.

A further issue relating to the undeveloped state of the

innovation lies in its educational coherence. The writer has concluded that it is now clear that concept-base CDT can be interpreted differently at three points along a continuum, the continuum representing the extent to which the six concept bases influence the teaching programme. This is shown diagramatically below.

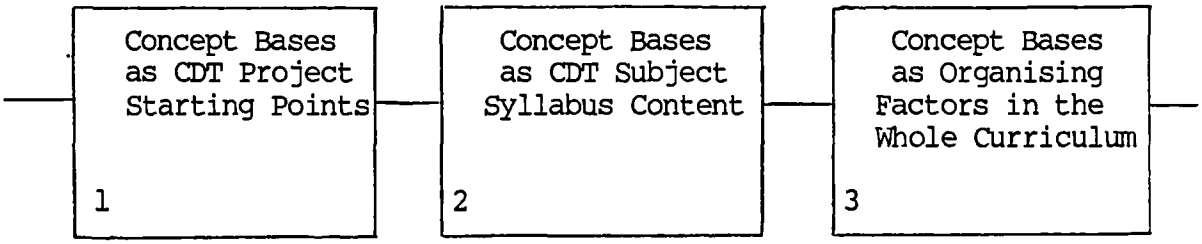

Figure 4: WRITER'S INTERPRETATION OF MANIFESTATIONS OF CONCEPT BASE CDT

Each of these interpretations figured in the deliberations of the pilot phase working party, and the examination development group, and in the writings of the inspector, although they were not perceived as distinct entities with any clarity. The lack of distinction between them caused confusion, and was evident in the failure to gain accreditation for the mode three examination (see chapter 7.

In the writer's first interpretation, the bases are simply collections of themes and ideas which teachers and pupils can use to generate starting points for designing and making. This was how the concept-base approach was developed by Rogers whilst he was in teacher training.

The second featured increasingly as the pilot phase advanced,

particularly in Rogers' writing[14] and his references to imagineering and cultural anthropology as areas in which children should receive practical (including CDT) education. The working party also moved in this direction and Figure 5 shows a curriculum model proposed by the writer on the assumption that the pupils would journey through the knowledge embodied in the original ten concept bases in a progressive spiral, using CDT projects as a vehicle.

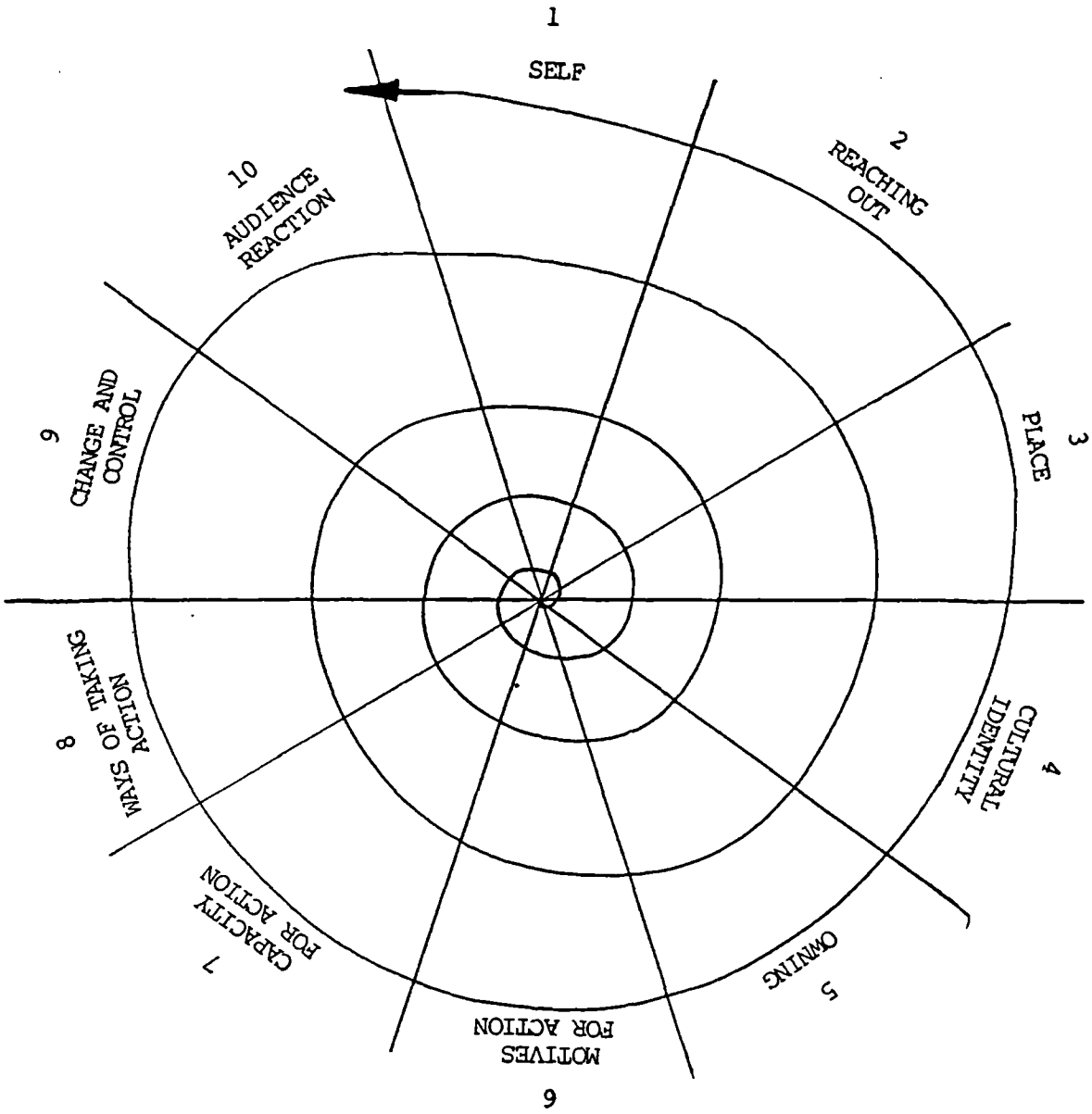

Figure 5: WRITER'S PROPOSED MODEL OF A SPIRAL CURRICULUM FOR CONCEPT BASE CDT

The model was based on Bruner's spiral curriculum idea discussed in section 5.2. The writer's attempt to ensure that: pupils were exposed to a balanced coverage of the concept bases; their journey through this coverage made progressive intellectual demands on pupils; repeatedly returning to the same concept base, albeit via different 'design and make' activities, would promote an increasingly rich understanding of the knowledge embodied in each concept base. As such, it had a close affinity with the idea of concept bases as CDT subject syllabus content and at a different level with the idea of concept bases as organising factors in the whole school curriculum (see figure 4).

The writer's third interpretation enshrines the idea of the bases as cross-curricular organisers for whole school programmes. This is simply expressed in the matrix below.

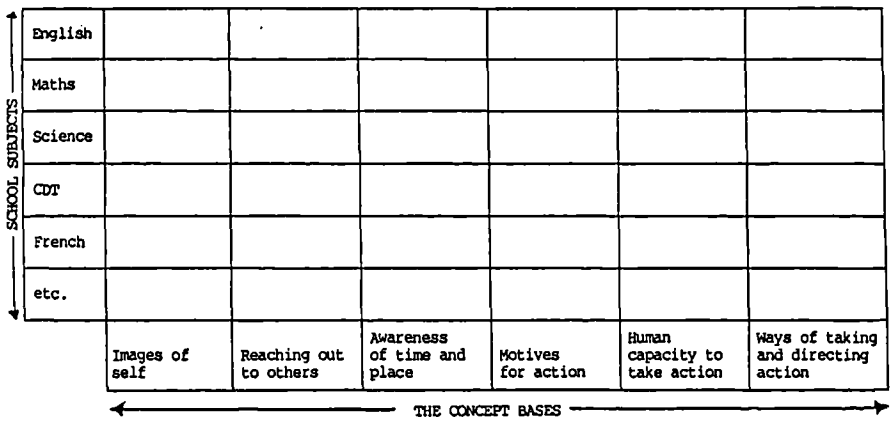

Figure 6

Within this matrix, the various subject disciplines would be taught within the contextual framework furnished by the concept bases.

Clearly, the first interpretation - concept bases as stimuli - is of most immediate value because it can be implemented without radically changing CDT syllabus content. On the other hand, the second interpretation - concept bases as knowledge - is more difficult, partly because CDT national criteria for external GCSE examinations currently proscribe such an approach, and partly because it requires the transplantation of syllabus content from other subject areas into CDT. In the heavily subject-dominated secondary sector, this could generate hostility between subject specialists and would require increased management activity for success. Thirdly, the use of concept bases as organisers of the whole curriculum requires changes of a different order altogether, and although one inner-city school did consider the option[15], no moves in this direction are currently evident in the system. Arguably, this is highly unlikely anyway given the nature of the proposed national curriculum (see pages 27-28). Also, there are other systems providing the vertical strands in this kind of matrix, which have widespread acceptance. Phenix[16] saw human existence being distinguished by a pattern of essential "meanings", and argued that general education should engender these meanings, which were: aesthetics; empirics; ethics; symbolics (including language and mathematics); synnoetics (including philosophy, psychology, literature and religion); and synoptics (including history, philosophy and religion).

Hirst's[17] "Forms of Knowledge" are more widely used in England, and HMI have extended and published them under the heading of "Areas of Experience" as one "point of view about the broad lines

of development which should feature in a rounded education"[18]. The areas are: aesthetic and creative; human and social; linguistic and literary; mathematical; moral; physical; scientific; spiritual; technological.

A further distinction was also drawn in the pilot phase between CDT as designing-making-testing activity and CDT as a practical teaching strategy to be used to enable the more passively learned academic subjects to benefit from active learning techniques. Indeed, the inspector frequently expressed an ultimate aim of removing CDT as a discrete subject from the curriculum and re-inserting it as an active learning technique to be used by other subjects across the curriculum. This needs to be distinguished from the integrative role for CDT proposed by Carter[19] in which discrete designing-making-testing activity would be based firmly on a study of major school disciplines.

Any future development of the concept-base approach in Manchester must clearly be based on a coherent stance towards these distinctions. It would seem self-evident that the interpretation of the concept bases as starting points for CDT activity would be the easiest to bring to fruition, particularly in the proposed subject-oriented national curriculum; it also seems likely that the innovation will be more readily received in primary schools whose curricula are currently less restricted by subject departmentalism and external examination forces than those of secondary schools. Should future innovators aspire to the use of the concept bases as CDT knowledge or as organisers for cross-displinary study, they would, in the writer's opinion, need to subject their intentions to rigorous analysis, particularly in

terms of children's concept formation and development. For example, the notion of 'key concepts', defined by Heywood[20] as "procedural devices to help teachers *in the selection and* organisation of course content", has significance for the Manchester innovation. The 'key concepts' idea was developed in the UK in the Liverpool middle schools geography, history and social studies schools council project[21]. According to Heywood[22], the "Liverpool team took a broad developmental view and designed a framework intended to lead the child from pre-disciplinary to disciplinary activities and through three levels of concept development. Level I concepts are specific, closed, easy to define, narrow in scope and can be experienced through the senses or through carefully evoked experiences using language, movement and drama. Level II concepts are not so readily experienced and more difficult to evoke, while Level III concepts are the 'key concepts', broad in scope and open to differing interpretations and meaning." As the writer indicated in section 5.6.3., the concept bases, falling midway between Taba's definition of concepts and thought systems, are arguably analogous to this sense of 'key concepts'. Future innovators may find it profitable to pursue this line of enquiry.

8.3 STRATEGY AND TACTICS

8.3.1 Strategic Planning

The scope for strategic planning to enhance this innovation was severely limited by several factors. Firstly, the complex forces impinging upon the development of CDT in organisationally complex schools operating within a rapidly changing environment, included school curriculum policy, staff expertise and attitudes,

tradition, resources and the nature of pupils: the innovators had little if any control over these. Secondly, industrial action reduced the degree to which teachers were prepared to participate in development, and this reduction became increasingly evident during the pilot phase. Thirdly, the inspector's duties were numerous and there was a limit to the time he could devote to the scheme. Fourthly, participants were volunteers, giving up free time to carry out development, and could not be deemed accountable for pre-specified achievements: frequently, other priorities at work or home took precedence over attendance at working party meetings. And finally, the concept base approach was not a fully-developed innovation ready for diffusion; of necessity, much work was required, the outcomes of which could not be predicted.

With these limitations in mind, the inspector's strategic plan, revealed retrospectively in an interview with the writer, and summarised on page 151, included three objectives - orienting CDT towards human needs, linking CDT with other areas of the curriculum, and developing an external examination. The objectives were specified and amplified in the presentations made at the start of the pilot project. Yet, given the exploratory nature of this pilot project, a second crucial stage of strategic planning - formulating a plan to achieve objectives - was not clearly addressed at the outset. The pilot project working party itself loosely formulated such a plan after week five, and its implementation and control became the responsibility of the project director, with the support of the inspector.

With hindsight, it can be argued that a sharper strategic plan

was necessary from the outset. The uncertainty of the situation was not untypical of strategic planning, which was characterised by Ansoff (see pages 105-106) as concerned with problems, opportunities, new ideas and uncertainty.

The working party increasingly recognised this during the first year, and eventually suggested some specific objectives for a future working party, reproduced on page 176. Arguably, any future project would benefit from: precisely stated objectives; a detailed plan; the means of implementing and controlling the plan; and scope to continuously review progress, make necessary adjustments and enable response to unforeseen events. Given the amount of development involved, and the advantages of proceeding incrementally, the plan would ideally be phased to mirror an extended S-curve sequence (see pages 90-91). In this particular case, the analysis required should focus on all levels of the LEA service which might impinge on results, particularly in relation to resource provision, eg. the city council, senior officers, personnel involved in TVEI and in awarding financial aid and release for INSET, headteachers, CDT departmental heads, teachers, parents, pupils, examination boards and external consultants from higher education.

8.3.2 Tactics

A classification of tactics to overcome barriers, derived from the literature survey of chapter three, is shown below.

TACTICS

1.	Networks	- Evolve Learning Systems
2.		- Skill/Attitude Change Through Peer Exchange
3.		- Diffusion Networks - Understand Adopting System
4.		- Understanding Innovation
5.		- Communication Flows
6.		- Interpersonal Relationships
7.		- Change Agent
8.	Institutions	- incremental change
9.		- experimentation
10.		- avoidance of over-diversification
11.	Individuals	- meaning and autonomy within shared value framework
12.		- positive reinforcement
13.		- internal competition
14.		- effective leadership
15.		- change through action
16.		- developing skills, knowledge and attitudes
17.		- relevance and problem solving
18.		- product champions
19.	Collaboration	- group composition
20.		- temporary task groups
21.		- internal competition

Some of these tactics were clearly adopted within the pilot phase. Rogers recognised the benefits of teachers coming together in a network. In particular, he frequently took the opportunity of introducing interested individuals to the working party and of involving working party members in in-service events and meetings within the LEA and beyond. The development of networks was necessarily limited by time and the part-time

operation of the working party, although some of its members did reflect on their practice - a characteristic of professionals in an evolutionary learning system. Because the innovation remained undeveloped, and not clearly communicated beyond the group, percolation through the CDT teachers outside the group was not noticeable.

From an institutional point of view, the pilot project did not address itself to incremental change or the dangers of over-diversification. On the other hand, it did encourage experimentation in members' schools, and in two institutions (7, 17 - see page 158), considerable impact was made on the CDT curriculum.

The individuals involved were attracted by the value system embodied in concept-base CDT and, arguably, in the avant-garde nature of the activities. They were also visibly affected by the positive reinforcement of receiving messages of support from eminent academics, and visits from individuals like a German minister of state. More could have been made from the potential for internal competition between the working party and the independently operating school department described in the last chapter. The importance of action in bringing about change was highlighted by a resurgence of optimism felt within the group once it had started to engage in the development of teaching materials, and as it worked to meet exhibition deadlines. Members of the group claimed, at the end of the pilot phase, to have developed certain skills in teaching materials production, and had their attitudes towards active learning strengthened. From a group viewpoint, there was ample evidence of a willingness

to collaborate once effective task group leadership had been established and individuals had acquired specific roles within which they could be seen to achieve.

Many of these tactics represent the effective management techniques which good leaders instinctively use. In this instance, they were adopted intuitively. For future LEA-based developments, a strong case can be made for: (a) developing a network system to diffuse the innovation, promote collaboration and skill transfer, broaden the professional vision of teachers and evolve learning systems; (b) promoting experimentation, ideas exchange and incremental development within and between institutions; and (c) enabling individuals to participate effectively in, and draw job satisfaction from, a successful task-oriented development project.

8.4 ADAPTABILITY

Both people and system adaptability are necessary in such an educational innovation. Heywood[23] indicated that for individuals to be adaptable, they need to rise beyond their frames of reference (see page 83) and that they can be helped to do this by being given access to contrasting frames of reference. Arguably, however, individuals also need motivation to be adaptable, as well as this broadened vision, and as Heywood[24] also noted, they will bring their own goals and qualities to their work, and will act in their own perceived best interests. Notwithstanding this though, "individuals need to see themselves as lifelong learners if they are to remain adaptable and at equanimity with themselves in a world in which technological and social change continues apace.."[25]

Although no systematic attempt was made to determine the motivational factors which led the seventeen individuals to join the working party, it is possible to offer an informed perspective with hindsight. The inspector clearly believed strongly both in this innovation, and that he had a professional duty to spread it. The writer, as project director, had reached a career stage at which experience in INSET programmes was timely; he was also intrigued by the potential connections between concept base CDT and his own interest in teaching strategies for pupils' conceptual development. A number of course members (codes: 6, 12, 14, 16 - see page 158) attended because they were looking for new directions in which to develop, or to learn about. Six members were from the school which hosted the pilot project, and for them attendance was convenient, and they were relatively easily persuaded to attend by the director (codes: 3, 4, 10, 12, 14, 15). Also, there was an element of 'grapevine' communication: member 12 persuaded member 7 to attend, as they had previously been colleagues with related interests; member 13 persuaded member 17 to join as they were from the same school. Of the seventeen members, eight were promoted during the pilot year or the year after. Seven of these promotions related to CDT in Manchester. There is no evidence to link membership of this working party causally with this promotion. However, two tentative inferences can be drawn: working party membership may have boosted their promotion prospects; or they were sufficiently dynamic individuals to gain internal promotion and this characteristic may have influenced their decision to join this radical group. The writer believes that there were two overwhelming, if covert, reasons for membership. Firstly, members were ambitious and hard-working: they perceived an opportunity to channel this work to advance their careers. Secondly, they were in

the main able and professionally committed individuals who saw an opportunity for participation in an important curriculum development activity. To the extent that this is a true reflection of teacher motivation in this sphere, future LEA programmes would need to be constructed to enable teachers to derive these motivational boosters towards adaptability.

The participants in the conference described in chapter 6, articulated a number of insights into people and system adaptability which need to be addressed in future developments. In particular, whereas the working party members were, in the main, willing to adapt, it was felt that many other teachers would not without support, persuasion and appropriate extrinsic incentives. Although the award of financial incentives might be beyond the remit of any future teacher group, it is likely that the motivational force of a carefully organised use of the tactics noted above would supply considerable support, persuasion and incentives relating to belonging to a successful group.

System adaptability in LEA administration, schools, CDT departments and examination boards, on the other hand, will be more difficult to promote. Not only will reluctant individuals be involved, but they will tend to be senior people beyond the direct influence of innovating teachers. Furthermore, they will be distributed amongst complex bureaucracies, each with its own mechanisms of dynamic conservatism (see page 83). An expanded future version of this innovation will require careful strategic planning and intelligent use of tactics in order to stimulate system adaptability within these organisations through pressure from the "grass-roots". Manchester teachers will be helped to apply this pressure by: clear

definition of the innovation; simple and appropriate modes of communicating the innovation; incremental change based on small-scale experimentation and action in a range of institutions; sound leadership; research to solve pedagogical logistical and managerial problems; acquisition of resources and their development to support adaptation; tapping into currently favoured development mechanisms such as TVEI; and using LEATGS funding (see page 259) to train teachers, second teachers for curriculum development, finance inter-school communication, and develop a responsive and productive resources centre.

8.5 RENEWING THE CONCEPT BASE INNOVATION: THE CHANGED CONTEXT

Since the innovation halted during the teachers' industrial action in 1986, a number of changes have occurred, both nationally and locally, which would significantly influence further attempts to develop concept base CDT in Manchester. These are analysed below.

8.5.1 The Teachers' Contract

The new teachers' contract coincided with a cessation of industrial action in 1987. Conditions of service were set out in detail and the school teaching year was pegged at 190 days, with a further 5 days for teacher activity and INSET. Weekly hours, during term time, included: up to 23.5 for class contact; 5 for general school duties; and an average of 4 for meetings, appraisal and INSET[26]. Although the contract was accompanied by an end to industrial action, in many areas it failed to encourage teachers to return to previous levels of voluntary 'out-of-hours' INSET activity. In Manchester, in 1987-88, no CDT twilight courses ran, whereas two years previously six were on offer every term (see page 193-4). This situation was acknowledged by the

city's chief education officer when, after exhorting a conference of CDT teachers to collaborate to develop CDT, he said, "I hope that some of you will take that on and think in terms of networks for this curriculum area, despite the 1265 hours"[27] *. 1265 hours represents the maximum time per year in which teachers can be directed to work within the contract.

Any attempt to revive the concept base CDT innovation, in the short term future at least, will clearly have to be designed with these limitations in mind. Non-financial incentives may be needed to induce teacher participation. Recourse will also have to be made to funding deriving from the new training arrangements examined in the next section.

8.5.2 The LEA Training Grants Scheme (LEATGS)

In April 1987, a new system for funding LEA INSET was implemented by the DES. This system was intended to: (1) improve teaching quality; (2) further teachers' professional development; (3) systematically meet national and local INSET needs; (4) improve the management of the teaching force; and (5) even out spending across LEAs[28]. £200 million was earmarked for INSET in England during 1987-88, £70 million of which was for DES identified 'national priorities'. As one such national priority, CDT was allocated £3.85 million and within this budget, Manchester was able to spend £54,000 and to recoup 75% of this from central government. Additionally, under a 'local priorities' category, the city was empowered to spend up to £1.47 million, and to recoup 50% of spending from central government. Subject to LEA

* my emphasis

policy, CDT was eligible to be considered to receive a portion of this local priority money.

LEAs were empowered to spend this money on: teacher tuition and examination fees; provision and evaluation of training; inspectors' time; supply teacher cover; residential, subsistence and travelling costs. Many LEAs have used some of their allocations to appoint teacher advisers to develop and deliver in-house INSET programmes, and also to provide supply teacher cover to release teachers for INSET during teaching time. At the time of writing, three CDT teachers are seconded within the city, for two years, to engage jointly in post-graduate research and to develop an INSET resources centre. Once this two year arrangement is completed, in August 1989, teacher advisers could be appointed as change agents to develop and diffuse the concept base innovation, in precisely targeted ways in Manchester, using recognised LEATGS funding channels.

8.5.3 The National Curriculum

The current government proposals for a national curriculum were noted in 1.6.2. The working party for the foundation subject Technology, entitled 'Design and Technology', at secondary level, in a DES press release[29], is to report in April 1989. The proposed nature of CDT and 'Design and Technology' is unclear at the time of writing, except that it is likely that future concept base CDT innovators will have to work within its guidelines, perhaps even more so than they were expected to do within GCSE guidelines in 1986 (see 7.2).

8.5.4 The New Role of Manchester LEA Inspectors

The LEA underwent a structural reorganisation in 1987-88, largely because of its need to severely curtail spending. The inspectorate ceased to be a separate branch (see page 128), the role of chief inspector as branch head was disestablished, and inspectors were relocated to schools branch. District inspectors, of which Rogers was one, were issued with a new draft job description. The main purpose of the new role was unequivocally specified as: "Monitoring progress on the delivery of City Council priorities in establishments"[30]. The bulk of the seventeen main tasks identified in the new job description was concerned with determining the effectiveness of individuals and establishments, and moreover with city council policies. Only three relate to development, and these involve: contributing* to subject development; co-ordinating teams of teachers engaged in curriculum development; and co-operating with the city's Education Development Service. Arguably, therefore, future innovations may be initiated and co-ordinated by the inspector, but his involvement in innovation will necessarily be less than previously: also, it would seem that the Education Development Service, as the official body for LEA curriculum development, is likely to be the most effective organisational home for future innovation and for a resources centre; and in such a restrained climate, innovations which precisely reflect city council policies, and are widely seen to do so, are more rather than less likely to receive LEA sponsorship. This has implications for the structure and nature of future innovations, and the effectiveness of communicating their central ideas to officers and politicians.

* my emphasis

Finally, inspectors are no longer able to finance innovation from their own 'estimates', as these were also withdrawn.

Future funding will therefore have to be won; the LEATGS budget for INSET, and TVEI budget, and money allocated to the Education Development Service are three currently obvious internal sources to tap. Other internal development sources need to be identified or proposed, and external sources might also usefully be investigated, subject to city council policy.

8.6 RENEWING THE CONCEPT BASE CDT INNOVATION: ISSUES TO CONSIDER IN FURTHER ACTION RESEARCH

This final part of section two of the present study represents a distillation of key issues for future action researchers within concept base CDT in Manchester to consider. The issues derive from the literature reviewed in chapter 3, and from the findings outlined in chapters 4 to 8. They are expressed below loosely within Comino's four stages of strategic planning, noted in 3.6.4: (1) formulate objectives; (2) devise a plan to achieve objectives; (3) implement and control the plan; and (4) review continuously to determine how well the plan is being implemented and controlled, and how far the objectives continue to be relevant. Within these categories, questions are asked; clear answers to these will be required for future change agents to be able to operate effectively.

8.6.1 Formulating Objectives for the Innovation

The objectives will derive from: the nature of the concept base approach to CDT; and the nature of city council curricular policies. They will also be influenced by the present and

unfolding situation in schools, especially in relation to resources, the changes noted in section 8.5, and the barriers identified in chapter 6. Clarification of the following questions will promote the formulation of sound objectives.

(1) (a) What is the nature of city council curricular policy, in particular relating to technological education?

(b) Are any evolutionary trends in this policy discernible?

(c) How can professional educators influence this policy?

(2) What can be done to persuade school senior managers that this innovation is of positive educational value to pupils of all abilities?

(3) (a) Can the nature of the innovation be clarified from the outset, especially in relation to the three possible interpretations discussed on page 259?

(b) Can the innovation be communicated effectively to the various parties involved, eg. city councillors, officers, inspectors, headteachers, teachers, parents and pupils?

(4) (a) Does the innovation lean towards a reflexive perspective, and away from a received perspective? (See page 177).

(b) If so, is adjustment to bias necessary to bring it into line with city council ideology and/or the ideology underpinning the national curriculum?

(5) Does the innovation need to be re-defined in other ways to match city council policy, the national curriculum or the values and policies of schools?

(6) Can philosophical analysis and psychological theory be used to clarify the nature of the relationship between meeting pupils' needs (relevance) and setting designing and making activities within their true contexts?

(7) Is it feasible to evaluate, through research, the hypothesis that Manchester pupils can be motivated to meaningful learning by the successful implementation of this innovation?

These questions need careful consideration before useful objectives can be precisely stated. Once stated, a plan should be devised. However, given that all human endeavour is necessarily experimental and, on the assumption that the future cannot be absolutely predicted, it must be recognised that circumstances may require a change in the objectives, the plan, or its implementation: hence the need for continuous review.

8.6.2 Devising A Plan

The formulation of objectives should embody intentions, or a vision of what is to be achieved, where, when and with whom. The plan should enable the gap between intention and eventual outcome to be bridged. Clarification of the following will promote the design of an effective plan.

(1) Can the classification of barriers to school technology outlined on pages 203-205 be used as a basis to reveal barriers to the intentions embodied in the objectives?

(2) Can research into the behaviour of Manchester CDT teachers be carried out to test the validity of those barriers articulated by teachers at the conference described in

chapter 6.

(3) Given the unequivocal rejection of the mode 3 GCSE proposal by the NEA, how far would it be productive to focus short-term planning on primary and lower secondary education, which are not so closely tied to GCSE national criteria?

(4) To what extent can the LEA commission action research, perhaps by seconded teachers, to solve the pedagogical, organisational and resource problems identified in 6.6?

(5) How could formal links between an LEA CDT resources centre and institutions of higher education be forged to facilitate such research?

(6) How can the plan be structured to promote desired incremental progression and yet be sensitive enough to enable unforeseen opportunities to be seized?

(7) What steps can be taken to reduce misunderstanding of the innovation at all levels in the system?

(8) What is the scope within the LEA to enhance the adaptability of individual teachers by expanding their frames of reference?

The plan, constructed after considering these issues, should not be regarded as immutable but as a framework which is responsive to unforeseen events and consequences. The processes of implementing, controlling and reviewing progress should thus provide feedback which may give rise to a reformulation of the plan.

8.6.3 Implementing, Controlling and Reviewing

Given the reduction in the inspector's scope for innovation relative to his broader duties, other change agents will be required to implement, control and review the plan. At the time of writing, LEATGS-funded teacher advisers, working from a dedicated resources centre, and collaborating with higher education establishments and the inspector, would seem to be the most feasible substitute.

Before appointing and briefing such individuals, the following questions need to be addressed.

(1) To what extent could the innovation be made to succeed in a model or show-case school, department or classroom, under conditions representative of general city conditions, so that other teachers could see it in action?

(2) How far would it be politically acceptable within the LEA to concentrate resources, at the beginning, on those schools, departments or classrooms in which rapid and effective innovation adoption and development is believed to be most likely?

(3) Could the innovation be cascaded effectively from such centres to less receptive centres? What change agent support would be required in this?

(4) What are the current opportunities for, and barriers against, the weaving and managing of networks for the development and diffusion of the innovation?

(5) What is required to promote and facilitate collaboration

within and between schools, and other related establishments?

(6) How can the plan be implemented so as to continuously extend the life cycle of the innovation? (See page 91).

(7) What incentives can be used, or developed, to encourage the required teacher participation?

(8) What devices can be used to promote experimentation and protect teachers whose experiments 'fail'?

(9) Can research be conducted to determine whether other LEAs or bodies have devised successful ways of supporting teachers in their production of effective teaching and learning materials, and in tracking down new materials from elsewhere?

(10) What criteria will be used to evaluate the innovation in its various aspects?

8.6.4 Conclusion

Although innovation can be rapidly accelerated by perturbations in a social system, progress is usually incremental. In being so, it can still give rise to a series of disruptions to the status quo. The extent to which future change agents can minimise the perceived undesirable effects of such disruptions will clearly influence their success in promoting innovation adoption and development. It is clear, however, that the gap between current CDT practice in the city, and the vision enshrined in the concept base approach to CDT, is sufficiently large to require the innovation to be managed incrementally over a prolonged period. This has strong implications for long term strategic planning and budgeting within the LEA.

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APPENDIX 1

42 Newington Drive
Bury
Lancs BL8 2DZ

6.2.86

W F Rogers
District Inspector - 14-19 Education
Manchester Education Department
Crown Square
Manchester M60 3BB

Dear Bill

I attended the Education for Capability conference in your place yesterday, and chaired the various discussions during the day. It was a most impressive event, although its ultimate test will be the extent to which it actually stimulated the growth of networks in the north west.

Some major implications for Manchester emerged during the last session. Here the Manchester delegates addressed two questions:

1) What should the LEA do to promote Education for Capability?
2) How can we start to plan for action?

The group agreed on the following and asked me to communicate the recommendations to you.

1. Much is already being done in the city which would meet the Capability criteria. This needs to be surveyed, analysed and classified.

2. Detailed case studies should be good Manchester practice and should be prepared/submitted by schools.

3. Few people in the system have a clear overview: the results of the survey and case studies should be communicated as widely as possible throughout the city's education service. A conference was thought to be an effective way of starting to: make the work public; clarify issues; stimulate further growth through city networks.

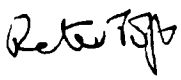
4. A senior representative of the LEA would need to coordinate, or at least facilitate, this programme of information collection, dissemination and discussion.

At the moment I am researching into aspects of curriculum innovation in CDT at Salford University. I have just discussed the above proposals with my supervisor, Prof. George Carter, and he agrees with me that a valuable chunk of my work next term could be to conduct such a survey and case study production under the aegis of an MEC officer (yourself?) and using the research expertise of Salford University. I would very much like to follow up this proposal, and given that the ideas were warmly sanctioned by the

secondary headteachers and a college principal present at the conference, I feel that schools would respond positively to such an exercise.

Could I meet with you to discuss this please? I will telephone next week to arrange for an appointment if this suggestion is acceptable.

Yours sincerely



cc Tony Rogers

WRITER'S FOOTNOTE:

This proposal was never carried out: the teachers' industrial action rendered it difficult to mount such a survey.

SECTION THREE: THE CDT SUPPORT THROUGH CHANGE PROJECT AS ACTION RESEARCH

INTRODUCTION

In section one of the present study, the evolutionary context of English school technology was analysed, and relevant literature of innovation management and educational research was reviewed. Action research was identified as a potentially effective way to bring about and evaluate innovation in the field. In Section two a local education authority innovation was documented as a case-study of the 'teacher-as-researcher' model of action research. Section three documents a north west regional innovation. This case-study focuses selectively on key issues arising from the aims, strategy and effects of the north west region CDT Support Through Change project, which was directed by the writer from a communications centre at the University of Salford. The project ran from 1 June 1986 to 31 August 1988. Its aims are set out below.

HYPOTHESIS

The hypothesis tested in this section rests on two assumptions, namely that:

(1) there is a severe quantitative and qualitative shortage of CDT teachers in the north west;

(2) the five aims of an innovative strategy designed to alleviate this perceived shortage were sufficiently accurately specified to attempt solution of this difficult problem.

The five aims of the CDT Support Through Change Project were:

(1) bring together key decision makers from each participating organisation (see Figure 1) into a consortium which would effectively support and monitor a full-time project team;

(2) recruit qualified teachers from non-CDT backgrounds and retrain and employ them as specialist supply teachers to cover one-term secondments of craft teachers to college courses designed to equip them to teach modern CDT;

(3) develop innovative college courses which would build upon the diverse experiences of the recruits to retrain them;

(4) stimulate curriculum development in participating schools;

(5) determine the potential of the project's strategy for other regions and shortage subjects.[1]

Figure 1 *THE NORTH WEST CDT SUPPORT THROUGH CHANGE CONSORTIUM*

	LEAS	PROVIDERS
North West TRIST University of Salford (1) HMI Observers	Bury Bolton Cheshire (3) Lancashire (5) Manchester (2) Oldham (6) Salford (4) Stockport Tameside (7) Trafford (8)	1. Crewe & Alsager College of Higher Education 2. De La Salle College 3. Edge Hill College of Higher Education

KEY

1. Co-ordinating.
2. Host LEA.
3. Withdrew at the end of year one because of a large surplus of CDT teachers
4. Withdraw at the end of year one when TRIST funding came to an end.
5. Participated in the project, but not its consortium support.
6.} 7.} 8.} Joined the project after the initial planning stages

In addition, the project had temporary connections with Clwyd, Liverpool and Wirral LEAs.

Within the project the writer has attempted to test the following hypothesis:

> that the five aims of the project can be strategically implemented through managed collaboration between specified agencies, whilst revealing insights, through systematic study, into the detailed forces impinging upon CDT teacher supply in the north west region.

However, given the complexity of this project, aims 1, 2 and 5 have been selected for detailed analysis in the present study. Aims 3 and 4 are referred to, but as the writer only had co-ordinating responsibility for these, and much of the developments were brought about by others, attention has been focused on those aims for which he had more direct responsibility.

CONCLUSIONS

The study concludes that:

(1) the five main aims of the project are achievable in the north west, under certain conditions of collaboration and funding;

(2) each participating organisation enshrines its own distinct perspectives on the problem, and frequently, the incompatibility of these distinct perspectives renders collaboration between organisations difficult;

(3) the assumption that there is a quantitative shortage of CDT teachers in the region is, in 1988, unjustified, and the strength of this assumption's underpinning of the project's initiation reflects: (i) the incomplete funding provided by the initial sponsoring agency which gave rise to the subsequent recourse to the retraining of non-CDT teachers through the standard one year conversion course, and (ii) the inadequacy of the management

information systems available to various personnel who had to make decisions within, and about, the project; it is then argued, by extrapolation, that there is probably an inadequacy in the management information systems available to those who make manpower planning decisions for CDT education generally.

RESEARCH STRATEGIES EMPLOYED IN THE PROJECT

The project was conceived and conducted as an exercise in the management of innovation. It is documented here as a case-study of the 'simultaneous-integrated' model of action research, described by Hult and Lennung[2] and noted on page 56 of the present study. In this model, knowledge is discovered, action is reinforced, participants collaborate within an ethical framework (in this case, a framework deriving from the protocol of professional relationships between school teachers, teacher advisers, LEA advisers, teacher trainers and HMI, each representing their own establishments), and information is fed back to fuel progress and clarify understanding.

The study is presented in full recognition of the explicit and implicit values which are embedded in participating organisations. The concerns expressed by Wallace in a recent review of action research[3] are concomitantly noted: Wallace concluded that where there exists a fundamental lack of consensus in educational aims, it is difficult to identify what actually constitutes improvement, and also to specify courses of action for improvement which satisfy all parties with their often dissimilar perspectives.

Wallace[4] noted that while "action research is eclectic in the choice of methods there is considerable emphasis on the qualitative methods of observation and interview. One methodological innovation is the

introduction of triangulation, a procedure for recording and juxtaposing the interpretations of a teacher, observer and pupils concerning a classroom activity, and then relating these interpretations to the teacher's original intentions."

The writer of the present study has selected methods on the basis of their potential effectiveness in the attempt to achieve the following objectives:

(1) to effectively manage the implementation of the strategic plan, and where necessary gather data required to continue in this process;

(2) to observe the effects of (1) and, where appropriate, to consider differing interpretations of phenomena and results in order to identify points of contact, and of departure, between participants.

To achieve the first objective, principles of managing innovation, outlined in Chapter 3, were used in conjunction with interviews and questionnaires to gather data. For the second objective, perspectives were gathered, using a variety of methods, and then subjected to analysis. The methods included:

(a) participant observation as director of the project and observer of some of its outcomes - a considerable amount of evidence was amassed early in the project, was recorded in a diary of events kept by the writer in the first year and is considered in chapters 10 to 13; other recording devices were also used (see below);

(b) focused interviews with members of the consortium consultative committee, the retrainee teachers, and the headteachers and CDT departmental heads of participating schools, particularly in relation to the first school placement (see chapters 12 and 13);

(c) correspondence between the writer, other participants and external agencies (chapters 10, 11, 12 13);

(d) from June 1986 onwards, the minutes and papers of the project's consultative and steering committees.

Finally, before examining the aims and strategy of the project, a note of caution must be sounded with regard to the limitations of action research in the formulation of generalisable knowledge, given that this externally funded project was being observed by the DES with regard to its future potential for use elsewhere. Halsey[5], in showing that research and action will affect each other in action research, highlighted that the strategy was unlikely ever to give rise to highly valid and reliable generalisations. Wallace[6] indicated that "generalisations are difficult to make on the basis of a single, possibly untypical instance. As the accounts are atheoretical they do not accord with the aim of conventional research to establish theories through generalisations or to test hypotheses derived from theories. On the other hand, however, if an action research project is a complementary or parallel study to some other, integration of conclusions could arguably lead to the formulation of universals. It must also be noted here that no replication of research, even using scientific experimental methodology is perfect, for the reasons advanced in chapter 2 of the present study. Stenhouse ...(7) ... has argued that it is possible to generalise by cumulative comparison from case to case according to a particular topic. Moreover, it is claimed that other practitioners may achieve valuable insights for their practice through 'naturalistic generalisations' (Stake...[8]), relating the findings of the case study to their knowledge of the

situation, gaining an impression of authenticity in the form of a vicarious experience".

Although conducted in recognition of the cases made by Stenhouse and Stake, the present study is written also in recognition of five potential problem areas identified by Wallace[9]. Firstly, it may not be possible to achieve consensus because of the conflicting perspectives noted above; conflict was always evident just below the surface of this project, and wherever it took a perceptible form it was documented and analysed for this study.

Secondly, when a consensus has been reached, there is no guarantee that it matches the truth (see section 2.2): a "process for reaching consensus may be necessary but is not sufficient for testing the truth of assertions; there must also be a theory of reference to some kind of reality corresponding to the truth claim ..."[10]. Data and perceptions of various phases or areas of consensus and disagreement were gathered throughout by the writer, as outlined above. Wherever possible findings were cross-checked with other available data. However, given the extreme sensitivity of some of the issues outlined in the next four chapters, it is by no means certain that the truth was always revealed.

Thirdly, decision makers may possess and exercise the power to hinder the action component of the project: apparent examples of this phenomenon have been documented in this study, but it is quite clear that the writer, as project director, was unable to penetrate the often secretive decision making procedures in schools, colleges, local education authorities and the Department of Education and Science, and consequently certain conclusions can

only be tentative, even speculative.

Fourthly, a collaborative venture can reduce freedom for individual action, and evidence to suggest that this happened is considered in the study.

Fifthly, action research may give rise to unintended or unforeseen consequences: this clearly surfaced in relation to the assumptions made in the early phases of the project about the CDT skills required by the retrainee teachers. Evidence for this is also documented.

Although action research clearly has methodological limitations, these are set, in this study, against its capacity to systematically support the management of innovation, which is essentially what this project was established to achieve. Furthermore, the writer has used a form of 'naturalistic generalisation' when relating his findings in the study to the more generalised knowledge about curriculum development, innovation diffusion, and industrial management reviewed in chapter three. The strategy designed to bring about this project and the context in which the innovation originated is described in Chapter 9.

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CHAPTER 9 : THE REGIONAL INNOVATION IN CONTEXT

9.1 SUMMARY

Although the action research project with which section three is concerned started in June 1986, it was preceded by a considerable planning and negotiating period involving a number of organisations from the north west region, and nationally. The intensity of this activity,which is documented in Chapter 10, was related to the complexity of the context from which the project originated, particularly in relation to manpower requirements in CDT teaching. Chapter 9 describes this context as a background to the documentation and analysis of research results outlined in the next three chapters. It focuses specifically on manpower forecasting in relation to perceived quantitative and qualitative teacher shortage in CDT, government responses to this perception, setting this within the current system for INSET in England and Wales. The strategies of the innovation are also described.

9.2 THE CDT MANPOWER REQUIREMENT CONTEXT OF THE PROJECT

9.2.1 Manpower Forecasting

Quantitative prediction of future manpower requirements is widely recognised to be difficult because of the volume, complexity and uncertainty of the impinging variables. In teaching, Taylor[1] has argued that "the employment prospects of teachers depend on birth projections, teacher wastage (including early retirement), the possibility of improved staffing standards in the schools, increased participation in education at pre compulsory and post compulsory ages, the level of in-service provision and release, the decisions of governing bodies and local authorities in

respect of appointing new entrants to the profession as against applicants from the ...'pool of inactive teachers' ... and finally the spending plans of government". Alternative employment prospects beyond education can be added to this list.

Matching supply with demand further complicates the issue as supply also varies, according to Taylor[2], in volume, academic quality and subject specialism. As the CDT Support Through Change Project was being established, there was a perceived quantitative and qualitative shortage of teachers with modern CDT as their main subject specialism as demonstrated below.

9.2.2 The Perceived Quantitative Shortage of CDT Teachers

References to a quantitative shortage of teachers abound in the literature of CDT from the early 1970s onwards, having been perceived by professionals from various strata of the service including senior HMIs, DES officials and professors of education.

In October 1973, the Institute of Craft Education (ICE), a body representing craft teachers, submitted a paper to the Department of Education and Science outlining its concern about problems of recruiting craft teachers[3]. In response to a letter from the Institute president to the Secretary of State, Moss, an assistant private secretary in the DES, stated that the "department is aware of the shortage of these teachers, which has been accentuated this year because of the raising of the school leaving age. The problem is that colleges of education cannot recruit the students although provision for training could be increased."[3] This failure to attract an adequate supply of candidates for training was again highlighted at a meeting held

at the DES between DES officials, HMI, ICE officials and representatives from the Association of Advisers in Design and Technical Studies and the Conference of College of Education Lecturers in Craft and Design in November 1973[3]. The meeting noted that teacher recruitment was healthy except in certain specialisms. In craft, there were 890 teacher training places in England and Wales, but in September 1973, 100 of these remained unfilled, and that "according to the best evidence available it seems that in order to meet the present shortage and the anticipated future demands an annual intake of about 1000 is needed"[3]

The meeting identified the following probable causes of under recruitment:

"unfavourable course options, preference for academic studies, lack of time provision for sixth form studies in craft, reluctance by teachers and career advisers to recommend craft teaching as an employment prospect, attitudes of head teachers and academic staff, association of school craft courses with CSE academic work, lack of status, unfavourable salaries compared with industry, declining numbers of male teachers in general, dilemma over conditions of service coupled with pupil reaction to visible teaching situations ... the attractions of alternative careers, particularly in industry and the armed services ..."[3]

A DES-sponsored advertising campaign was announced at the meeting and members agreed that the most practical further attack on the problem was for teachers throughout the country to identify and encourage those of their own pupils with an inclination towards this kind of work.

In 1980, Cantor[4], head of the education department at Loughborough University of Technology, - a major training establishment for CDT teachers - drew conclusions from a study of DES statistics. These related to the age profile of CDT teachers and they pointed to an impending surge of retirements, mainly of teachers who had left the armed services after 1945 to be 'emergency trained' for craft teaching. Cantor argued that the gap opened up by this surge would not be filled at current rates by new entrants. Furthermore, whereas he noted a survey carried out by the Association of Advisers of CDT in 1976 revealing 1000 vacancies, he also drew attention to the freezing or obscuring of the situation by reducing the CDT timetable in some schools in response to unfilled vacancies, and in others by the employment of non-specialist teachers for CDT. However, in highlighting a serious teacher shortage, he revealed that "estimates vary widely as to the precise number of teachers needed and probably nobody knows the exact position."[5]

Evidence of widespread concern about the CDT teacher shortage continued to surface in the nineteen eighties. In the editorial columns of the journal School Technology, frequent references were made to the present and impending shortage. Concerns were expressed about the potential for TVEI to absorb teachers with the requisite technological skills away from their current activity[6]. A later article[7] examined a DES proposal to make CDT available to all pupils in the 11-16 age range, but noted the shortage of specialist teachers might render this objective problematic. A later editorial examined the implications of the proposed extension of TVEI to all LEA secondary schools with its

technological curriculum.[8]

Carter et al[9], in a case study of curriculum development in Engineering Science - a GCE A Level subject with close links to the more technological manifestations of CDT - concluded that one of the reasons for the failure of the syllabus to become as popular as its product champions had intended lay in the excessive demands made on teachers. The teachers not only required a knowledge of physics, but this had to be set in an engineering context demanding open-ended project work. By implication, the widespread adoption of such a syllabus could exacerbate a teacher shortage by reducing the number of teachers judged to be able to teach it effectively. Arguably, the adoption of increasingly rigorous and open-ended CDT syllabuses in the 1980s will also reduce the pool of teachers able to teach them effectively. This links closely to the qualitative shortage outlined in Section 9.2.3.

Before examining this other mode of shortage, however, recent national DES figures need to be scrutinised. In 1985, Perry[10], a senior member of HMI, defined the problem as one of under-recruitment for training. In 1984, nationally, four major categories of training course under recruited, shown in Figure 1.

Figure 1

Course	Target Student Nos.	Actual Student Nos
University B.Eds	90	51
University PGCE	30	22
Public B.Eds	265	225
Public PGCE	205	189
TOTAL	590	487

This continued under-recruitment had to be seen against a government intention to expand technology across the curriculum through TVEI and against raw figures for reported CDT teaching vacancies in England and Wales, "of which 9.4% of all secondary vacancies in 1984 were for CDT teachers"[11].

Straker's[12] recent examination of a similar national shortage of mathematics teachers painted a national picture of the CDT shortage. He analysed figures which are supplied by the DES every January. An allowance was made for the effects of different lengths of "tuition time by calculating a comparative index for each subject. The comparative index (r) is given by:

$$r = \frac{\text{No. of vacancies in the subjects as a \% of all vacancies}}{\text{\% of tuition time in the subject}}$$

An index of 1.0 suggests that a subject has its 'expected' vacancy share. Shortage subjects have vacancies greater than unity"[12]. The numbers in Figure 5 show the number of vacancies for CDT in England and Wales, with the comparative indices in brackets.

Figure 2: NUMBER OF CDT VACANCIES IN ENGLAND AND WALES

(Source Table 1, Page 26, Straker, Neil, 1988, "Mathematics Teacher Shortage in the UK: a continuing Problem", Journal of Education for Teaching, Vol 14, No. 1, 1988.)

	1979	1980	1981	1982	1983	1984	1985	1986
CDT Vacancies	294	389	177	120	161	182	159	217
	(1.9)	(2.0)	(1.2)	(1.0)	(1.3)	(1.4)	(1.2)	(1.3)

Finally, the relatively low number of female teachers of CDT must be noted. In 1985 the Equal Opportunities Commission published a report on its investigations into teacher training for CDT[13]. Given that women were very much underrepresented in CDT teaching, the report noted that the highest ratio of women to men was to be found in the one-year retraining courses for qualified teachers and concluded that this pool of applicants would continue to exist. Flexible, part-time courses were identified as being potentially valuable to (a) enable LEAs to release women teachers to retrain with minimum disruption in schools and (b) attract more mothers to re-enter work after retraining.

In response to this report, the Prime Minister wrote:
"There has been a serious shortage of teachers of craft, design and technology for some years, and recruiting more women teachers is one important way of improving teacher supply".[14]

It was within the context of this widely and authoritatively expressed perception of CDT teacher shortage that the organisers of the CDT Support Through Change Project conceived of the project in the late months of 1985. The national situation was soon to be fragmented by uneven demographic trends, but the illusory nature of the shortage in the north west region did not become apparent until midway through the project. This will be discussed later, but it is now appropriate to consider another kind of teacher shortage.

2.3 The Perceived Qualitative Shortage of CDT Teachers

In Chapter one of the present study, the tendency of academic subjects to evolve under the influence of various forces was

noted. Recent development in school technology and education for capability were highlighted, as was the restrictive inherited influence of the previous conceptions of craft education on present practice (see page 8). It was argued in sections 4.3.2 and 6.6.1 that the skills of many Manchester CDT teachers, even in 1984, were limited to the teaching of crafts, and that they were experiencing considerable difficulty in coming to terms with CDT.

A major HMI inspection of CDT education in Wigan conducted during the summer and autumn term of 1984 came to a similar conclusion: with "a few exceptions the teachers in all the establishments were specifically trained for teaching woodwork, metalwork and technical drawing. Many are now attempting to teach CDT without the necessary philosophical understanding, essential training in new skills and professional strategies and, in some cases, confidence in their own ability to teach the newer syllabuses"[15]. Furthermore the "dedicated but traditionally trained CDT teachers have not had the opportunity to focus their talents with sufficient precision on the changing goals. Initial training for a different perception of craft teaching and a lack of LEA CDT in-service courses or school visiting to see the work of others, has left the departments bereft of ideas but conscious of the needs to make changes"[16].

Arguably, this scenario was true not just of Manchester and Wigan but of most LEAs in England and Wales, although the scale of the problem varied from place to place. It sharply highlighted a need to support craft teachers through a period of dramatic change and by implication increase their adaptability. HMI

organised a series of conferences throughout the regions in 1985 to consider the problem of providing this support. The north west regional conference, held in November, provided the focus in which the CDT Support Through Change Project could be conceived. This is examined more closely in chapter 10.

9.2.4 Government Responses To Perceived Shortages

In July 1986 the Secretary of State for Education and Science, and for Wales, issued a consultative document[17] designed to accurately define the problems of specialist teacher supply, in order to stimulate discussion about possible policy solutions. The document distinguished between three types of shortage:

overt shortage, measured by unfilled vacancies;

hidden shortage, where shortages are masked by the use of teachers from other disciplines to teach shortage subjects;

suppressed shortage, where a teacher shortage is solved by reducing the subject on the school timetable.

The report based its identification of an "above average difficulty in supplying teachers of mathematics and CDT" on DES statistics supplemented by evidence from LEA advisers. The following points made in the report are relevant here:

(1) on the basis of a 1984 DES school staffing survey, it was estimated that 13% of CDT teaching was carried out by teachers without a higher education qualification (craft or design oriented);

(2) on evidence from the same survey, a reduction in the proportion of tuition time given in CDT was noted;

(3) furthermore some schools and local authorities apparently stopped advertising for certain specialists (including CDT) because of a consistent failure to attract suitable candidates;

(4) serious future shortfalls were evident from projected demographic trends; population decline indicated a potential drop in the cohort of newly qualifying teachers in the 1990s at a time when increasing school rolls would lead to a higher demand for teachers;

(5) 45% of tuition in design-based CDT courses was being given by teachers with no higher level qualification in design-based CDT.

The document considered causes and possible solutions to the problems of teacher supply identified therein, and invited comments and proposals from recipients of the document. A plethora of schemes emerged; although the CDT Support Through Change Project had started operating one month before the document was issued, the project was clearly a proposed solution to the CDT teacher supply problem. Having been partially funded by central government via the Manpower Services Commission, it must arguably be seen as one of a number of local initiatives which were designed to respond to a nationally perceived problem. As such, its radical strategy had to be modified to fit into the systems operating at the time for the in-service training, and retraining, of teachers, and these are outlined in the next section, and the modification of the project strategy to match them is analysed in chapter 10. In order to appreciate the contextual influence of the INSET system on this project, it is necessary to trace aspects of system development from 1970.

9.2.5 The System for INSET in England and Wales

In 1970 the Secretary of State appointed a Committee of Inquiry to review the education and training of teachers. The subsequent James Report[18], published in 1972, recommended that teacher education should be split into three cycles: (1) personal development; (2) pre-service training, including induction into a first post; and (3) in-service education and training. The government reacted favourably towards cycle 3 and its 1972 White Paper[19] also pointed the way forwards to the development of public sector Colleges of Higher Education, running various programmes in addition to teacher education. Two of these colleges came to be the training bases for two of the three groups of teachers being retrained for CDT within the CDT Support Through Change project.

Government accepted, according to Dent[20], James' Cycle 3 view of the importance of INSET. However, the report's recommendation that at any given time 3% (rising to 5%) of teachers should be released for INSET, was slow to materialise. Taylor noted that a study carried out in 1979 "showed that the full-time equivalent figure for release for in-service training was 1.07%"[21].

Taylor also noted the conclusions drawn by HMI from its own survey of INSET which had shown "that 'teachers' practice in the classroom was most markedly affected when they themselves had recognised the need for training and when it had been possible for them to discuss alternative teaching strategies with colleagues', and that the 'support of the head is essential'. HMI were less happy about existing provision of full and part-time courses leading to certificates and diplomas, which

they thought to be particularly in need of 'careful review'. They also felt that 'some of these courses may have outlived their usefulness'."[22]

In a review of research into teacher education, Wragg[23] expressed surprise at the relatively low number of investigations designed "to study changes in classroom climate, teaching strategies or pupil learning. Clearly it is difficult, time-consuming and methodologically problematic enough to follow teachers into their classrooms and study what happens, let alone to ascribe any changes to an in-service course rather than other events." In service programmes, perhaps for methodological reasons, were clearly not being sufficiently evaluated.

A major report prepared for the Secretaries of State by the Advisory Committee on the Supply and Education of Teachers (ACSET), identified three defects in the prevailing INSET system:

(1) too few teachers were able to receive training;

(2) inadequate funding was available;

(3) the needs of schools and teachers were not systematically matched to INSET provision.

The government had started a scheme in 1983 of earmarking funds to be spent on INSET in certain national priority areas, which after 1985 came to fund the one-term CDT courses referred to in aim (2) on page 287. However, it "is easy to be critical of this scheme of earmarked funding; it only tackles a small part of the whole INSET problem, it bears all the marks of a scheme set

up in great haste and without adequate consultation ... Nevertheless ... local authorities and institutions of higher education have had the opportunity to work together in a new style of cooperative course provision ..."[24]

When the CDT Support Through Change Project was conceived, both one-year retraining programmes for non-CDT teachers had been running in Colleges of Higher Education for some years. LEAs were able to recoup up to 75%* of the costs of seconding teachers to these courses from central government under a system known as 'the uncapped pool'. In this, as many teachers as LEAs nominated and institutions of higher education accepted were seconded, 75% of the costs being met from 'the uncapped pool'. LEAs were then obliged to pay a fixed proportion of the total cost of the pool back to central government, whether or not they seconded teachers. Thus those LEAs prepared to find the 25% local share were able to second as many teachers as they chose or could find supply cover for and quite clearly, these arrangements favoured long course attendance in preference to short courses. The latter, being wholly or partly self-financing were a drain on LEAs and were often charged to teachers themselves, depending on the policy of the LEA in which they worked. The long courses, on the other hand, not only benefitted from DES financial support for teachers, but also from the subsidy of courses through the colleges' receipt of funds through the National Advisory Board for Further and Higher Education (NAB). Teachers entered the project under this established long course funding system.

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* Confirmed in a letter from Mr A R Faith of Teachers Branch 1, DES, to the writer, dated 8th July 1988.

The ACSET report made fourteen recommendations to improve teacher education. A summary of these is reproduced here in full.[25]

" 1) A general grant to LEAs for INSET should be introduced, covering the cost of staffing resources in schools for INSET purposes and provision.

2) The Secretaries of State, in guidance issued to the UGC and the NAB/WAB, should draw attention to INSET as an area of great importance.

3) Each LEA should develop clear and coherent policies towards INSET and programmes for implementation.

4) LEAs should review their locally-based INSET provision.

5) Each LEA should set a budget for INSET, based on a target equivalent to about five per cent of their expenditure of teachers' salaries.

6) Every school should have an agreed procedure for reviewing INSET needs, and for assessing priorities including priorities for release.

7) A review of each school's INSET needs should be carried out annually on the initiative of the headteacher.

8) Every LEA should satisfy itself that there are adequate staffing resources for each school to enable school-based INSET to take place.

9) Each school should make an annual submission to the LEA justifying the use of its INSET resources and setting out the case for the release of teachers for whom externally based courses are proposed.

10) The headteacher should ensure that school-based INSET activity is properly evaluated and that teachers returning from externally based courses are encouraged to share their new insights with colleagues.

11) The Secretaries of State should invite proposals for area INSET committees, whose function would be to act as 'broker' between LEAs and higher education institutions.

12) Higher education institutions should continue to receive substantial central funding in respect of INSET courses of one-term or more full-time.

13) Directly attributable costs of shorter courses should be met through fee-income.

14) Central funding of higher education institutions in respect of INSET should include a contribution to developmental work."

In March 1985, the government's first response was to allocate £20,000,000 additionally for INSET, to be administered by the Manpower Services Commission under a TVEI-Related INSET scheme

(TRIST). The project received its first tranche of funding from TRIST. Also, the government "announced that a new specific grant would be introduced to support LEA spending on INSET and there would be legislation to provide for this from the financial year 1987-88. The TVEI-related training was seen as a 'bridging operation'"[26]. The new specific grant came into being midway through the CDT Support Through Change project, and the turbulence left in its wake, relating to project funding, nearly induced the premature end of the project. This is documented in the next chapter. Before turning to that, however, it is now necessary to describe the strategies which were designed to enable the project to achieve the aims outlined in the introduction to section three of the present study.

9.3 THE STRATEGY OF THE CDT SUPPORT THROUGH CHANGE PROJECT

The organisations participating in the project were shown in Figure 1 of the introduction to section three. The geographical relationships between these organisations is shown below. The crucial importance of some of the relatively long distances (a) between the colleges and certain LEAs, and (b) between the places of residence of some retrainee teachers and the more outlying placement schools, became evident throughout the project.

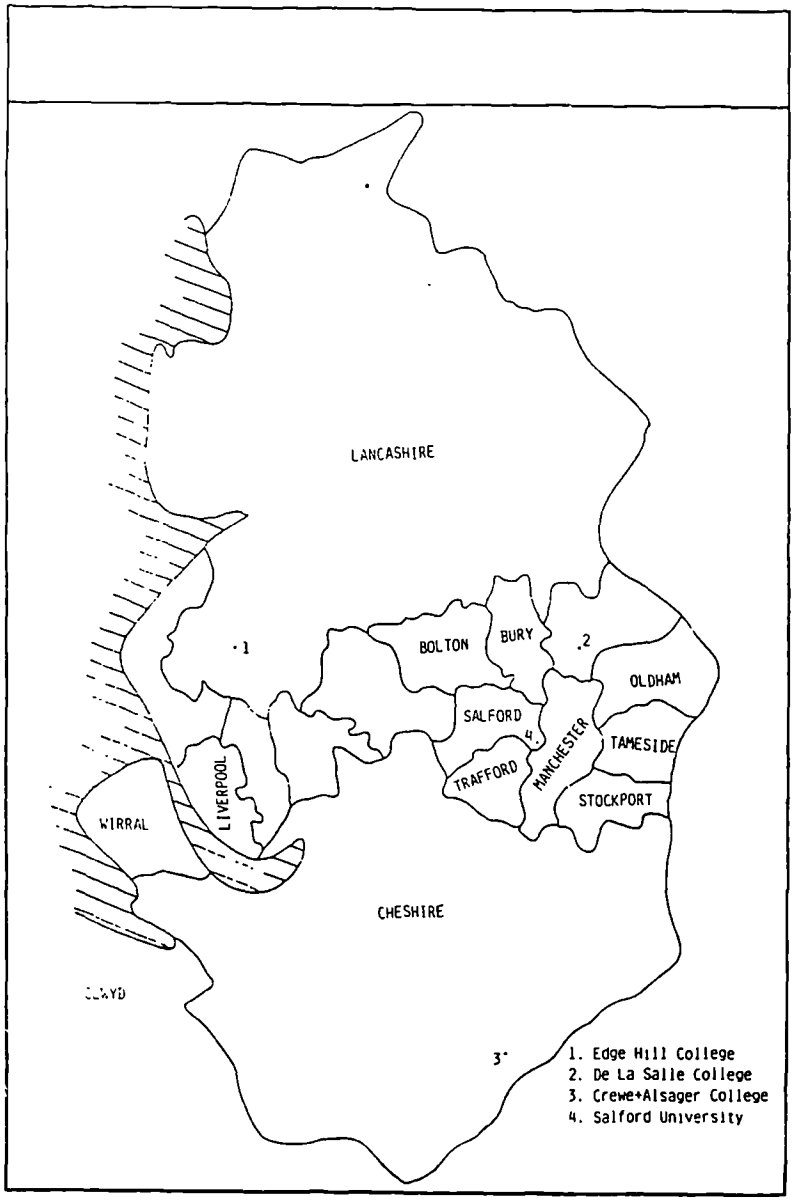

Figure 3: LOCATION OF THE TRAINING AND CO-ORDINATING BASES IN RELATION TO THE PARTICIPATING LEAs

The two-year multiple sandwich model shown in Figure 4 was devised to achieve the project aims.

Teachers were recruited, and retrained at one of the three colleges and were employed to teach CDT in schools for three one-term periods within the programme. The project continued until its planned completion at the end of the 1987-88 academic year.

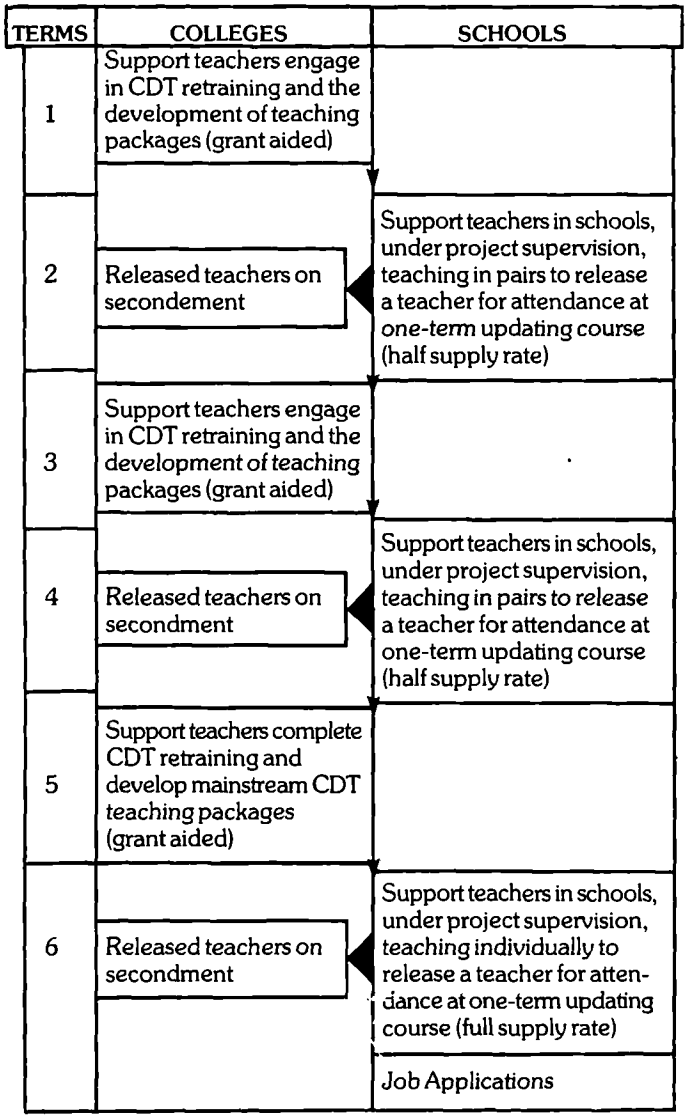

Figure 4: WRITER'S CONCEPTION OF THE PROJECT'S STRATEGY

Chapters ten to thirteen describe and evaluate the operation of the project as a case study of simultaneous-integrated action research, and they also highlight:

(1) the effects on the innovation of radical changes in the system of funding INSET, which came on stream mid-way through the project cycle;

(2) the difficulty of accurately knowing about, and forecasting,

manpower requirements for the teaching of CDT; and

(3) the contrasting, and often irreconcilable, requirements of retrainee CDT teachers from various organisations participating in the project.

9.4 CONCLUSIONS

This action research project thus arose out of a strongly held and widespread belief in a quantitative and qualitative shortage of teachers. It was one of a number of initiatives designed to tackle aspects of the teacher shortage within the context of particular funding arrangements. Despite the perceived imperative to act within such a climate, the project only succeeded in coming to life in the face of numerous problems because of the exercise of powerful product championship. This will be made clear in the next chapter.

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CHAPTER 10 : GENESIS OF THE CDT SUPPORT THROUGH CHANGE PROJECT: ESTABLISHING THE CONSORTIUM

10.1 SUMMARY

Within the complex context of CDT manpower requirements, the project's seeds were sown towards the end of 1985 by individuals who, as the research uncovered, had an incomplete grasp of the uncertain nature of the manpower situation. The chapter embodies an argument that this reflects the inadequate management information systems to which they had access. Furthermore it suggests that the individual making the bid, at the invitation of the funding agency, had little technical experience of such work and received insufficient administrative, clerical and accountancy support from his LEA until late into the genesis of the project.

The chapter is particularly concerned with the first of the five aims of the project, namely:

"to bring together key decision makers from each participating organisation into a consortium which would effectively support and monitor a full time project team".

More specifically it documents and analyses the events leading up to the establishment of the consortium. Account is given, deriving from multiple sources of evidence, (see page 135) of: conceiving the project; funding and appointing its staff; and establishing financial systems between the participating establishments. Its main conclusions highlight the difficulty of innovating in a bureaucratic environment in which events are controlled 'before' rather than 'after the event' and of the need for innovators in such an environment to act in unconventional

ways. In chapter 11, the effects of collaboration within the consortium are examined.

10.2 CONCEIVING THE PROJECT

On 19 November 1985, a one-day north west conference focused on ways of supporting craft teachers in their adaptation to modern CDT practices. The conference was one of a series held nationally, and given that it had been organised by HMI, had a high profile within north west CDT circles.

Colleges of Higher Education had already developed INSET programmes to offer this support to craft teachers in the region; in particular, a one-term course, designed in specific colleges at the request of the DES, was available. However, the colleges were having difficulty in recruiting viable groups of teachers. For the one-term courses, teachers were to have been seconded full-time to study at college, being replaced by temporary specialist CDT supply teachers. Some LEAs and schools had been unable to recruit supply teachers, though, who were able to offer sound and relevant specialist tuition during the secondments. Accordingly, some craft teachers were being denied this secondment opportunity. The significance of this denial needs to be seen in the light of the general qualitative shortage of CDT teaching skills outlined in section 9.2.3.

This high-profile conference was attended by HMI and teacher trainers, together with advisers, officers and senior school staff from LEAs in the region. In one of the seminars, a teacher adviser argued that LEAs should circumvent the problems of the lack of specialist CDT supply by setting up task forces of such

supply teachers and deploying them to facilitate teacher release for INSET. According to Rogers[1] seminar members quickly pointed out that specialist CDT supply cover was required by schools rather than generalist cover. In response, he suggested that non-specialist supply teachers could be trained and equipped with 'teaching packages' to enable them to deliver effective CDT lessons in schools.

Rogers, as seminar 'scribe', documented this discussion in his seminar report to HMI Steels, the course organiser: in the report he elaborated on the idea of curriculum packages being developed, and non-specialist supply teachers being trained to use them within the Manchester LEA. On 28 November, a regular meeting of the north west LEA CDT advisers was held, and attended by HMI Hicks, the DES staff inspector for CDT, and Trayers, the north west adviser for TRIST. CDT teacher trainers from colleges in the region also attended this meeting. Rogers was asked by McNicol, the Stockport LEA CDT adviser, to present the ideas which he had developed from the previous conference. Furthermore, given that TRIST funds were still available at the time and that TRIST was actively attempting to foster collaboration between LEAs and higher education establishments, as evidenced by the large number of collaborative projects* funded, Rogers was invited by Trayers to submit a bid.

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* TRIST Collaborative Projects: In the north west alone, there were 10 LEA-led collaborative projects and 12 provider-led projects. This has to be seen against the number of LEAs in the region, which was 17.

Source: TRIST Internal Paper Circulated to Project Director in Spring 1987.

In December, he circulated to the north west CDT advisers and teacher trainers who had attended the 28 November meeting a first draft proposal[2] which embodied a number of features he had begun to articulate at the two November meetings noted above. These included:

(1) the participation of three, or more, LEAs with their CDT advisers; those tentatively identified were Bolton, Bury, Liverpool, Manchester, Salford and Stockport;

(2) a teacher co-ordinator to be seconded full-time from each LEA;

(3) teacher trainers from regional colleges - tentatively identified as Crewe and Alsager and De La Salle - to train non-specialist supply teachers in the use of 'CDT curriculum packages'; the packages would enable the teachers, working in 'mini-teams' of three, to carry out their own teaching schemes in schools; this was intended to protect them from having to use the heavily craft-based schemes already existing in the schools which they would not be qualified to teach safely;

(4) in order to attract people of acceptable calibre and enhance their career development, the supply teachers were to be given unspecified incentives relating to status and pay, and they would also receive a diploma from the college in which they were trained to use the 'packages';

(5) a regional co-ordinator would be seconded to oversee the operation;

(6) events would be documented and reported as the scheme would be regarded as a pilot for collaboration between higher education establishments and LEAs.

The first draft was expanded, in consultation with the regional TRIST adviser and teacher trainers from Crewe and Alsager and De La Salle Colleges, into a detailed proposal[3]. The proposal was considered by a conference of potential participants, which eventually evolved into the project consortium, at Salford University on 21 January 1986. Salford University was chosen as a venue because of its central location, and the relationship developing between Rogers and members of the University's Department of Electronic and Electrical Engineering, focused on Professor G Carter. The proposal's features which had evolved from the first draft in line with pressure from the colleges and TRIST, included:

(1) a two-year scheme, beginning with one term to train the 'mini-teams', followed by five terms of supply cover, distributed among participating LEAs in half-term blocks;

(2) the initial one-term training to have been carried out by teacher advisers based in the participating colleges of higher education;

(3) during the five terms of supply cover, the supply teachers to have been enabled to attain specialist CDT teacher status, on the basis of part-time study;

(4) a full-time co-ordinator to have been appointed, supported and guided by a steering committee through the envisaged labyrinthine complexity of effecting collaboration between

participating organisations;

(5) TRIST to provide all necessary funds for its remaining four terms of operation, except for supply teacher salaries and teacher training fees; these were to be financed within the LEAs using standard INSET funds; after TRIST's expiry in June 1987, further funds were to be sought, for the remaining year of the project, through the newly emerging INSET funding system LEATGS (see page 273).

The conference was attended by those who had responded to Rogers' previous invitation to join the scheme, including LEA CDT advisers, heads of CDT departments in the higher education colleges, HMI Steels, and the north west regional TRIST adviser, Trayers. Manchester Polytechnic's Faculty of Art and Design had indicated that it would send a representative, given that it was apparently seeking to enter the field of CDT teacher training; however, the representative did not arrive, or send a message, and a representative from Edge Hill College of Higher Education was invited to bring the college in to fill the gap.

At the conference, the regional TRIST adviser stated that the funding request was acceptable, given that LEAs would meet the costs of supply salaries and teacher training fees. At this point, however, the first major crisis emerged when some LEA advisers made it clear that they could only participate if costs were fully met. TRIST, on the other hand, was not able to meet the costs of supply teaching or training fees. This would represent a 'double funding' from central government, given that mechanisms already existed to fund both costs. In the former

case, 75% of supply teacher salaries used to release teachers for long course secondment (including one-term and one-year secondments) could be recovered by LEAs from the 'uncapped pool' within the DES, described in section 9.2.5; the remaining 25% had to be met locally from the rates. At this time, the one-term courses noted above attracted 90% DES funding under a special temporary scheme designated 1/85 by the DES, thus reducing the local burden to 10%.

Paying for the supply teachers to be trained in the use of the CDT teaching 'packages' was more difficult, as there was no established source from which funds could be diverted. This was followed by an impasse at the conference, resolved only when Brown, the designate Head of the Design and Technology department at De La Salle College, argued that a variant of the one-year retraining course would attract 100% DES funding to enable LEAs to pay for course fees and student grants. The assumption would be that the supply teachers would register as students at the college, and be appropriately funded for three terms; for the remaining three terms, they would be paid as supply teachers in LEAs, releasing teachers to attend one-term 1/85 courses, for which 90% DES funding would be recoupable. This compromise was adopted to give rise to the six term sandwich model shown in Figure 4 of chapter 9. It also elevated Rogers' prior aim of enabling the supply teachers to study for a diploma - previously unspecified - into granting them a fully-fledged specialist CDT teaching qualification. Members of the conference, apparently, did not realise at the time that retraining a cohort of teachers in this way was unnecessary on quantitative manpower grounds in the region. This will be examined more closely in chapter 13.

By February 1986, a consortium structure was agreed by representatives of participating organisations to include: Bury, Bolton, Cheshire, Manchester, Salford and Stockport LEAs, the University of Salford, Crewe and Alsager College of Higher Education, De La Salle College and Edge Hill College of Higher Education. At the same time Rogers began to fully involve the writer in the reformulation and detailed development of the proposal with a view to his eventual appointment as project director should the proposal attract funding. The third draft of the proposal, prepared in February by Rogers[4], included the following features:

(1) the provision of supply cover was to be combined with supply teacher retraining to confer specialist CDT teacher status;

(2) three teacher advisers were to be attached one to each college;

(3) a regional co-ordinator and administrator would be based at Salford University;

(4) strong consultative and steering committees would be convened, drawing senior decision-makers from participating organisations and enabling the scheme to operate across LEA and college barriers;

(5) 'support teams' of 2 or 3 supply teachers would be created and be given adequate car allowances and creche facilities;

(6) the 'support teachers' would receive training based firmly on a diagnosis of their individual needs;

(7) and the scheme would be launched shortly after Easter, 1986.

The bid was formally submitted by Rogers on behalf of the consortium to TRIST. It was subsequently rejected by TRIST for being too lengthy, not costed in sufficient detail and being too expensive. Rogers[5] was surprised by the latter, given the earlier signals received from the north west TRIST adviser at the 21 January 1986 conference. After discussions between Rogers and the TRIST adviser, and telephone conversations between Rogers and HMI Steels, a revised and reduced bid was prepared by the writer for submission. This was considered and finalised during a meeting between Rogers, the TRIST adviser and the writer in the Manchester LEA offices on 24 March 1986. A summary of the funding request is shown in section 10.3.1.

TRIST funds were awarded to projects on the basis of written proposals considered monthly by a committee. This proposal was to have been submitted in time for the committee to consider it during its March meeting, which, the proposers thought, would have enabled the project to start as scheduled after Easter. To ensure the deadline was met, Rogers sought and gained verbal assurance from his chief inspector that the bid, which was lengthy by the departmental typing pool's standards, would be typed on time. In the event the bid was not typed on time and the March committee meeting was missed. The proposal was not then considered until 28 April.

No immediate decision was taken at the meeting, however, as the committee wanted answers to four supplementary questions. The questions were: (1) What exactly is the training programme to be

followed in Higher Education? (2) How will kits and packages relate to standard courses that pupils will follow? (3a) What degree of support will be given to support teachers whilst in the schools? (3b) How will this compare with the support given to normal probationers?

These questions were answered directly in a note signed by Rogers and drafted by the writer[6], but having to answer them led to a further delay. Ironically, the answers given to questions (2) and (3)(a) and (b), which were accepted by TRIST, were extractions from a previous draft proposal. This proposal had been shortened after a complaint from the regional TRIST adviser that it was too long; in the process of shortening, this information had been removed.

In early May, Rogers received informal approval from Brooks, the north west TRIST manager, of the project, its funding, and Rogers' designation as project officer. Shortly after, the writer was appointed to be project director from 1 June, eight weeks later than had been originally intended. Although formal operation began in June, the writer had been operating as 'shadow director' from 12 May. His job description is reproduced in appendix 1. On 19 May, six weeks after the project was due to start, a letter of offer for funding was received from north west TRIST (see appendix 2).

10.3 STAFFING THE PROJECT

10.3.1 Funding For Teacher Advisers

The letter received on 19 May signalled the award of funds of up to £85,561, to be spent as indicated in Table 1.

TABLE 1

SUMMARY OF REDUCED FUNDING REQUEST TO TRIST	
Staff : Salaries	£34,600
Staff : Travelling	£ 6,656
Equipment/Materials for 36 students	£20,000
Evaluation and Report	£ 1,180
Induction Conference	£ 2,000
Project Base	£18,600
Office Accommodation Rental	£ 1,040
Management Meetings	£ 1,485
TOTALS	£85,561

The final bid noted an assumption on the part of the consortium that the three colleges would be able to appoint one person each to act jointly as tutor for the retraining course and teacher adviser for the school placements. This proved to be a naive assumption given the timescale. Colleges have to obtain funding for new appointments on the basis of requests made annually to central government via the National Advisory Board (NAB). By the time the project had reached this stage, the annual cycle for such a request was over and would only have been possible had the project been deferred for a year[8]. This would not have been possible as TRIST ended before the completion of the next academic year. Furthermore, appointing temporary teacher advisers at 'senior lecturer' level was not technically possible at Edge Hill College[9]. In the interests of equity, it was subsequently proposed by Rogers and the writer that such appointments would have to be arranged at 'lecturer grade 2' level. This however would have meant that teachers currently

being paid school teacher salaries at scale 4 level - a level of seniority considered by Rogers and the writer to be appropriate for transfer into this form of higher education - would have faced a salary cut of nearly £2000 pa. It was believed that this would discourage applications. To temporarily solve this problem, whilst Rogers found alternative funds to extend Lecturer 2 salaries to scale 4 level, Carter, chairman of the project consultative committee, arranged for Salford University to grant an unsecured loan to the project[10]. In the event this was not required (see below).

The incorrectness of the assumption about possible appointments by the colleges precipitated a second, major crisis. Rogers had arranged, in conjunction with the writer, for interviews to be held for three teacher adviser posts on 6 June. He had experienced considerable difficulty in persuading headteachers to permit staff to apply for these posts, which had been advertised internally in Manchester schools. In the summer term, teachers are contractually obliged to give three months notice of resignation, the final date for which is usually 31 May. After this date resignation is only possible with the consent of the headteacher. At least one headteacher witheld this consent and a potential candidate, who ironically was appointed to the project in the following term, was obliged to withdraw.

Within the context of these delicate negotiations, conducted whilst Rogers carried out his mainstream duties, a circular letter, drafted by the project director and signed by Rogers, was issued on 28 May to seek support from potential funding

agencies. This is reproduced in full below.

City of Manchester

Education Department
Crown Square
Manchester M60 3BB
Telephone ~~061 228 2101~~ 061 234 5000

G Hainsworth MA
Chief Education Officer

Your reference
Our reference I/AER/SB
Date 28 May 1986

If telephoning or calling please ask for extension

Dear

TRIST CDT SUPPORT THROUGH CHANGE PROJECT

This project is now poised to run, but it requires urgent guidance and official confirmation about the means by which the three teacher advisers can be paid at a level commensurate with their current status.

When Manchester submitted its final reduced bid, after consultation with the North West TRIST Adviser, it was assumed that each teacher adviser would be paid as a Lecturer II, and that each college would finance this through its normal channels. This has created three problems:

1) Most applicants are on the top of the Scale 4 post, which is higher than Lecturer II. As an LEA we are morally bound not to encourage teachers to take cuts in salary. At least one of the colleges is unable to pay temporary staff at rates beyond Lecturer II. It would seem, therefore, that teacher advisers should be paid on Scale 4.

2) Various administrative and salary problems will arise if the teacher advisers are recruited separately by each college. The most efficient system will be to keep successful candidates on the Manchester payroll and offset the costs by funding from an outside source.

3) Colleges would find it impossible to recruit through their normal channels, given the time-scale to which we must adhere.

THIS PROBLEM IS OF THE UTMOST URGENCY - WE ARE ALREADY BEHIND SCHEDULE IN COURSE PREPARATION AND INTERVIEWS WILL BE HELD ON 6 JUNE. It will be imperative to brief the candidates in advance of their interview as to the salary scales and conditions within which they will operate.

Given that there are various perspectives on this, it is difficult to identify who has the authority to resolve the problems in such a way that we will know by 6 June that the Scale 4 is authorised and that the source of funding is officially confirmed. There are a number of possibilities:

1) Manchester could continue to pay the salaries and bid to a single source for reimbursement. This would be ideal.

2) Manchester could pay the salaries and bid to different sources to take account of variations in the scheme eg term one in college (college funding), term two in schools (TVEI/MSC/DES Funding?), the pattern continuing for two years.

3) The project be recognised as a two year variant of a one year course, and that the colleges bid separately for L11 pay, use this to reimburse Manchester, and a top-up sum be sought (from the Design Council?) to take the L11 salary up to Scale 4. With assumptions of a further 5% salary rise this year and 19% on-costs, this difference will amount to £1,860; for year two this may rise to £2,000.

4) the teacher-adviser register for advanced study in their base college, or the University of Salford, and research into aspects of the scheme; the DES pays secondment salaries in the usual way, and Manchester bids for the shortfall from TRIST.

I am circulating this letter so widely because the problem is immediate, intractable and needs a number of contributions from organisations with different perspectives. I am asking each participant to discuss it in appropriate circles and inform me of potential solutions so that we can interview candidates on 6 June within a framework which is clear and authorised.

Yours sincerely

Tony Rogers.

Tony Rogers
District Inspector
Craft/Design/Technology

The letter was particularly aimed at eliciting advice from the DES. It was not successful, and so the interview date was postponed. Curtis, the national TRIST manager, responded to the circular letter by refusing to enter into a formal TRIST funding agreement with the consortium unless funding for the teacher advisers was obtained from sources other than TRIST[11]. This issue was again resolved after much persistent long distance

telephone calling, often carried out after office hours and using private domestic telephones, without recompense.

Rogers asked college representatives on the project consultative committee - Anderson, Brown and Clay - to investigate the possibility of teacher advisers being appointed to the colleges as researchers, attracting DES funding through the 'uncapped pool'. On 10 June, Anderson telephoned the writer[12] to inform him that his college's Dean of INSET had spent some time and effort to engineer such a scheme for Edge Hill. Whilst this was going on, Brown, at De La Salle, was awaiting a letter from Rogers to the college principal, demonstrating where funding would derive from. Clay was carrying out similarly time consuming investigations to Anderson at Crewe and Alsager. A great deal of negotiating followed involving these college heads of department, their senior management, Rogers, the project director, the HMI staff inspectors for INSET - Tomlinson - and CDT - Hicks - together with DES Civil Servants[13]. Eventually, Clay telephoned the project director on 11 June to indicate that Crewe and Alsager College would register all three teacher advisers as 'students' engaged in curriculum research.

It thus became possible for Manchester to tap into mainstream DES funding for INSET to pay the three teacher advisers' salaries. Under this 'uncapped pooling' 1/86 arrangement (see page 273), the DES provided 90% of funding and Manchester provided 10%. This resolved the problem yet, given that scale 4 salaries at the highest increment were £16299 pa at the time, supplemented by on-costs of 13%, the writer estimates that the 10% share of costs accruing to Manchester ratepayers totalled

£4910 in the first year. This needs to be evaluated in terms of nil contributions from all other LEA participants. Furthermore, this special 90% DES funding, known as 1/86, was rationed between LEAs to be used for their own INSET needs. Manchester used up its total allocation of 1/86 funding[14] to finance the teacher adviser posts, therefore denying secondment opportunities to other CDT teachers. This cost was not faced by other participating LEAs, yet the benefits were enjoyed by the ten LEAs who employed the supply teachers who came to be retrained by the teacher advisers. In fact, two of the teacher advisers actually regularly taught pupils in schools in Lancashire, Bolton and Salford to cover specialist examination classes which their supply teachers could not cope with, in order for the secondments to proceed smoothly in those schools (see appendix 3). No staffing charges were made by the project on the recipient LEAs for these services. This also needs to be seen in the context of conditions of service. A second run of the project was mounted separately by Crewe and Alsager and Edge Hill Colleges (see section 11.6.2). College lecturers were nominated to act as course tutors. In both cases, the conditions of service obtaining in the colleges did not permit these lecturers to teach in schools, thereby reducing their flexibility in overcoming the problem of their supply teachers being unable to teach certain specialist classes.

This research has thus uncovered a major flaw in collaborative projects carried out rapidly. Each participating organisation has its own goals, routines, traditions, rules of operation and timescales. Collaboration often needs compromise in order for the appropriate synchronised meshing to occur. When this was in

the power of the consultative committee participants, the meshing generally occurred. However, as in this case, when major external agencies were involved, it was very difficult to bring about changes in their routines in order that a relatively small activity like this project should be facilitated. The question of synchronised meshing is considered in detail in chapter 13.

10.3.2 Appointing The Teacher Advisers

On 13 June, interviews were held in the Manchester LEA offices for the three teacher adviser posts. Six candidates, all from Manchester, had been shortlisted. After a briefing session, each candidate faced two separate interview panels. Panel one, consisting of Rogers, the writer and Holland, the Bolton CDT adviser, considered the candidates' general educational and teaching capability. Panel two, consisting of the three college heads of CDT, considered the candidates' CDT capability and examined the candidates' own CDT work and that produced by their pupils. Although panel one wanted to make three specific appointments, panel two had concluded that only two of the six candidates were of the calibre required for lecturing in higher education.

Once again, the project came close to abortion, until it was suggested by Clay of Crewe and Alsager College that the writer, with part-time lecturing support, could cover at the college lacking a teacher adviser - De La Salle - for a term until re-advertisement might yield an acceptable teacher adviser candidate.

Only Manchester teachers were interviewed, which disturbed the college heads of CDT who were used to recruiting staff from a national field. To cast the net wider in seeking a third teacher adviser, the chief education officers of the other five consortium LEAs were invited by letter to nominate candidates. Only the Bury officer replied[15], and it was then too late in the financial year to secure a secondment. Accordingly, the third teacher adviser was recruited from Manchester and took up post on 1 January 1987.

10.4 CREATING PROJECT FINANCIAL SYSTEMS

10.4.1 The TRIST-Manchester Contract

On 19 May 1986, the north west TRIST manager wrote to the Manchester chief education officer to confirm that the bid had attracted funding of £85,561 (appendix 2). The project director, having previously been seconded to research at the university during this academic year, was free to begin operations at this time, and indeed office accommodation for the project base had already been made available. Despite this, the staffing branch of the education department was unable to authorise spending until funding for the three teacher advisers was secured which, as noted above, did not happen until 11 June.

On 19 May the draft contract from TRIST was delivered by the

writer from the north west TRIST offices to the Manchester education department. The arrival by post of the draft contract had been promised on 12 May by Curtis, the national TRIST manager, in a telephone conversation with Rogers. On 19 May, given that the contract had not arrived, the writer met the north west TRIST adviser to discover why it had not done so. During this meeting, at the north west TRIST office, the adviser found the contract in a filing cabinet, arguing that she did not know why it had not been sent to Manchester. It was accompanied by the offer of TRIST funding, and the writer delivered them both to the LEA by hand to avoid further delay. However, officers in the Town Clerk's department subjected the contract to a standard legal scrutiny and declared that the contract was unacceptable. In particular they were unable to enter into an agreement which implied that Manchester had responsibility for the actions of other LEAs and Colleges[16]. Changes were made, after considerable disagreement between this department and TRIST. The signed contract was delivered by hand by the writer to north west TRIST on 6 June. The contract, which was between TRIST and the Manchester LEA only, is reproduced in appendix 4.

10.4.2 Releasing Funds to the Project

Previously, on Tuesday 20 May, the director met an officer nominated from the resources branch of the LEA to liaise with the project team. The officer was updated on progress and issued with a draft of the contract and copy of the letter of funding confirmation from north west TRIST (appendix 2). He stated that he was unable to authorise spending until the teacher adviser funding had been secured and the contract signed. He agreed to let Rogers know as soon as spending could

begin, but informed the director that in the whole of the following week he would be taking leave.

No further communication was received from this officer until 10 June when Rogers attempted to raise the issue with him at 10.50am. Rogers left the meeting with the impression that the officer had major reservations about the project. At 11.40am, when the director and Rogers were meeting in Rogers' office, the head of resources branch came into the inspectorate section of the building (itself an unprecedented event according to Rogers[17]) with his deputy, and the nominated officer, and a fraught and tense meeting ensued. In this meeting the resources branch officers explained that, where externally funded projects were to claim costs in arrears from the funding agency, as was TRIST policy, the LEA education committee should have been previously alerted to make funds available for the project director to spend, prior to making quarterly claims in arrears to TRIST. The junior resources officer who had been charged to liaise with Rogers had apparently failed to keep senior staff in resources branch aware of developments in the project, and the branch had therefore not brought the request for a financial float before the education committee. The resources officers were also concerned that the lack of teacher adviser funding might in any case sink the project.[17]

During further negotiations between the writer, Rogers and resources branch officers, conducted amidst considerable aggravation, the officers were persuaded to prepare a submission for committee consideration. On 23 June, the Education Policy Sub-Committee confirmed the submission of a self-financing

development proposal to the Finance Sub-Committee of the Policy and Resources Committee of the city council. It was only after this development that officers from resources branch would authorise the director to begin spending, some seventy four days after the originally envisaged project starting date, some thirty days after TRIST had confirmed its funding offer, and eighteen days after the city treasurer had signed the contract. These delays severely hindered the early progress of the project in its pursuit of the aims listed on pages 286-287, and further reflect the problem of synchronous meshing noted in section 10.3.1. In the face of the rapidity of change required by TRIST and the procedures long established in the participating institutions, the delays were only reduced by action of an unconventional nature, specifically carried out by Rogers and the writer, in particular the repeated willingness to move ahead to the next stage on the assumption that barriers created by established bureaucratic procedures would be overcome in time to avert future crises. This parallels the conclusion formed by Blau[18] who, in the USA, "showed how in a Federal Agency, employees who were expected to work on complex cases requiring difficult judgements needed to defy prescribed procedures and create an informal network of consultation in order to remain effective at their work. In other words, the rigidity of the bureaucratic structure needed to be bypassed if the agents were to carry out their tasks effectively." Similarly, Burns and Stalker[19] distinguished between two polarities of systemic organisation. On the one hand, mechanistic systems, being appropriate to stable conditions, are characterised by precise role definitions, hierarchies and fixed procedures. On the other hand organic systems, being more appropriate to changing

conditions, are characterised by networks, diffusion of control and flexible procedures. Clearly the latter is a more appropriate form of organisation for the kind of innovation with which the present study is concerned. Yet, arguably, the organisations participating in this project revealed characteristics leaning more towards the mechanistic end of the spectrum.

However, having overcome institutional rigidity in the face of externally required change, financial systems were thereafter developed by the writer in conjunction with the LEA's Accounting Department and the University's Department of Electronic and Electrical Engineering, and appropriate spending codes were cleared. Procedures were then confirmed with the north west TRIST manager and a summary is shown in appendix 5.

10.5 ANALYSIS

This research has thus uncovered a number of crises which had to be overcome in giving birth to the project.

Firstly, LEAs beyond Manchester made it clear through their representatives at the January conference that they were unwilling or unable to participate if extra costs were to accrue to them.

Secondly, there was serious early misunderstanding about the extent to which TRIST would finance the whole scheme. The speed of development required by TRIST was, like most Manpower Services Commission categorically funded projects, far greater than that used to in the LEA, College, NAB and DES bureaucracies. This forced participants to operate instinctively and verbally, often by telephone, given that the use of letters would have led to

unacceptable delays and participants had no groundrules to follow. Unrecorded agreements reached in haste, and verbally, are by definition not subject to checking procedures. Inevitably, misunderstandings surfaced. Furthermore, participants were often operating in unfamiliar territory, and lacked detailed knowledge of how the administration of LEAs and colleges were structured and related to the project.

Thirdly, and relating to the previous problem, finding funds for the teacher advisers was difficult; a logical solution, which two of the colleges adopted for a second run of the sandwich model, would have involved securing funds through conventional NAB channels to appoint lecturers. However, as already noted, the short TRIST timescale left insufficient time to wait for the next annual NAB bidding cycle for the colleges to secure their own funding.

Fourthly, recruiting teacher advisers of good enough calibre from a limited geographical area and in such a short timescale proved difficult. In fact, teachers in post on the day of the interviews (13 June) would not have been able to resign from their LEAs without special dispensation, given that three month's notice was required. Manchester was only able to waive this because it had a surplus of CDT teachers which was used to fill the vacancies left.

Adequate TRIST funding would have pre-empted the first three problems; more time for colleges to recruit their own staff and/or for other LEAs to nominate teacher advisers, would have pre-empted the latter.

At each point the project nearly terminated and was only kept alive by a level of determined product championship which with hindsight belies description. In a memorandum to the writer on 28 September, Rogers highlighted "the high degree of risk and uncertainty that we have endured and will undoubtedly have to continue to cope with in the next two years ... I must say that from my point of view I am well aware that I have not had, and will not have, any official allocation of time or space to give to this programme and I know that I am vulnerable to the possibility that I will 'leave undone that which should be done' for my district schools and for my subject role (this must also come to an end in the foreseeable future"[20].

A considerable amount of project officer's and writer's energy was consumed in drawing threads together within such a turbulent and bureaucratic environment. It is difficult to visualise how such a collaborative endeavour could be initiated within the constraints imposed without either this idiosyncratic devotion to an idea or the application of authoratative and powerful central pressure, which was not accessible to participants. It is also possible to link the transactions described in this chapter with those which Shipman[21] referred to in his evaluation of a curriculum project. He concluded that 'horse trading' played a significant role in its progress (see page 77), and the evidence considered so far in the CDT Support Through Change project would confirm this conclusion.

The seeds of the project's crises were sown in its origins outside of conventional bureaucratic routines. Rogers, like his other inspector colleagues, was not expected in his role to be familiar, for example, with LEA-project accounting systems. It is doubtful

whether this collaborative project would have come to fruition within such machinery however, without the 'foot-in-the door' approach deliberately adopted by Rogers and the writer, and the energetic but 'extra curricular' product championship noted above. It would have been considerably simpler and cheaper in professional costs, had the multi-layered and cumbersome LEA machinery been altogether bypassed. Within the project the University of Salford has evidently evolved a much less cumbersome administration and more efficient financial situation, not encumbered by the time consuming procedures required by local government democracy and bureaucracy, and a concomitant institutional tendency to be receptive to innovation and flexible. Centering the finances on such an establishment would, with hindsight, have reduced costs, but it would have required a major reallocation of INSET funds by the DES away from LEAs and towards the project.

10.6 CONCLUSION

Handy[22] identified 'after-the-event' control as being conducive to product champions having autonomy and authority to proceed. Conversely, he argued that 'before-the-event' control can stifle innovation as product champions cannot take unusual action without reference to a higher authority. Bureaucracies accountable to the public, such as LEAs and government funding agencies may, in Handy's opinion, be too heavily oriented towards 'before-the-event' control to be able to promote innovation. As such they conform to Burns' and Stalker's mechanistic model. According to Pugh et al[23], Argyris's research into industrial administration shows "that all human behaviour in organisations is explicable in terms of the essential opposition of the needs of

the individual to the needs of the formal organisation. The result is adaptation by both, and the development of informal group organisation. The behaviour of the 'whole' organisation results from the interaction of all three". Moreover, the clashes which inevitably occur between the individual and the organisation generate frustration. The evidence of this project's genesis, singular as it is, tends to support Handy's view, but also indicates that 'before-the-event' or mechanistic control can be circumvented by energetic orchestration and product championship, as individuals confront organisational homeostasis. It would seem justifiable to conclude here that a theoretical knowledge of the bureaucratic constraints on innovation, together with ways by which individual innovators may overcome them, would enable innovators to operate more effectively. This argument is further supported by evidence discussed in chapter 11, which focuses on the early phase of the project, and in particular on the effects of collaboration.

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12. Toft, PN, 10 June 1986, information extracted from project director's diary.

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APPENDIX 1

CDT: SUPPORT THROUGH CHANGE

JOB DESCRIPTION: PROJECT DIRECTOR: GROUP 8 HEADSHIP

1. This complex and innovative project will require management which:

   (a) keeps a clear oversight of direction;

   (b) is flexible and responds rapidly to needs as they arise;

   (c) promotes effective working relationships between participating organisations with tact and diplomacy;

   (d) communicates freely and effectively with all participants;

   (e) operates with initiative in what is largely uncharted territory.

2. The Director will report directly to the Consultant and Steering Committees which represent all participating organisations.

3. Responsibilities include to:

   (i) carry out the policies determined by the Consultant/Steering Committees;

   (ii) service these committees;

   (iii) organise, maintain and administer project operations through its various phases;

   (iv) monitor and evaluate operations and support participants in responding to problems as they arise;

   (v) induct and lead the team of teacher advisers;

   (vi) liaise with all participants from a communications base;

   (vii) establish regular meetings, taking account of the needs of all participants and the different phases of operation;

   (viii) manage the base and ensure smooth operations within its multi-institution context;

   (ix) induct and organise the work of the secretary ensuring that full use is made of university, college and LEA facilities;

   (x) monitor finances;

   (xi) support the committees in seeking funding for year two;

   (xii) oversee the purchase of materials and equipment, and establish effective financial procedures;

(xiii) oversee recruitment of support teachers;

(xiv) contribute substantially to the training and supervision of support teachers and released CDT teachers;

(xv) work with college lecturers and teacher advisers in the development of support teacher courses;

(xvi) oversee placement of support teachers;

(xvii) contribute to outside evaluation;

(xviii) disseminate findings and ensure positive publicity;

(xix) contribute to and organise a final conference and report;

(xx) undertake such other reasonable responsibilities as may be required from time to time by the Consultative and Steering Committees.

APPENDIX 2

LETTER OF FUNDING OFFER FROM TRIST

Your ref:

Our ref:

Date: 16 May 1986

Manpower Services Commission

Training Division

North West Regional Office
Washington House
The Capital Centre
New Bailey Street
Manchester
M3 5ER

Tel 061-833 0251

Mr B Hainsworth
CEO
City of Manchester
Education Department
Crown Square
Manchester
M60 3BB

Dear Sir

TVEI RELATED INSERVICE TRAINING (TRIST) CDT SUPPORT THROUGH CHANGE

I am writing to thank the Authority in respect of the supplementary proposal requesting financial support for the delivery of the above project.

Your submission was warmly received by the Commission and I am pleased to confirm that your proposals have been approved in principle.

I have already advised the Project Officer (Mr T Rogers) that the project has now been approved, to enable the necessary recruitment of key personnel. The Commission's approval applies only to that part of the proposal scheduled to be completed on 30 June 1987. The funding of the project will be up to the maximum £85,561 requested. However, it must be recognised that within this ceiling economies should be made if at all possible. For example the advertising costs for the project estimated at £8000 may turn out to be an overestimate. In such an event any savings made should not automatically be vired to alternative activities without prior approval from the Commission.

The North West TRIST Adviser, Mrs Maureen Trayers will continue to liaise fully with the Authority throughout the lifetime of the project, and both Mrs Trayers and myself look forward to the successful development of the project.

I shall be writing to you again directly with details of the Contract of Agreement, but if you should have any queries in the meantime please do not hesitate to contact me.

Yours faithfully

pp CLIVE BROOKS
NW TRIST Manager

APPENDIX 3

DETAILS OF SCHOOL TEACHING CARRIED OUT BY THE PROJECT'S TEACHER ADVISERS TO ENABLE SECONDMENT DIFFICULTIES TO BE SOLVED

PETER GOULDEN (Edge Hill College of HE)

	TERM 2	TERM 4	TERM 6
1.	St Richards, Lancs: 2½ hours per week (25 hours in the term).	Joseph Eastham, Salford: 1½ hours per week (19½ hours in the term).	
2.	Longridge High, Lancs: 2 hours per week for 10 weeks (20 hours in the term.		

NEIL NUCKLEY (De La Salle College)

	TERM 2	TERM 4	TERM 6
	Hayward School, Bolton: 4th and 5th year Control Technology (60 hours throughout the term).		

APPENDIX 4

TRIST CONTRACT

CB/045A

AGREEMENT FOR THE INTERIM SCHEME OF TECHNICAL AND VOCATIONAL IN-SERVICE TRAINING - NORTH WEST REGIONAL COURSE CDT SUPPORT THROUGH CHANGE

1. This agreement is made between the Manpower Services Commission established by section 1 of the Employment and Training Act 1973, (hereinafter called "the Commission") of the one part, and the ~~MANCHESTER LOCAL EDUCATION AUTHORITY~~ COUNCIL OF THE CITY OF MANCHESTER (hereinafter called "the Authority") of the other part.

2. The activities described in the Authority's plan (~~Annexe~~ Appendix 1 hereto which shall form a part of this Agreement) to provide TVEI Related in-service teacher training programme entitled CDT SUPPORT THROUGH CHANGE shall be carried out in accordance with the description contained in said plan. The Authority shall co-operate in the delivery of said plan with 5 (Five) other education authorities, three colleges of Higher Education and the University of Salford as specified in paragraph 6 of the the plan. The Authority shall use its best endeavours to ensure that the plan is carried out in a manner acceptable to the Commission.

3. The Commission shall provide funds cash limited to a maximum of £85,561 for the Authority's plan described in said Appendix 1.

4. This Agreement shall commence on the date of exchange of its signed copies and, subject to the provision for earlier termination contained in clause 5 below, shall terminate on 30 June 1987.

5. The terms of this Agreement may be varied only with the written mutual agreement of the parties hereto. This Agreement may be terminated by either party giving to the other three month's written notice without cause assigned. Either party may at any time serve on the other party a notice in writing specifying any material breach of this Agreement and requiring the party in breach to remedy such breach (if capable of remedy) within 28 days from the date of such notice. In the event of such breach being without remedy or not being remedied within 28 days of service the party serving notice shall be entitled to terminate this Agreement without further notice.

6. In the event of such termination by the Commission its financial commitment under or arising out of this Agreement will be limited to the eligible expenditure incurred by the Authority up to and including the date of termination and subsequent expenditure arising from commitments reasonably and necessarily incurred by the Authority in accordance with clause 7 prior to the date of termination.

7. The Commission shall reimburse the Authority quarterly in arrears as provided in Clause 8 hereof agreed expenditure certified by the Authority's ~~Chief Financial Officer~~ City Treasurer as wholly and necessarily expended on the plan. Such reimbursement shall be made for salary costs (including cost of supply cover) equipment costs and other costs within the limits set out in Appendix 1 to this Agreement. These amounts are intended to meet the additional expenditure the Authorities will incur in providing the CDT SUPPORT THROUGH CHANGE course as in the said plan over and above what would otherwise have been spent on in-service training by the Authorities. The Authority shall not recover any part of the said expenditure from any other sources. The Authority shall keep separate accounts for the training provided under the plan and vouchers to support all payments made. In all matters the Authority shall pay due regard to the principle of economy and cost effectiveness. The Commission auditors and those of the National Audit Office shall have the right to examine these accounts at any reasonable time and to receive suitable oral written or other explanations into the economy efficiency and effectiveness with which the Authority has used the Commission's resources in discharging its functions under the Agreement.

8. Claims for reimbursement shall be completed and returned to the Commission by the fifteenth day of the month of June, September, December, and February, for expenditure incurred for the quarters ending 30 June, 30 September, 31 Decemnber, 31 March respectively. The Commission shall arrange for payment directly into the Authority's bank account by electronic funds transfer using the Bankers Automated Clearing Service. A payment advice note to the Authority will specify the date the payment will appear in the account.

9. A grant claim for the year ended 31 March 1987 shall also be completed and returned by 31 May next following the said month of March. A copy of the grant claims shall be submitted by the Authority to the Audit Commission or its duly appointed Auditor. Any balance due to the Authority as a result of the auditors finding shall be paid immediately.

On termination of the Agreement any payment by the Commission in excess of the amount certified as due by the auditor shall be refunded to the Commission without delay. For continuing arangements any such excess payment will be adjusted by the Commission by reducing a subsequent claim. The amounts to be reimbursed shall not include value added tax.

10. The Commission shall not accept responsibility for any expenditure outside the approved sums and purposes specified in the said Appendix 1 and shall have the right to disallow claims not considered a proper charge against the Commission.

11. Purchases of individual items of equipment with the funds provided by the Commission costing in excess of £500 shall be accepted as authorised expenditure only if they are contained in the said plan or prior written authority for the purchase of any item has been obtained from the Commission.

12. The Authority shall maintain the equipment in good working order and condition (fair wear and tear only excepted), and shall not dispose of the items without the agreement of the Commission. Upon the termination of the Agreement, or upon the items ceasing to be required for the purpose of in-service teacher training the items shall be sold on the best terms available and the proceeds after deducting expenses reasonably and properly incurred in their sale shall be paid to the Commission or set off against future payments due to the Authority from the Commission.

13. The Commission shall not be liable for any accident, loss or damage whatsoever or to whomsoever caused by any act, default or omission of any person taking part in in-service training.

14. While persons are in training including taking part in visits, or residential provision, the Authority shall ensure that during the currency of this Agreement there is an insurance in force covering all insurable risks.

15. Any reports or publications sponsored by the Authority and arising out ~~of~~ of the plan shall be made available to the Commission. Copyright and rights in the nature of copyrights in the materials produced by using funds provided by the Commission under this Agreement shall vest in the Crown and except as permitted by the terms and conditions of this agreement such materials shall not be reproduced or desseminated except within the Authority without the prior written consent of the Commission.

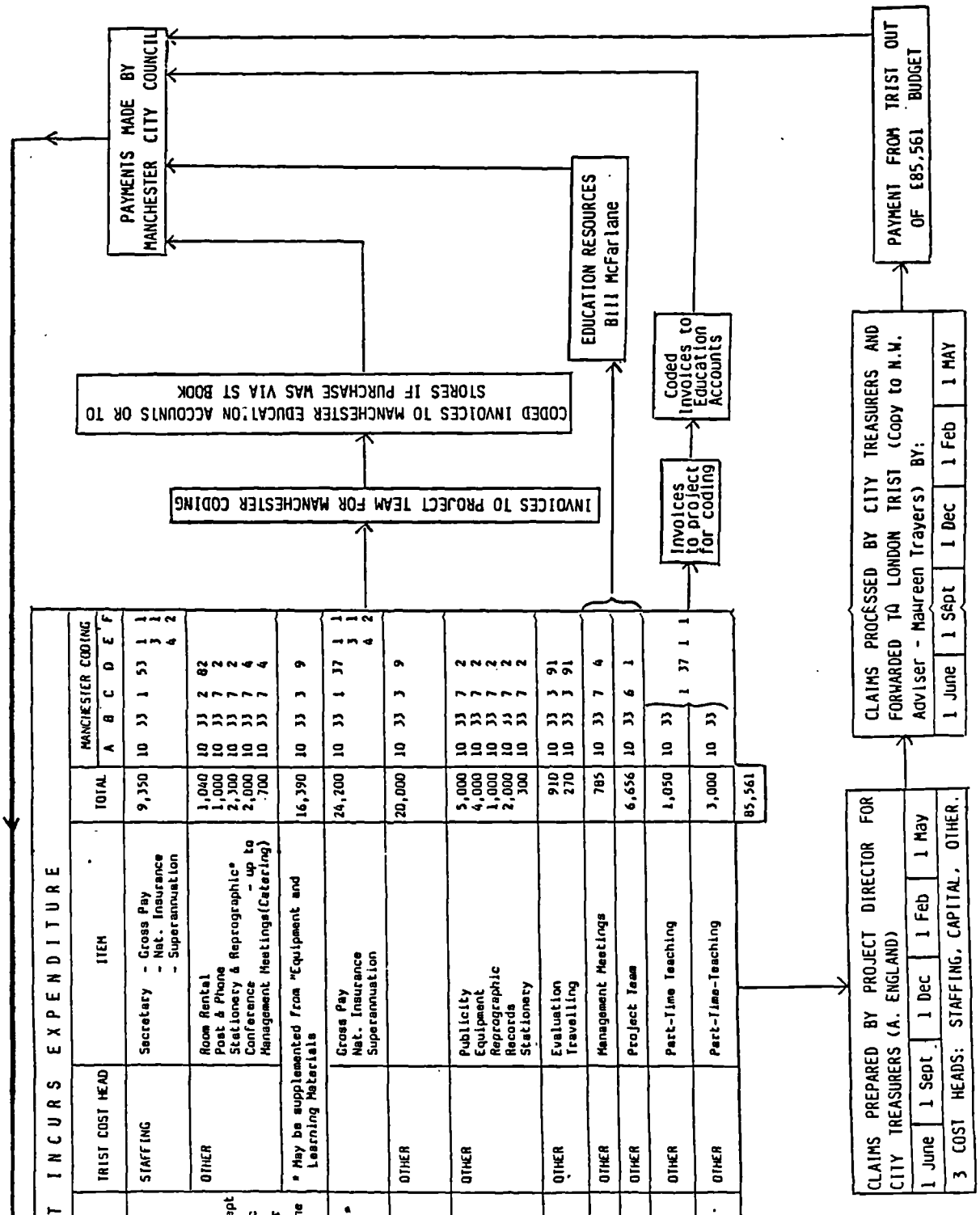
16. We, the undersigned being the authorised representatives of the parties named in clause 1 of this Agreement, do hereby agree the terms and conditions of this Agreement on behalf of our respective organisations.

Signed for and on behalf of the ..power Services Commission	Signed for and on behalf of ~~MANCHESTER LOCAL EDUCATION AUTHORITY~~ COUNCIL OF THE CITY OF MANCHESTER
Signature:	Signature: G. Hainsworth
Name (in Capitals)	Name (in Capitals) G. HAINSWORTH
Address:	Address: EDUCATION OFFICES, CROWN SQUARE, MANCHESTER, M60 3BB
Date:	Date: 30 May 1986

APPENDIX 5

CDT SUPPORT THROUGH CHANGE PROJECT - BUDGET PROCEDURE

1.6.86 - 30.6.87



CHAPTER 11: ESTABLISHING CONSORTIUM COLLABORATION WITHIN THE PROJECT

11.1 SUMMARY

This chapter continues with the previous chapter's focus on the first of the project's five aims, namely to "bring together key decision makers from each participating organisation into a consortium which would effectively support and monitor a full-time project team". Specifically, it examines the effects of collaboration in supporting the full-time project team in pursuit of project goals.

Deriving maximum benefit from scarce resources - an MSC interest - is identified as the rationale behind this form of collaboration. The sources of evidence on which the chapter's findings and conclusions are based, are identified; in particular the use of focused interviews, and the limitation of this form of evidence, is discussed; also the use of multiple-evidence sources to increase the reliability of the evidence is noted. The perceptions of a range of participants of the effects of collaboration are described and analysed, within three domains: collaboration between members of the project consultative committee; collaboration between distinct and varied organisations; and collaboration as it affected the three colleges and the LEAs.

It is concluded that: significant collaboration took place, without which those project goals which were achieved would not have been as effectively achieved; the role of product championship was vital to make systems behave in unconventional (but necessary to the project) ways; the project, as an

innovation, disrupted virtually all of the organisations with which it worked, as it sought to shape their adaptation; and finally, that it would have been considerably easier to manage collaboration, and achieve organisational adaptability, had the project team possessed control of a majority amount of the total funds spent under various branches of the project activity. These funds, in the main, derived from central, not local government. Greater project team control would have enabled contractually binding relationships to be formed and, if so planned, would have served to encourage LEAs to continue with the original project goals without perceiving them as financial burdens.

11.2 THE COLLABORATIVE RATIONALE

Collaboration between independently functioning organisations was a fundamental requirement of many TVEI-related (TRIST) programmes (see footnote on page 372). Woolhouse, head of the TVEI unit in MSC when the project began, later explained[1] the rationale behind this TRIST drive towards collaboration: MSC recognised that the education service had limited resources to deploy in achieving its goals and it therefore sought to maximise the effects of these resources by sharing where appropriate. His argument rested on the principle of a well co-ordinated group being able to achieve more than the sum of its parts, all other variables being equal.

The project was consequently established to bring together key decision makers from participating organisations. It was assumed in the original project proposal[2] that these individuals would be able to make internal decisions and call upon resources which, when combined with similar decisions and resources from the rest of the consortium, would enable project goals to be achieved in an

efficient and cost-effective way. The project director played a central role in co-ordinating this endeavour.

During the project, the writer (project director) acted to bring collaboration about in pursuit of the following goals, with the support of members of the committee:

(1) recruiting non-CDT teachers for retraining;
(2) ensuring that these teachers received financial support for their studies;
(3) developing retraining programmes in the colleges, based on their existing courses;
(4) developing support materials ('packages') for the teachers to use in schools;
(5) placing the teachers in schools to release craft teaches for one term secondments;
(6) establishing an effective communications network;
(7) responding to crises.

The consultative and steering committees[3] were the intended mechanisms for promoting the collaborative pursuit of goals, occasionally in committee groupings, but generally with members working as individuals to bring about adaptation in their base organisation. Aspects of their work are examined throughout the rest of section three of the present study. Collaboration as a general concept is examined in this chapter. Its effects are evaluated from four perspectives: (1) the consortium committees; (2) variations between participating organisations; (3) the LEAs; and (4) the colleges; the perspectives of the schools are considered in chapter 12. Sources of evidence are discussed in section 11.3.

11.3 SOURCES OF EVIDENCE RELATING TO THE EFFECTS OF COLLABORATION

11.3.1 The Sources

Following the principle described by Yin[4] that multiple sources of evidence should be tapped in complex social case studies, particularly where there are different perspectives on the situation, the following sources were used for this chapter:

(1) minutes of the Consultative and Steering Committee meetings;

(2) the writer's project diary, which contains records of telephone conversations and informal meetings;

(3) project correspondence;

(4) the writer's records of focused interviews with participants.

11.3.2 The Focused Interviews

The writer designed pro-formas to form the basis of focused interviews with two sets of participants. These were:

(1) LEA advisers, who were interviewed in January 1987, and again in June 1988 as the project was nearing completion;

(2) College heads of CDT, who were interviewed in June 1988.

The interviews were conducted with extremely busy people. The writer believed that he should seek to minimise the amount of time he requested from the interviewees and interviews were limited to one hour's duration. Given that various types of information were required, the focused interviews accordingly covered a wide range of topics, some of which are of direct relevance to the account given in this thesis, and some of which were more related to operational matters which might require the writer's remedial action. Question 8 of the first advisers' interview schedule (see below) falls into this category, being

related to the development of a teachers' network beyond the remit of the project but for which the writer had a certain responsibility. Notwithstanding this, the three proformas used for the structured interviews are shown below. The evidence the interviews generated is considered in the rest of this chapter and in chapter 12.

Before the pro-formas are shown however, it is necessary to indicate the assumptions on which they were designed. LEA advisers and college heads of department were interviewed, in two phases. In phase one (spring term 1986) and from the viewpoint of this thesis, advisers were interviewed largely to gauge the immediate effects of the project, then, on: (1) the supply teacher cover offered to schools and LEAs and (2) the provision of INSET in LEAs. In phase two, in the summer term of 1988, advisers were again interviewed to determine the effects of the project on their LEA's INSET provision. College heads of department were interviewed to determine their perceptions, as they had by then experienced the project in its entirety, of the project's impact on their colleges and departments. They were not interviewed in phase one because the writer believed that their perceptions of the project, which for them involved a long-term retraining aspect, would be incomplete at that early date.

The interviews were designed to reveal the perceptions of different types of participant. Before the sets of interviews were held, the writer had formed his own perspective on the situation, as project director: he had acquired much information from his three teacher advisers, who were tutors in the

colleges, and supervisors of supply teachers in the schools, and from his daily contacts with project participants. The interviews were therefore 'focused' in the sense meant by Yin[5] when he wrote:

"a focused interview [is one] .. in which a respondent is interviewed for a short period of time - an hour for example. In such cases, the interviews may still remain open-ended and assume a conversational manner, but the interviewer is more likely to be following a certain set of questions derived from the case study protocol."

"For example, a major purpose of such an interview might be simply to corroborate certain facts that the investigator already thinks have been established .... In this situation, the specific questions must be carefully worded so that the investigator appears naive about the topic and allows the respondent to provide a fresh commentary about it ... This type of corroboration is similar to that used by good journalists, who will typically establish the events at a meeting, for instance, by checking with each of the important participants. If one of the participants fails to comment, even though the others tend to corroborate one another's version of what took place, the good journalist will indicate this result by citing the fact that a person was asked but declined to comment."

".....However, the interviews should always be considered <u>verbal reports</u> only. As such they are subject to the problems of bias, poor recall and poor or inaccurate articulation. Again a reasonable approach is to corroborate interview data with information from other sources."

Answers to questions were corroborated with the other

information sources noted in 11.3.1. However, although the questions were designed to provide corroborative or contradictory evidence relating to the writer's perceptions as the central participant observer, a number of unforeseen insights emerged: these are noted in the following narrative. Before this, however, transcripts of the three sets of focussed interview questions are reproduced below.

11.3.3 The Interviews with LEA CDT Advisers, January 1987

The writer asked the following questions. He attempted to put the questions to the interviewees in a consistent manner throughout the whole exercise.

1. I would firstly like to focus on your view of the nature of the model of the project. Can you tell me how you viewed it after the planning meeting at Salford in January 1986, and in the light of experience, how you view it now?

2. Can we now turn to the project's actual impact on your LEA? Would you give me your perception of this, including both benefits and costs?

3. Can we now look into the future? How do you plan to use the project in our four terms after April 1987?

4. a) What effects will GRIST* have on your LEA's overall CDT INSET programme?

   b) What are your plans for CDT INSET after April 1987?

* LEATG Scheme

5. To what extent will you employ the following ways of offering CDT INSET after April 1987?
   a) Programmes at Institutes of Higher Education
   b) LEA-based programmes
   c) School-based programmes
   d) Other programmes

6. a) Do you plan to employ CDT teacher advisers under GRIST?
   b) If so, how many?
   c) If so, how will they operate?

7. Would you be able to visit the support teachers working in your schools this term?

8. My final question relates to general support for CDT in the region. I would like to set up a support network of female CDT teachers under the aegis of DesTech.
   a) In principle, would you support this?
   b) Would you give me permission to approach headteachers of schools where female teachers work, and the teachers themselves to
      (i) request a visit to the school
      (ii) invite the teachers to a series of 'out of hours' meetings?

9. Have you any other comments on the project?

The interviews were conducted with the advisers shown in Figure 1.

LEA	VENUE	DATE
Bury	Bury Education Offices	28.1.87
Bolton	Bolton Education Offices	16.1.87
Cheshire *		
Lancashire	Woodlands Conference Centre, Chorley	19.1.87
Manchester +		
Salford	Salford Education Offices	23.1.87
Stockport	Stockport Education Offices	21.1.87
Tameside x		
Trafford	Salford University	23.1.87

* Interview not held due to adviser's pressure of work. He wrote brief answers to the questions on the proforma sent by the writer after the adviser had declined to be interviewed.

\+ Interview not held because writer had to cancel because of crisis in the project needing his immediate attention. The inspector, instead, produced detailed written answers to the set questions.

x Interview not scheduled as there was no CDT adviser in post.

Figure 1: LEAs In Which Focused Interviews Were Held Between The Writer And The LEA CDT Advisers

11.3.4 The Interviews with the LEA CDT Advisers, May/June 1988

The writer asked the following questions. He attempted to put the questions to the interviewees in a consistent manner throughout the whole exercise.

1. I would firstly like to focus on your view of the nature of the model of the project. Can you tell me how you viewed it after the planning meeting at Salford in January 1986, and in the light of experience, how you view it now?

2. Can we now turn to the project's actual impact on your LEA. Would you give me your perception of this, including both

benefits and costs?

3. Would you use a re-run of the project now? Why?

4. How do you, and your LEA, come to know about future CDT staffing needs?

5. Do you have profile of skills, qualification, age, etc., of CDT teachers in your LEA? Why?

6. What effects did GRIST have on your LEA's ability to exploit the project?

7. To what extent have you employed the following ways of offering CDT INSET under GRIST?
   (a) Programmes at Institutes of Higher Education
   (b) LEA-based programmes
   (c) School-based programmes
   (d) Other programmes

8. (a) Have you employed CDT teacher advisers under GRIST?
   (b) If so, how many?
   (c) If so, how do they compete as a means of delivering INSET with secondments to one-term courses?

9. Have you any other comments on the project?

The interviews were conducted with the advisers as shown in Figure 2.

LEA	VENUE	DATE
Bury	Bury Education Offices	15.6.88
Bolton	Bolton Education Offices	14.6.88
Cheshire *		
Lancashire +		
Manchester	Manchester Teachers' Centre	16.6.88
Oldham	Oldham Education Offices	21.6.88
Salford x	Salford Education Offices	27.5.88
Stockport /	Dialstone Centre, Stockport	23.6.88
Tameside	Ashton Training Centre	14.6.88
Trafford	Trafford Teachers' Centre	14.6.88

* Interview not held because of the LEA Adviser's previous refusal to be interviewed.

\+ Interview not held because the adviser was on sick leave.

x Interview was held, despite the LEA's prior withdrawal from the project, to determine why it withdrew.

/ Interview held with different CDT adviser; the one previously interviewed was currently seconded to the DES.

Figure 2: LEAs In Which The Second Batch of Focused Interviews Were Held Between The Writer And The LEA CDT Advisers

11.3.5 The Interviews With College Heads of CDT Department: June 1988

The writer asked the following questions. He attempted to put the questions to the interviwees in a consistent manner throughout the exercise (see figure 3).

1. I would firstly like to focus on your view of the nature of the model of the project. Can you tell me how you viewed it after the planning meeting at Salford in January 1986, and in the light of experience, how you view it now?

2. Can we now turn to the project's impact on (a) your CDT department and (b) your college. Would you give me your interpretation of this, including benefits and costs?

3. What have been the main differences in the impact of the original project, and the second run, on your (1) CDT department and (2) college?

4. Would you continue to use the project model? Why?

5. What effects has GRIST had on your department's role in (a) 1 year retraining courses and (b) 1 term updating courses?

6. What are your views on our ability to forecast manpower needs in CDT teaching in England?

7. Are the teachers retrained in your department in association with the original Support Through Change Project different in any way from those teachers you have retrained through your established one year courses? How?
   (a) Before retraining
   (b) After retraining

8. To what extent are they now competent to teach CDT at secondary level?

9. Have you any other comments on the project?

Figure 3: Colleges in Which Interviews Were Held Between The Writer and The College Heads of the CDT Department

COLLEGE	VENUE	DATE
Crewe and Alsager	Committee Room	10.6.88
De La Salle	Head of Department's Office	9.6.88
Edge Hill	Head of Department's Office	9.6.88

11.3.6 Use of Multiple Sources of Evidence

The evidence deriving from the writer's analysis of the interviews he conducted, together with the other sources noted in section 11.3.1, was used to evaluate (1) the extent to which collaboration enabled the project to achieve its goals and (2) the barriers which reduced the efficiency of collaboration. The evaluation is documented under five headings in sections 11.4 to 11.6 of this chapter. Wherever possible sources of evidence were cross-checked for corroboration (see 11.3.1)

11.4 COLLABORATION AND THE CONSORTIUM COMMITTEES

The project was originally to have been overseen by a consultative and a steering committee[6]. The former, chaired by the Dean of the Faculty of Engineering at Salford University, included at the outset CDT advisers from participating LEAs, heads of CDT departments from the three colleges, the project director, two representatives of the University and two HMI observers. The latter, chaired by the Director of the Centre For Computers in Education and Training at Salford University, was composed of LEA, college and university members of the consultative committee, or their representatives, together with the project's teacher advisers. The role of the former was to:

"(a) advise, support and promote, through professional contact, the scheme;

(b) oversee and maintain the quality of operations;

(c) consider the future potential of the scheme;

(d) oversee evaluation and the production of the final report."[7]

The role of the latter was to:

"(a) contribute to the recruitment of supply teachers;

(b) contribute to the identification of CDT teachers for secondment;

(c) liaise with, support and advise the regional director;

(d) prepare and test some packages to be used by support teams on school experience sessions;

(e) contribute to the training programmes and monitoring of school practice;

(f) visit the induction conference;

(g) contribute to evaluation, the final report, and the dissemination of findings."[8]

The committees thus operated at distinct levels: the former was concerned with policy and strategy, the latter with operations. The relationship between the two groups was discussed at the first meeting of the consultative committee, at which the writer was secretary. The following was agreed and minuted:

"The bid indicated that the consultative committee should play an overall advisory, supportive and evaluative role, whereas the steering committee would be involved in detailed developments, for example, in recruitment, course development, training and teaching

practice. It was agreed that the steering committee would form a sub-set of the consultative committee, consisting of consultative committee members or their representatives, together with the teacher advisers. Allen Flinn agreed to chair the steering committee."

"The consultative committee would oversee the bid for year 2 funding, and also be responsible for detailed documentation of the project. The outside evaluator would report to this committee but not be a member."[9]

This express aim was later significantly diluted as members of each committee came face to face with the implications of membership, and the efforts it was to demand of them. This can be illustrated by briefly tracing the history of the steering committee.

The project started operations formally in June 1986, considerably later than originally planned (see chapter 10). Thus the project team had to move quickly to meet teacher recruitment, course design and induction conference organisation goals. The teacher advisers had been told by the writer at their interviews of the assistance they would be able to obtain from steering committee members. In fact the proposal to TRIST had indicated seven distinct activities which would be supported by steering committee members (see above).

The committee consisted of: five members of the project team (A - see figure 4); two representatives from the university (B); one representative from each of the three colleges (C) and each of the

LEAs (D). The attendance pattern of the first three meetings is shown in Figure 4.

Figure 4: Chart of Steering Committee Attendance Derived By The Writer From Meeting Minutes

	A					B		C			D					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
16.6.86 Meeting	A	A	A	D	A	A	B	A	A	A	B	A	A	A	A	A
30.6.86 Meeting	A	A	A	D	A	B	C	A	A	A	C	B	C	A	A	A
24.7.86 Meeting	A	B	A	D	A	A	C	B	A	B	C	B	C	A	A	A
TOTAL ATTENDANCE	3	2	3	0	3	2	0	2	3	2	0	1	1	3	3	3

KEY: A = Member Present
B = Member Absent With Apologies
C = Member Absent Without Apologies
D = Member Not In Post

Meeting 1 had an 82% attendance, meeting 2 had 62% and meeting 3 had 50%. Given the normal workloads of the individuals involved and the travelling distances from some of the more outlying centres (see Figure 3, chapter 9), it is not surprising that attendance was so unsatisfactory to the project team. The writer therefore drew the percentage attendances of steering committee meetings to the attention of the consultative committee at its second meeting on 9 September 1986. After hearing of the writer's concern, and considering members' workloads, the meeting took a pragmatic decision: "Because of the overlap between the business of the consultative committee and the steering committee, it was decided that the original purpose of the two committees was no longer valid and that they should merge into one joint committee."[10] Thereafter the joint committee, referred to as the consultative committee, met once per term. Its business varied to suit the phase requirements of the project and its composition evolved organically to meet changing perceptions. For example,

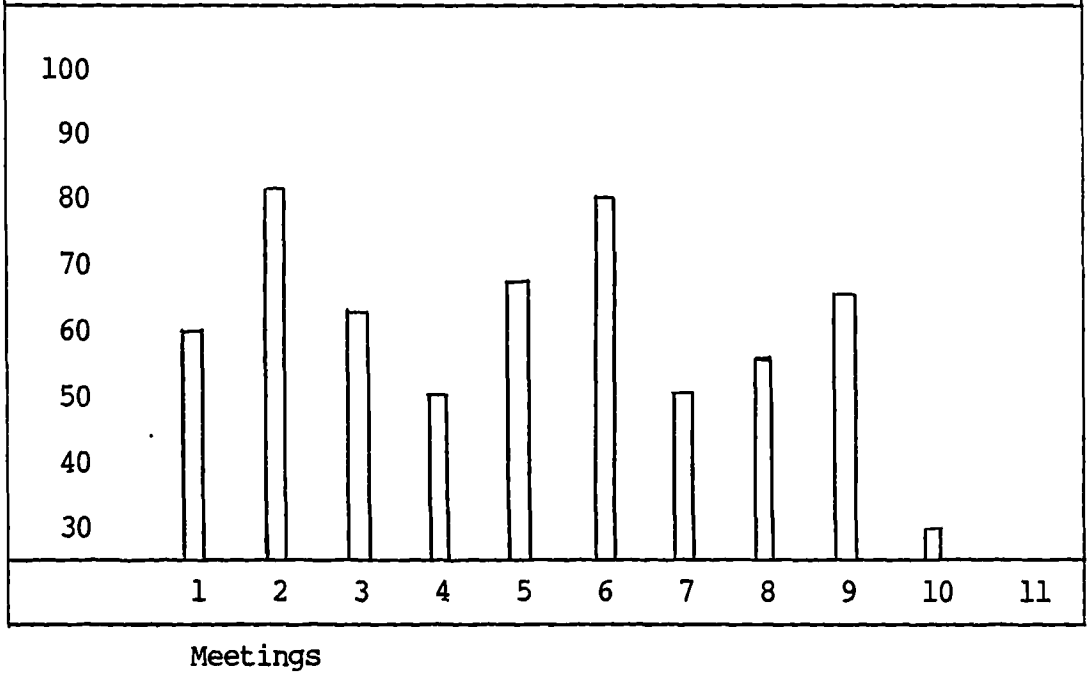
when it became clear that the project had recruited a 42% proportion of women teachers to retrain for CDT, against a national average of less than 4% of women in CDT teaching, members drew parallels with the findings of the Equal Opportunities Commission (EOC) enquiry into CDT teacher training, described in section 9.2.2. of the present study. It was therefore decided to invite a representative of the EOC onto the consultative committee, and she took up this place on the 8th May 1987[11].

Taken together, the attendance patterns of the committee meetings can be seen from figure 5.

Figure 5(a): Attendance Patterns of the Project Committee Meetings, Extracted by the Writer From Meeting Minutes

MEETING	ATTENDANCE OF MEMBERS	ATTENDANCE OF OBSERVERS
1. Consultative Committee	9/15 = 60%	-
2. Steering Committee	13/16 = 81%	-
3. Steering Committee	10/16 = 62%	-
4. Steering Committee	8/16 = 50%	-
5. Consultative Committee	10/15 = 67%	2
6. Consultative Committee	12/15 = 80%	3
7. Consultative Committee	8/16 = 50%	5
8. Consultative Committee	11/20 = 55%	7
9. Consultative Committee	13/20 = 65%	3
10. Consultative Committee	6/20 = 30%	3
11. Consultative Committee	Cancelled due to large number of apologies for absence received	

Figure 5(b): Bar Chart of Meeting Attendance Figure



The re-named consultative committee thus met ten times during the life of the project. Meeting agendas varied to suit the evolutionary stages through which the project evolved, and they are reproduced in appendix 1. The writer has formed three conclusions from his participation in and analysis of these meetings. Firstly, to draw together such a large number of key personnel from participating organisations required significant investment in their time and salary costs, even though attendance was so erratic. And secondly, the meetings rarely made binding decisions relating to agenda items discussed, at levels needed for progress to be made. Generally, LEA advisers were not able to commit their LEAs to new actions or financial commitments without detailed negotiations with their superiors; this was generally the case with CDT heads of college departments, but less so given that the advisers were dealing with larger sums of money relating to secondments and supply teacher salaries. Furthermore, the writer regularly felt that the advice offered to him from committee

members in certain technical and financial spheres beyond their remit was inadequate. He expressed this in a report to the committee on 3 October 1986:

"The project has succeeded in being a catalyst for drawing together separate institutions, but this has been labour intensive and has required very rapid learning from the project team. Much time would have been saved at various points had the director had access to high level specialist advice, particularly concerning: the operations of DES and LEAs; the internal management of colleges; the grants system. I would suggest that future collaborative projects make use of short-term consultancy with senior people seconded from relevant institutions. Funding arrangements would need to reflect this."[12].

A third conclusion needs to be set against the second. Whereas binding decisions were rarely made at the meetings, issues of common concern were thoroughly discussed. These discussions - for example at the 3 October 1986 meeting when college heads of department agreed to make separate but co-ordinated bids to the NAB for funding for a second run of the project - frequently led to concerted action back at the base organisation. Even though this had to be followed up by the writer in his position as project director, collaborative and effective action frequently flowed from such committee discussions.

11.5 COLLABORATION BETWEEN ORGANISATIONS WITH DIFFERENT GOALS

Etzioni[13] defined organisations as "social units (or human groupings) deliberately constructed and reconstructed to seek specific goals. Corporations, armies, schools, hospitals, churches and prisons are included; tribes, classes, ethnic groups,

friendship groups and families are excluded. Organisations are characterised by:

(1) divisions of labour, power, and communication responsibilities, divisions which are not random or traditionally patterned, but deliberately planned to enhance the realisation of specific goals;

(2) the presence of one or more power centres which control the concerted efforts of the organisation and direct them towards its goals; these power centres also must review continuously the organisation's performance and re-pattern its structure, where necessary, to increase its efficiency;

(3) substitution of personnel, ie. unsatisfactory persons can be removed and others assigned their tasks ... [Organisations] ... are much more in control of their nature and destiny than any other social groupings."

The organisations which came together within the project consortium generally worked separately, or even in competition, although co-operation between LEAs and colleges in the north west had previously not been uncommon within CDT *. Generally, however, they differed in two ways. Firstly, there were different types, characterised by their essentially different goals. The

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* In the north west, CDT advisers from the 17 LEAs and teacher trainers from the colleges met regularly to discuss issues of common concern. They had also collaborated formally in the TRIST-sponsored 'Designing the Designers' project, which was hosted by the Stockport LEA from 1986-87.[14]

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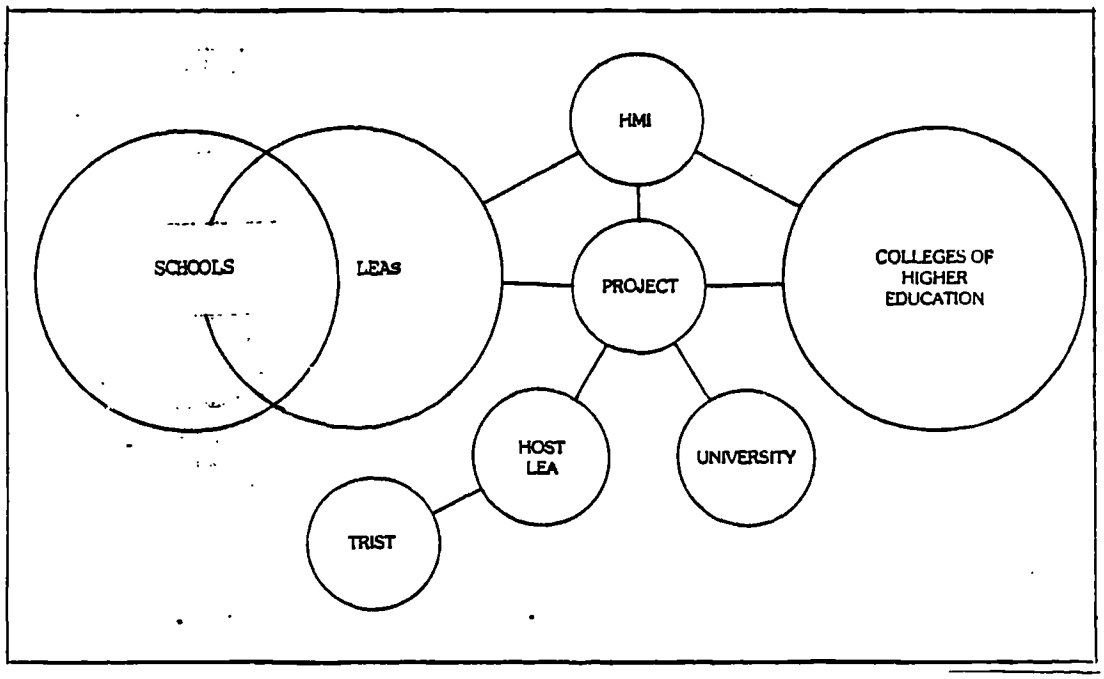
different types, and the relationships (within the project) between them, are shown schematically in Figure 6. Secondly, within each of the major categories of schools, colleges and LEAs, there were differences of philosophy, management and administrative practices: differences between them were thus in terms of the three features of organisations delineated by Etzioni (see above).

Figure 6: Writer's Schematic Conception of the Relationships Between the Consortium Participants



LEAs were described in section 4.2. They operate within a national framework to deliver an education service to local communities; the needs of specific communities, identified by elected representatives, are necessarily prime considerations. Their increasing domination by national party political stances was noted in chapter 4. This is peripherally related to different spending policies: for example, some LEAs spent considerably more on INSET at the time of the project genesis than did others - this

was reflected in the government's drive to rationalise INSET provision and funding discussed in chapter 9. Within this context, the relatively extensive and sophisticated INSET provided by the Manchester LEA (see section 4.3) and from the writer's experience, the equally impressive Cheshire LEA provision, contrasted sharply with that offered by some of the other north west LEAs. Whereas some large LEAs had been prepared to finance sophisticated INSET programmes, others, especially smaller ones, had not. Thus, at the 3 October 1986 consultative committee meeting, funding for the second year of the project was discussed, and although none of the LEA advisers, at that time, wished to withdraw, "the advisers for Bury, Salford and Stockport had massive reservations about LEA funding."[15]. Also, Collinson, the Salford CDT adviser, indicated in an interview with the writer[16] that his senior officers would only allow the LEA to participate in the project if no costs, other than those of updating Salford teachers, were to accrue to the LEA. When, for the last five months of the project, funding had to be provided by each participating LEA under LEATGS arrangements, Salford consequently withdrew from the project (see appendix 5). LEAs thus differed fundamentally in their stances towards project funding. This is covered in more detail in section 11.6.

The colleges of higher education were referred to in 9.2.5. They operate within another national framework, delivering courses to specific intakes of student, and in this context, their prime responsibility was to those students and the provision of appropriate courses. The University had a neutral but professionally committed interest as a focal point and co-ordinating centre.

The DES, whilst not a direct participant in the project, was linked by the presence of HMI observers, who attended as part of their information gathering brief[17] and because HMI had originally been instrumental in bringing the project initiators together and introducing them to TRIST (see section 10.2). Whereas TRIST had only a temporary life cycle, it had a national brief to encourage and finance developments in teacher in-service training. Although it provided funds for the project from June 1986 to July 1987, the following table, prepared by the writer based on figures he used in the preparation of bids for funding, indicate the relatively high levels of funding which had to be won within the consortium from non-TRIST sources.

Figure 7: Writer's Calculation of The Funding Sources to Meet the Crude Costs of Operating The First Year of the Project

SOURCE	PURPOSE	AMOUNT(£)
TRIST	Central Project Costs	85,600
DES & Manchester LEA 1/86 INSET Funds	Teacher Adviser Salaries, with on-costs	45,000
DES & Manchester LEA	6 Secondments for Retraining	90,000
DES & Participating LEAs	30 1-term Supply Salaries	150,000
DES and LEAs	30 2-term Student Grants	38,100
DES and LEAs	36 3-term College Tuition Fees	21,600
	TOTAL	430,300
	TRIST Percentage Share :	19.9%

These are crude figures which do not, for example, take account of the incremental salary rises of individual teachers. However, they quite clearly reflect the multiple funding sources on which

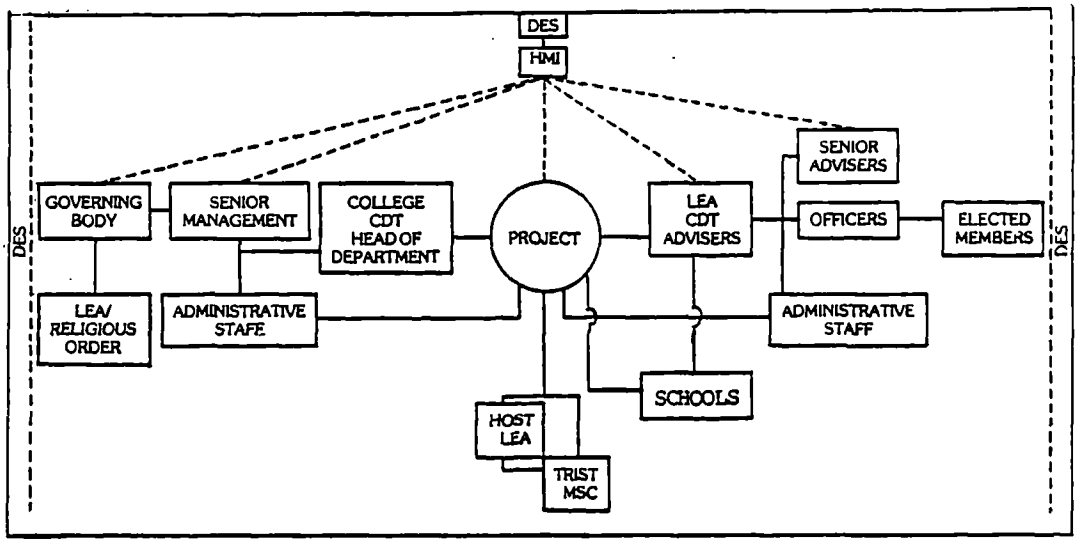
the project relied, and the relatively low proportion (19.9%) of costs met by TRIST, in what was a project widely acclaimed to be 'TRIST-funded'. This observation of the writer is supported by the way TRIST was acknowledged on the cover of the writer's preliminary report (see appendix 2). The cover design was created in an ad hoc meeting of regional TRIST project directors which the writer chaired at Salford University on 13 November 1986. At this meeting, both the north west TRIST adviser and manager insisted that the TRIST identity should feature predominantly on report covers. The writer believes that this is a reflection of the strength of TRIST as a power centre within the project consortium which, after Etzioni[18], "controlled the concerted efforts of the organisations ... [directing] ... them towards its goals."

Finally, schools in which project supply teachers taught represent a major organisational focus. Their concern is to provide a general education for pupils. The quality of this education is partly influenced by continuity of teaching, and partly influenced (amongst other influences) by the degrees to which teachers use modern practices. Headteachers thus had to balance the long-term benefit of seconding permanent teachers for updating with the short-term disruption to classes left by these teachers; this was a very real consideration, (and is discussed in more detail in section 12.4.4), despite the provision by the project of specialist and supervised supply teaching cover.

The diversity of goals and characteristics of the various participant organisations can thus be seen. Bringing about collaboration between them occupied much of the writer's time during the project, given that initiatives had to be sensitive and

responsive to organisational differences. The schematic view of the communications network which the writer forged to facilitate collaboration is shown in figure 8.

Figure 8: Writer's Conception of The Communications Network He Evolved in the Project



The project team, and in particular the writer, found that bringing about collaboration, within these schematic networks, was time consuming and difficult. Given that each participating organisation had its own perspective on the situation, and its own pressing needs and constraints, negotiation and compromise were essential. Difficulties surfaced where changes required by the project, such as the awarding of discretionary grants to teachers already qualified (see chapter 12) did, in some LEAs, necessitate energetic orchestration through complex committee structures. Success in the collaborative venture depended on the extent to which the team recognised and came to terms with the ambience of each participating institution, and the goals of its members, and worked to minimise hindrance to the achievement of its goals, or even enhance this achievement, whilst propelling the wider goals of the project.

FitzGibbon and Heywood[19] recounted that research had indicated that, in in-company industrial training programmes: "... Conflict exists between the goals of the organisations and the goals of the individuals sent on such courses; the organisation seeking improvement of on-job performance, the individual seeking skills for promotion. This must be resolved initially with an exercise which clarifies the goals of both trainers and participants and produces an agreed set of objectives meeting the needs of both."

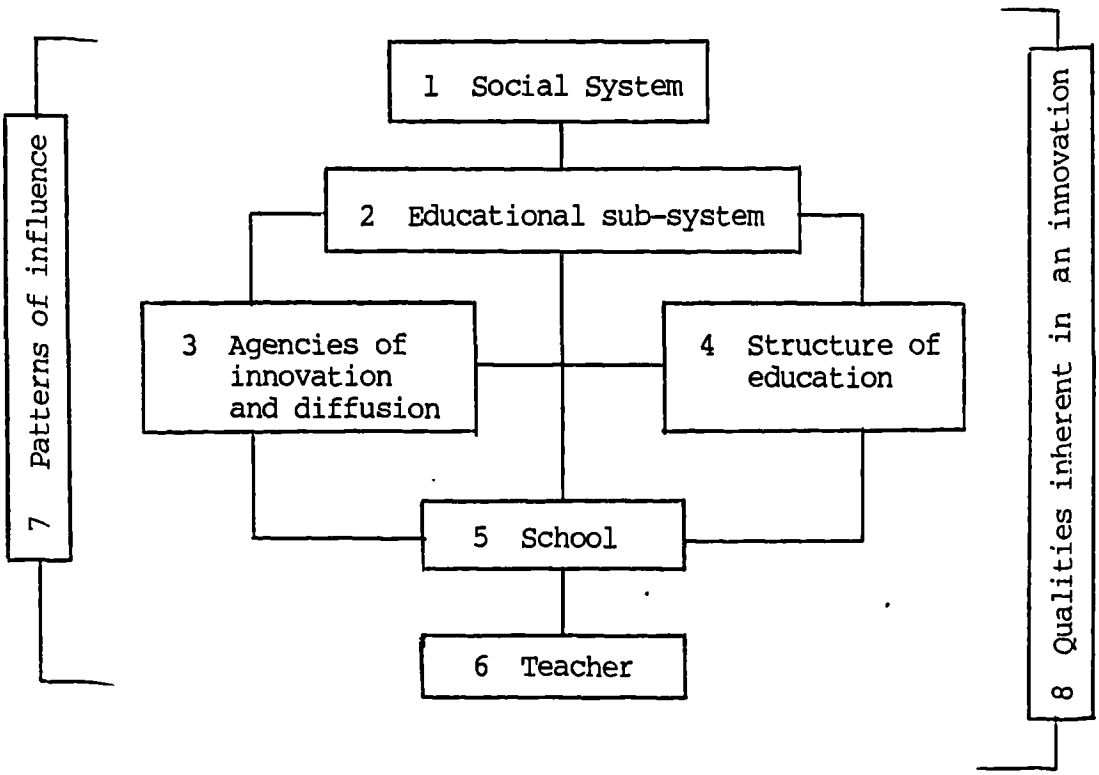
From the outset, participants had accepted the outline of the project strategy, although some deviated in the way they deployed the supply teachers in schools. Yet, no systematic attempt was made to clarify goals in detail; the writer believes that this would have been difficult before the participants had experienced the project and engaged in their own learning. However, should the strategy be used again, arguably, future participants would benefit from the kind of exercise noted above, providing that they had sufficient knowledge of their own roles and organisations vis-a-vis the demands of collaboration.

In a broader sense, Hoyle[20] argued that a burgeoning curriculum development movement needed sociological insights into how curriculum change takes place. He granted that the processes were very complex, requiring "different levels of analysis, patterns of interaction, and clusters of variables"[21]. He offered a diagram of relationships between elements of the change process, which is reproduced in figure 9. However, he made it clear that "this diagram cannot be regarded either as a model or a paradigm. The lines which connect the boxes indicate a reciprocal relationship, but not the direction of flow of influence. Models could be

constructed to indicate the systematic relationship between some of the variables suggested, but we know too little at the present time about the process of educational innovation to construct a single overarching model."[21]

Figures 6 and 8 in this section, and figure 10 in section 11.6, arguably reflect elements of boxes 3, 4, 5 and 6 of Hoyle's model and support its validity. Implicit in figures 8 and 10 are patterns of influence at various levels (Hoyle's box 7) together with the varied perceptions of the qualities inherent in the CDT Support Through Change Innovation. Figues 6, 8 and 10, however, show up more detailed linkage patterns than those evident in Hoyle's highly generalised diagram, and move some way towards models indicating systemic relationships between variables in the project's innovation process.

Figure 9: HOYLE'S MODEL OF ELEMENTS IN THE MECHANISMS FOR CURRICULUM CHANGE



11.6 COLLABORATION AND THE MAJOR PARTICIPANTS

Members of the consultative committee were, by implication, at the outset committed to the goals of the project. First and foremost, however, they were salaried employees of other organisations, notably those described above. It is therefore reasonable to assume that their loyalties to the project would be tempered by what their employing organisations made possible, (a) in terms of formal codes of practice and (b) in terms of the intangible network of relationships and practices which had evolved within each.

This simple statement hides a tremendous complexity. Education is a social system and, as was noted in chapter two, Lovell and Lawson cited four factors which reduce the accuracy of prediction in social sciences. These are: (1) the impinging values of the observer; (2) the inaccessibility of some of the data; (3) human changeability; and (4) the complexity of the interwoven variables.

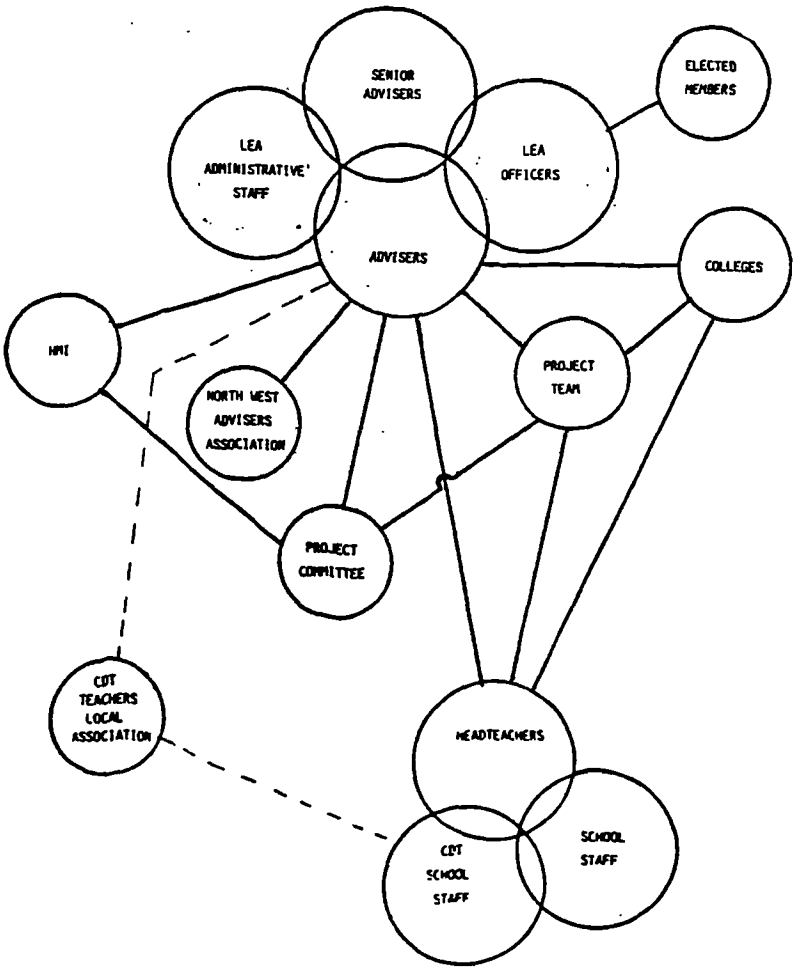
The four factors are further complicated here because this research focuses on managing innovation in organisations rather than simply observing their status quo modes. As indicated in chapter three, Schon argued that man is more technologically adaptive than emotionally adaptive. Our frequently experienced difficulties with emotional adaptivity make change inherently give rise to threat. Individuals and social systems - which consist of individuals - often strive to maintain emotional security by resisting change. Thus, dynamic conservatism can resist innovation and collaboration, making them difficult to manage. Furthermore, the conditions under which the project was designed did not remain static. In particular, LEATG created considerable

changes in the underlying groundrules of the project, which in turn led to changing conceptions of its benefit to participants. These themes are explored below under the categories of: LEAs; and colleges.

11.6.1 Collaboration from the LEA Perspective

In this project, the LEAs were principally represented by their CDT advisers, who were members of the consultative committee. As was shown in chapter four, LEA advisers are busy people with numerous demands on their time. Within the project, their roles were further complicated, as they were obliged to negotiate and plan at various levels of seniority and within numerous formally constructed social systems. A simplified schematic representation of this web of relationships is shown in Figure 10.

Figure 10: WRITER'S CONCEPTION OF THE INTERLOCKING SOCIAL SYSTEMS WHICH PROJECT ADVISERS HAD TO OPERATE WITHIN



In order to illuminate this schematic view, the writer has selected a major issue which preoccupied advisers: LEAs' long-term commitment to the original goals of the project. This is analysed below.

Chapter 10 outlined some of the attitudes towards participation in the second year of the project which LEA advisers expressed in consultative committee meetings. Each LEA had a different stance, however, to the same problem. The problem centred on their perceived ability to pay the true costs of project supply teachers' salaries for one term periods whilst they seconded craft teachers to be updated in colleges. Under the LEA training grant (LEATG) scheme, described in chapter 8, the LEAs were notified of an indicative allowance, by the DES, which they were permitted to spend on INSET. Of this allowance, in national priority areas like CDT, LEAs would receive 75% from the DES and have to find 25% from their own rates levy. The sums allocated for 1987-88 for the major participating LEAs are shown in Figure 11.

LEA	Indicative Allowance for CDT INSET
Bolton	£ 35,000
Bury	£ 21,000
Cheshire	£118,000
Lancashire	£168,000
Manchester	£ 54,000
Oldham	£ 30,000
Salford	£ 30,000
Stockport	£ 35,000
Tameside	£ 28,000
Trafford	£ 24,000

Figure 11 : 1986-87 LEATG Indicative Allowance for CDT INSET.
Source: See reference 22

Of high significance was the way money could be spent. Under the previous 'uncapped pool' system, LEAs could only recoup money by sending teachers on courses approved by the DES, usually in establishments of higher education. Under the new LEATG system they were allowed to spend their money in other ways as well, including short courses, in-house development programmes, and local consultancy[22]. Given the criticisms of traditional long higher education courses levelled by HMI (see chapter 9), their high cost (up to £15,000 for one teacher to attend a one year course on full salary, with 'on-costs'), and the relatively low number of teachers trained within limited budgets, LEAs began to develop alternative modes of providing INSET under the LEATG system.

A further problem, articulated particularly by Mawson[23], a Cheshire teacher adviser, and Rogers, the Manchester CDT inspector[24], turned on perceptions of the poor quality of, or inappropriate content in, the one term updating courses running in north west colleges. This was not so perceived in most of the other LEAs: many of these continued to regard the one term courses as effective[25]. In Cheshire and Manchester, however, it was decided that with the advent of the LEATG system in April 1987, the bulk of their CDT indicative allowances for INSET would be spent on in-house programmes. Both Cheshire and Manchester had completely ceased to send teachers on one-term higher education courses by the end of the academic year 1986-87. Instead, both LEAs appointed teacher advisers to deliver internal INSET programmes. Some of the effects of these two phenomena are noted in the LEA vignettes below, and include: increased freedom for LEAs to determine INSET models; and the

local rejection of some higher education INSET courses. Each vignette has been written from evidence gathered by the writer from the sources noted in section 11.3.1.

BOLTON

In Bolton, the LEA had made a policy decision to devolve all LEATG INSET money to schools. It was the professional responsibility of headteachers to systematically analyse their organisational and staff developmental needs, in conjunction with their teachers, and to derive from this analysis a one year proposal for INSET. This costed proposal was then forwarded as a bid for money to the LEA. According to Holland, Bolton's CDT adviser, this form of 'bottom-up' approach to INSET is not reconcilable with central priorities like the Support Through Change project. With an LEA budget of £35,000 for CDT INSET, it would not be possible for any one school - given that there are 18[26] secondary schools and colleges in the LEA - to justify receiving £5,000 to pay for a one term secondment to a CDT updating course, if all schools were to receive a broadly equal share of funds every year.

When LEA officers heard that the Cheshire and Salford LEAs had withdrawn, they wanted also to withdraw. Given that there was no contractual obligation to continue, Holland had to orchestrate an energetic and protracted process of negotiation to persuade his senior officers to allow the LEA to continue after April 1987. This succeeded.

BURY

Heath, the Bury CDT adviser, had intended to use the project to accelerate his process of seconding each of his 18[26] secondary school heads of CDT to be updated at Edge Hill College. He was highly satisfied with their performance when they emerged from this course, and was able to offer back-up and consultancy support to the departmental heads, on their return to school, in their development work. Heath's major theme for all of this was the creation of coherent 11-14 secondary foundation courses for CDT.

The LEATG system gave Heath a considerably greater control over spending. Previously he had to negotiate with the deputy director of education for funds; under LEATG, funds were specified for CDT by the DES. He chose to continue spending on one-term secondments and was authorised within the LEA's policy under the LEATG system to make such choices, in contrast with his opposite number in Bolton.

In a different vein, the radical nature of the project had been treated very cautiously by Bury officers, notably the deputy director of education. The writer had to attend a personal interview with this deputy on 30 October 1986 to convince him that funding for year two would be technically feasible under LEATG. In the event, he would not accept the writer's reassurances without written confirmation from the host LEA - Manchester. A letter from Rogers (appendix 3) was necessary to free this blockage.

Despite this, according to Heath, the LEA's participation in the project was later used by its senior advisers to demonstrate that Bury was actually collaborating when HMI were investigating this issue. Thus, once the officers were satisfied with

financial arrangements, and given that the adviser was very satisfied with the kind of training his teachers were receiving, Bury demonstrated clear long term commitment to the project, but, as can be seen from figure 16, only used the supply teachers to facilitate secondments to Edge Hill in term 6. In the previous term, they were used to cover two vacancies and create an internal secondment opportunity.

CHESHIRE

Cheshire used the project's supply teachers in term two to fill three temporary vacancies in schools. The LEA advisers had already decided not to send teachers to Crewe and Alsager College for one term courses, although they seconded teachers to one-year courses. Instead of using the one-term course, they had appointed a teacher adviser and established a 'Design Centre' in a disused primary school in Frodsham. When the writer visited this unit in the spring term of 1987[23], it was already well equipped to host INSET courses in a variety of CDT aspects.

The LEATGS funding was used to appoint three more teacher advisers. The team of four, with the support of the two CDT advisers, was perceived to be capable of covering the whole spectrum of CDT INSET through short courses and consultancy in schools. Cheshire therefore did not intend to employ the project supply teachers to create opportunities to second teachers for one-term courses. Furthermore, on 10 June 1986, when the writer telephoned the Cheshire consultative committee adviser to discuss placements for term four, the adviser indicated that his LEA anticipated having a surplus of 17 CDT teachers in September 1986. This being true, Cheshire would not

be able to employ project teachers, even to fill temporary vacancies, as there would be none. He intimated that the surplus was generated because LEATG funding would not allow the LEA to continue seconding CDT teachers to one year courses to its previously high level *.

The writer followed this up with a letter to the chief education officer on 25 June, having had no further word from the adviser. The letter is reproduced in appendix 4, and drew attention to the location of a large proportion of project teachers in Cheshire. A reply came subsequently by telephone from the adviser, in which he confirmed Cheshire's withdrawal from the scheme, indicating that the county council had made an understandable policy decision not to employ supply teachers until its surplus of permanent teachers disappeared, over which he had no influence.

LANCASHIRE

Lancashire was not officially part of the consortium. However, five of the project's teachers received grants from this LEA; the CDT adviser - Taberner - sanctioned these reluctantly under persuasion from the writer and an HMI member of the consultative committee. His agreement was subject to the LEA receiving supply cover as if it were a member of the project. This was agreed by the writer, largely because the Lancashire teachers in

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* In a lecture delivered at Salford University on 20 May 1988, Smalley, the Greater Manchester inter-LEA co-ordinator for collaborative LEATG activities, indicated that some LEAs had previously used the 'uncapped pool' to fund secondments for teachers who had been rendered supernumerary by school falling rolls. Secondment was therefore used to avoid teacher redeployment and redundancy. The LEATG system had closed this loophole. The writer believes, although he has no written evidence, that this explains Cheshire's changed position vis-a-vis the Support Through Change Project.

the project would have found it very difficult to travel to LEAs in Greater Manchester for supply work (see figure 2, Chapter 9). Although Lancashire awarded grants to the teachers, it did not contribute to central project costs as did the other LEAs after April 1988 and it sent no representative to consortium meetings: it was arguably not a collaborating participant in the scheme, although it did receive its benefits, and finance the studies of five of the retraining teachers.

OLDHAM

Oldham was not a member originally because it did not have a CDT adviser to draw the inception of the scheme to the attention of senior officers. It was invited to join during a consultative committee extension planning meeting[37] on 29 January 1987 and did so. Thereafter the LEA took up its full quota of supply teachers: it used them, not to release teachers to the colleges, but to carry out its own in-house curriculum development exercises based at its curriculum development centre.

MANCHESTER

Manchester, through the influence of Rogers, the project originator, was committed to the completion of the project, despite Rogers view articulated in his written response to the January 1987 focussed interview questions (see section 11.3.4): "Manchester is out on a limb - philosophically and in terms of its positive role in this project in that it creates yet another area of difference from the interpretations of other LEAs. It provides all the project team, all the GRIST [LEATG]* funding and all the energy. It recruits well, etc [meaning that it had no quantitative shortage of teachers, or of CDT supply teachers].*

* my insertions

These factors may not be endearing to other CDT advisers. Thus we are developing an independence that is becoming more and more obvious." In the same response, he noted that he would participate in future collaborative projects but his choice would depend "on the willingness of LEA advisers and college lecturers to form consortia based on real partnership." In the second interview (June 1988) he expressed his view that collaboration in such a project was vital, but that the project's experience had strengthened some inter-organisational relationships and weakened others. He was unimpressed with the reasons for the withdrawal from the project of the Cheshire and Salford LEAs, and was critical of the way the colleges 'hijacked' the second run of the project before LEA advisers had chance to adapt to its significance. With hindsight, he argued that collaboration within the project would have been stronger had the participants each been contractually committed from the outset: this would have given more educational control over events, and reduced the influence of administrative expediency. He also noted the momentary nature of such a project in the eyes of officers in a big LEA like Manchester, arguing that "when it goes [the project], so will collaboration".

SALFORD

Salford entered the scheme through a route which differed from the other LEAs. According to Ivison[27] a Salford secondary headteacher, it was not until she learned of the scheme inadvertently, and then drew it to the attention of the LEA's principal adviser, Pemberton - himself a former CDT adviser - that the LEA became involved. It did so, as already stated, on the assumption that no costs would accrue to the authority.

Prior to the 30 June 1986 meeting of the steering committee, Collinson, the adviser, telephoned the writer to tender apologies for absence, and to state that he would like it noted in the meeting's minutes[28] that he could not offer the level of commitment to the project which the writer had requested of advisers in the previous steering committee meeting[29]; in particular he was unable to visit the colleges to give lectures. The LEA made full use of its quota of supply teachers in the first two placement terms, but when funding arrangements changed, as noted above, Salford withdrew (see the letter of withdrawal in appendix 5).

STOCKPORT

The Stockport adviser, McNicol, was keen to collaborate, having managed an earlier TRIST-sponsored regional project - Designing the Designers. He had also encouraged Rogers to develop the Support Through Change proposal. McNicol was keen to second teachers for updating, feeling that a majority of Stockport schools undervalued CDT because their headteachers and CDT teachers were unaware of its educational potential[30]. Having been impressed by the quality of the one-term courses at Crewe and Alsager, he was keen to make full use of them. He therefore carefully calculated the costs of participation in the project and ensured that they were built into the LEA bid for LEATG funding.

TAMESIDE

Tameside was not originally involved in the scheme because it did not have a CDT adviser to draw its inception to the attention of officers. However, one of the supply teachers

applied to the LEA for a grant. Ashton, the science adviser, authorised this after discussions with the writer in September 1986, but was only prepared to do so if Tameside received specialist supply teaching as a member of the consortium, which was agreed to by the writer. Thereafter, the LEA made full use of its quota of supply teachers and ensured that money was set aside under LEATG. The project enabled the release of five teachers for a term which, according to McGuigan[31] - the CDT Advisory Teacher - had previously been impossible: headteachers had refused secondment due to a lack of specialist supply cover.

TRAFFORD

Trafford was not part of the project at its inception, largely because it had no CDT adviser. The newly appointed adviser (Stevenson) had been present in another capacity however at the November 1985 conference at which the project was first mooted. After taking up post in April 1986, he attempted to convince his chief education officer of the value for Trafford in joining the scheme. Accordingly, this officer wrote to Rogers on 24 June 1986[32] seeking membership. Stevenson was co-opted onto the consultative committee at its meeting on 3 October 1986[33]. Stevenson had previously been involved in the TRIST-funded collaborative project 'Designing The Designers' and had used it to support teachers who were already making progress in design education. He observed that their successful participation in a high profile regional project had boosted their self-confidence, and wanted to derive the same benefits from the Support Through Change project.

Once Trafford was fully integrated into the project - a process which happened gradually between June 1986 and early 1987 - the

LEA used its full quota of supply teachers to release craft teachers to one-term updating courses. The needs of the LEA were basic, given that very few of its CDT teachers were trained in CDT, and the one-term courses at Crewe and Alsager and Edge Hill colleges were viewed by Stevenson as effective ways of changing teachers. Accordingly, under the LEATG scheme, he ensured that CDT INSET money was used to continue funding one-term secondments.

He was also keen to make full use of the modern teaching schemes which the project supply teachers had been equipped with. He therefore carefully targeted schools: he selected those where at least one CDT teacher was attempting to innovate. This person remained in the school to support the supply teacher and observe his or her teaching in action. A further teacher, more in need of the updating course, was seconded. Stevenson argued[34] that Trafford, at the end of the project, would have six secondary school CDT departments with a teacher making progress, a teacher updated, and the loss of a common excuse that "our kids cannot do it", because the project's supply teachers had proved otherwise: namely that design-based projects could be effectively taught to such children.

The upshot of these positive benefits to the LEA was that the project came to have high status[35] in the authority, enhanced by its exposure to HMI and other LEAs. Its regional and higher education focus made it easier for Stevenson to persuade school headteachers to participate. Trafford officers used the LEA's participation in the project to demonstrate evidence of regional involvement, which was essential in making its LEATG bid to the DES. As a result, Stevenson had powerful arguments to use when persuading officers to fund Trafford's long-term commitment to

the project: he had, however, been careful at the outset to calculate the long-term costs of involvement to ensure they were within his potential budget[36].

These LEA vignettes demonstrate the varied organisational pressures exerted on advisers in the development of their attitude to long-term participation in the project. A formal and binding contractual arrangement was, with hindsight, suggested by some advisers as a means to enable them to resist the pressures. However, the writer does not believe that this project, given its hasty formulation and unusual structure, would have been able to commence had contractual obligation been binding. Some of the advisers may have wanted to proceed but the evidence of the project's experience would suggest that they would have been prevented from doing so by their officers, whose focus was cautiously financial rather than educational.

Within the context of the non-contractual arrangement, collaboration had to be pragmatically and sensitively orchestrated, initially by Rogers, and latterly by the project staff and consultative committee members. This involved tactical acceptance, by the writer, of each LEA's use of supply teachers. In the original proposal, they were to be used exclusively to release teachers for one-term INSET courses in consortium colleges. The extent to which this did not happen is shown below in Figures 12 to 16. The reasons for advisers' use of supply teachers for other purposes have been documented in this section. Some chose not to send teachers to one-term college courses, and the effects of this abrogation of the original agreement were felt most sharply in the colleges. This

Figure 12: Breakdown of Purposes for which LEAs Employed Project Supply Teachers: (Source: Writer's Records kept as part of his Project Director Role).

TERM 2	LEA	SCHOOL	PURPOSE OF SUPPLY COVER
1.	Bolton	Deane	Secondment: Edge Hill
2.	Bolton	George Tomlinson	Secondment: Edge Hill
3.	Bolton	Haywood	Secondment: Edge Hill
4.	Bury	Coney Green	Covering Vacancy
5.	Cheshire	Alsager	Covering Vacancy
6.	Cheshire	Brookvale	Covering Vacancy
7.	Cheshire	St Thomas More	Covering Vacancy
8.	Lancashire	St Richard's	Secondment: Edge Hill
9.	Lancashire	Ormskirk	Secondment: Edge Hill
10.	Lancashire	Longridge	Secondment: Edge Hill
11.	Liverpool	Club Moor	Covering Vacancy
12.	Manchester	King David	Internal LEA Secondment
13.	Manchester	Newall Green	Secondment: Crewe & Alsager
14.	Manchester	St Paul's	Secondment: Edge Hill
15.	Salford	Walkden	Secondment: Edge Hill
16.	Stockport	Bramhall	Secondment: Crewe & Alsager
17.	Stockport	Stockport School	Secondment: Crewe & Alsager
18.	Tameside	St Thomas More	Secondment: Edge Hill
19.	Trafford	Sale Moor	Secondment: Crewe & Alsager

Figure 13: Breakdown of Purposes for which LEAs Employed Project Supply Teachers: (Source: Writer's Records kept as part of his Project Director Role).

TERM 4	LEA	SCHOOL	PURPOSE OF SUPPLY COVER
1.	Bolton	Sharples	Secondment: Edge Hill
2.	Bury	Woodhey	Internal LEA Secondment
3.	Bury	Coney Green	Covering Vacancy
4.	Lancashire	Darwen Vale	Secondment: Edge Hill
5.	Lancashire	Ivy Bank	Secondment: Edge Hill
6.	Lancashire	Parklands	Secondment: Edge Hill
7.	Manchester	Abraham Moss	Internal LEA Secondment
8.	Manchester	Brookway	Internal LEA Secondment
9.	Manchester	Burnage	Internal LEA Secondment
10.	Manchester	Ewing	Internal LEA Secondment
11.	Manchester	Oakwood	Internal LEA Secondment
12.	Manchester	Sheena Simon	Internal LEA Secondment
13.	Manchester	Spurley Hey	Internal LEA Secondment
14.	Oldham	North Chadderton	Internal LEA Secondment
15.	Oldham	Royton & Crompton	Internal LEA Secondment
16.	Salford	Joseph Eastham	Covering Vacancy
17.	Salford	St Ambrose Barlow	Covering Vacancy
18.	Stockport	Bramhall	Secondment: Crewe & Alsager
19.	Stockport	Priestnall	Secondment: Crewe & Alsager
20.	Stockport	St James'	Secondment: Edge Hill
21.	Tameside	Stamford	Secondment: Edge Hill
22.	Trafford	Lostock	Secondment: Crewe & Alsager
23.	Trafford	Wellacre	Secondment: Edge Hill
24.	Trafford	Wellington	Secondment: Crewe & Alsager

Figure 14: Breakdown of Purposes for which LEAs Employed Project Supply Teachers: (Source: Writer's Records kept as part of his Project Director Role).

TERM 6	LEA	SCHOOL	PURPOSE OF SUPPLY COVER
1.	Bolton	Withins	Internal LEA Secondment
2.	Bolton	Little Lever	Secondment: Edge Hill
3.	Bury	Derby	Secondment: Edge Hill
4.	Bury	Castlebrook	Secondment: Edge Hill
5.	Clwyd	Deeside	Secondment: Edge Hill
6.	Lancashire	St Theodore's	Covering Vacancy
7.	Lancashire	Upholland	Secondment: Edge Hill
8.	Lancashire	Northlands	Secondment: Edge Hill
9.	Manchester	St Gregory's	Internal LEA Secondment
10.	Manchester	South Manchester	Covering Vacancy
11.	Manchester	Oakwood	Internal LEA Secondment
12.	Manchester	Spurley Hey	Internal LEA Secondment
13.	Manchester	Parrs Wood	Internal LEA Secondment
14.	Manchester	Burnage	Internal LEA Secondment
15.	Manchester	Brookway	Internal LEA Secondment
16.	Oldham	Hathershaw	Internal LEA Secondment
17.	Stockport	Avondale	Internal LEA Secondment
18.	Stockport	Bramhall	Secondment: Crewe & Alsager
19.	Trafford	Great Stone Boys'	Secondment: Crewe & Alsager
20.	Trafford	St Paul's	Secondment: Crewe & Alsager
21.	Tameside	Stamford	Secondment: Edge Hill
22.	Tameside	Little Moss	Secondment: Edge Hill
23.	Wirral	Rockferry	Secondment: Edge Hill

Figure 15: Pattern of Use Made of Supply Cover During The Project

		NO.	PERCENTAGE
TERM 2	College Secondments	13/19	68%
	Crewe & Alsager	4/19	21%
	Edge Hill	9/19	47%
	Internal LEA Secondments	5/19	26%
	Covering Vacancies	1/19	6%
TERM 4	College Secondments	11/24	46%
	Crewe & Alsager	4/24	17%
	Edge Hill	7/24	29%
	Internal LEA Secondments	10/24	42%
	Covering Vacancies	3/24	12%
TERM 6	College Secondments	11/23	52%
	Crewe & Alsager	3/23	13%
	Edge Hill	9/23	39%
	Internal LEA Secondments	9/23	39%
	Covering Vacancies	2/23	9%

The Percentage Project Success Rate in Using Supply Cover For Its Intended Purpose Was Thus:

Term 2: 68%; Term 4: 46%; Term 6: 52%

Figure 16 : Percentage of Supply Cover Used By LEAs For Intended Secondment Purpose

	TERM 2		TERM 4		TERM 6	
	%	No. of Placements	%	No. of Placements	%	No. of Placements
Bolton	100	3	100	1	50	2
Bury	0	1	0	2	100	2
Cheshire	0	3				
Clwyd					100	1
Lancashire	100	3	100	3	66	3
Liverpool	0	1				
Manchester	66	3	0	7	0	7
Oldham			0	2	0	1
Salford	100	1	0	2		
Stockport	100	2	100	3	50	2
Tameside	100	1	100	1	100	2
Trafford	100	1	100	3	100	2
Wirral					100	1

is examined in section 11.6.2.

11.6.2 Collaboration From the College Perspective

At Crewe and Alsager College, the head of department, Clay, was in June 1988 still enthusiastic about the basic sandwich model of the project but claimed that it was not possible to implement in the prevailing climate. Given central government's implementation of the LEATG scheme, and the impending independence - and hence the need not to lose money - of the colleges, he perceived college-LEA co-operation as being "virtually impossible" in this context. He was particularly scathing about "whimsical" LEAs expressing a need for specialist supply teachers, participating in their early recruitment and training, and then withdrawing without fulfilling their obligations. The withdrawal of the Cheshire LEA - in which this college is located - left seven teachers without future supply teaching placements in their home LEA and considerably reduced the numbers of teachers which the college expected to enter its one-term CDT updating courses. This low number is reflected in figure 15.

The college ran an independent second run of the two-year sandwich scheme starting in September 1987. Only 4 students received grants, making them able to take up offers of a place. According to Clay, the absence of the consortium access to LEA advisers which underpinned the original project exacerbated the problems of finding places. Although the college had been invited by NAB to bid for funds for a third run, and despite having staffed the department for the second run with a senior lecturer/course tutor, the college was not going to proceed.

The project had thus made the college more cautious about commitment to schemes over which it lacked control: the experiences of the project, at this college, had been very negative.

The head of department at Edge Hill College, Anderson, expressed similar admiration for the project model, but his experience had highlighted its nature as an "administrative minefield". The college had entered into a second run of the model, with NAB funding, like Crewe and Alsager. Anderson had been convinced of the second run's potential by the positive stance taken by LEA advisers at the 29 January 1987 planning meeting at Salford University for a second run[37]. However, time had demonstrated that they were not able to fulfil promises made to employ supply teachers in order to second craft teachers for a term. Anderson argued that they did not have the authority or budgetary control within their LEAs, or had not seen all the implications for them of re-running the scheme. He also expressed consternation at the advisers' apparent inability to plan ahead sufficiently, claiming not to understand why this was so. Its upshot was the extreme difficulty for his staff in tracking suitable supply placements for his second run retrainee teachers.

Anderson had therefore decided not to proceed further with this model, despite claiming that the amount of effort in setting it up at Edge Hill would have justified a number of further intakes: he argued that it would have run for at least ten years in the south of England where CDT teacher shortages were acute.

Brown, the head of department at De La Salle College, was not as

critical of the LEAs in their collaborative performance. However, he had not attempted a second run of the project - because the college was closing - and so arguably had not been as severely penalised as the other two colleges. He saw the best attribute of the project model as its "marriage" between LEAs, colleges, schools and teachers. He was also pleased with the results in his college of the collaborative curriculum development exercises which he, his staff and the project staff had supervised with the department's retrainee teachers. Having expected collaboration between the colleges in the project, he expressed great dissatisfaction that this had not matched his expectations. Each college had operated independently after a short series of early discussions relating to course commonality.

The most significant implication of this analysis is that the colleges did not feel that the project was possible to administer under their circumstances. Whereas in the first run of the project, all retrainees were placed in schools, the act of placement was extremely time-consuming for the project director and his team. Under the second run, the colleges did not have access to this level of administrative support. Nor did they have direct access to LEA advisers. This is considered again in section 11.6.3.

11.6.3 LEA and College Perspectives

In the introduction to section three of the present study, Wallace's views were noted, in particular that where there exists a fundamental lack of consensus in educational aims, it is difficult to define what counts as improvement, or to specify

improving actions which satisfy all parties with dissimilar perspectives.

In this particular project, the LEATG scheme changed the rules of operation, giving LEA advisers a freedom which they had not previous possessed. One aim of this was to empower them, as consumers with financial backing, to persuade higher education to respond more to client needs via market forces. Some advisers responded by ceasing to buy one-term college courses altogether (see figure 16).

A second change centred on the gradual realisation in the early phase of the project that there was no quantitative shortage of CDT teachers in the region: advisers decreasingly supported the second run because of the moral difficulties enshrined in recruiting local, and probably immobile, mature students to retrain for CDT posts which did not exist in the region.

A third difficulty centred on the financial changes jointly brought about by LEATG and economic cutbacks. Where elected members or officers sought to make reductions, cutting a perceived non-essential non-local activity, was tempting. This cut was effected in Cheshire and Salford, and aimed at in at least one LEA - Bolton (see section 11.6.1).

These factors help to explain the apparent lack of forward planning by advisers. Their extreme workload, and the complex requirements of schools (see chapter 12) also serve to explain this phenomenon. A fourth factor, on the other hand, helps to explain the later negative attitudes of advisers towards the

colleges. The project had originally been conceived as an LEA initiative to create supply teacher cover. As explained in chapter 10, the focus shifted towards the colleges and their one-year retraining programmes as the only perceived way of financially supporting the teachers through their studies. When the project team took up post, and began to develop CDT support teaching materials rapidly and without the help of consultative committee advisers - who were asked for such help formally at the early committee meetings by the writer[38] - some advisers felt distanced from events. Finally, when two colleges obtained NAB funding for a second run and, in the eyes of advisers, proceeded to develop this independently, advisers felt even more isolated from the scheme.

These difficulties accompanied a marked rift between the colleges and the LEAs, although this was considerably more perceptible in the colleges. The writer's conclusions about this are reported in section 11.7.

11.7 CONCLUSIONS

This chapter has attempted to illuminate some of the effects of collaboration in pursuit of project goals. In a profound sense, it is clear, partly from this account and partly from the account of the teacher recruitment and deployment given in chapter 12, that collaborative activity contributed to project goal achievement. It is also clear that project goals could not have been achieved without collaboration. Yet collaboration, as evidenced in this account, has certain costs.

Firstly, chapters ten and eleven have highlighted the importance

of the role of product champions in the tenacious pursuit of innovation. Without the idiosyncratic expenditure of energy, and the bold, or audacious, refusal to accept conventional bureaucratic reasons for respecting the status quo, the project would not have been initiated.

Secondly, and as was noted in section 3.5.1 of the present study, innovations are not so much pure disseminations of new practice as a flow of "related disruptions of complex systems, resulting in a new figuration"[39]. Schon's solution to this problem was for innovations to be introduced by setting in motion and guiding "a chain of related processes of social learning in which sequences of deliberate entrepreneurial intervention interact with unanticipated and inadvertent processes, all more adequately treated under the metaphor of battle than communication."[40] He proposed that organisations wishing to innovate should become self-transforming learning systems which could respond rapidly to change. This project was not charged to bring about long-term change in participating organisations. During its life cycle, it promoted innovation and adaptation of a collaborative nature largely because of the raised level of energy it brought to the participating system. When the energy reduced its flow, as when the second run was set up without a project team with time and resources to co-ordinate, severe problems were encountered which effectively blocked innovation. Dynamic conservatism was not surmountable where previously, at great effort, it had been. Essentially, participants in the first and particularly the second run did not have the power to bring about lasting change in the organisations concerned - they were not able to turn them, in this context, into Schon's "learning systems". Arguably, a much more

senior level of committee participant than LEA adviser or college head of department would have been required to engineer such far-reaching change.

Alternatively, the organisations, which from this perspective stood in the way of the collaborative achievement of project goals could have been circumvented altogether. Roche, in a lecture to the Royal Society of Arts on the regeneration of inner cities proposed a centralised intervention model. Reiterating a previously expressed statement, he said:

"Posterity may well condemn us for letting our cities rot and citizens suffer. Not for lack of resources but for lack of a vision which will cut through the incompetence, red tape and inertia that is throttling us. The building of cities is one of the highest ideals a civilized society can aspire to; let us grasp the opportunities now open to us to improve the lot of our fellow citizens, with vision, audacity and sensitivity".[41]

He proposed the establishment of a National Urban Renewal Agency, with three functions:

(1) to act as a focus for a major national initiative;

(2) to invest money, and attract money from private investment;

(3) to co-ordinate the participation of local groups, transforming aspirations into positive action.

He defined the primary role of such an agency as:

"to act as a unified source of funding for inner city areas, able to ensure continuity of investment over a number of years. In addition, it would be staffed to provide technical and liaison expertise for the formation of local partnerships and

consortia."[42]

The writer's experience as participant observer in this collaborative endeavour, together with the views expressed in the interviews, would suggest the following tentative reactions to a translation of Roche's idea to this kind of project:

(1) collaboration is possible by persuasion but extremely difficult to engineer between complex and differently oriented organisations;

(2) the experience of Manpower Services Commission categorically funded projects in promoting curriculum change suggests that where central funds are shrewdly targeted, results can be efficiently achieved;

(3) and that collaboration in this project, or future manifestations of it, would be far easier to achieve and maintain if control, through the allocation of funds on a contractual basis, were to be exercised by a central agency; this would require the full cost or a substantial proportion of full cost, of the overall project to be administered by a co-ordinating body.

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APPENDIX 1

AGENDAS OF THE PROJECT'S CONSULTATIVE COMMITTEE MEETINGS

22.5.86

1. Introduction to Members.
2. Origins of the Project.
3. The Role of the Consultative Committee and Steering Committee.
4. Practical Help from the Committees - Discussion.
5. Appointments of Teacher Advisers.
6. Common Core Course Principles.
7. The Project and LEAs Beyond the Consortium.
8. Press Release.
9. Induction Conference.
10. Future Meetings.
11. Any Other Business

9.6.86

1. Introduction to Members.
2. Future Tasks for the Steering Committee.
3. Curriculum Planning for Support Teacher Training:

    3.1 Principles;
    3.2 Commonality, Diversity and the Three Colleges;
    3.3 Packages;
    3.4 Allocation of Development Tasks.

4. Dates of Future Meetings.
5. AOB.

30.6.86

1. Chairing the Meeting.

2. Apologies for Absence.

3. Notes of the Last Meeting.

4. Matters Arising.

5. Curriculum in the 3 Colleges:

   5.1 Agreed ground rules;
   5.2 Analysis of existing courses;
   5.3 Agreed framework for detailed development;
   5.4 Foundation course;
   5.5 Crewe & Alsager;
   5.6 De La Salle;
   5.7 Edge Hill.

6. DES Short course. 21-16 April 1987.

7. Contributions from Steering Committee Members:

   7.1 'Packages' (Curriculum Development);
   7.2 Making presentations in the colleges;
   7.3 Visiting support teachers in school;
   7.4 Conference - displays and seminars.

8. Any Other Business.

24.7.86

1. Apologies for Absence.

2. Notes of the Last Meeting.

3. Matters Arising.

4. Conference: (a) Programme
   (b) Displays of work

5. Curriculum Development: School Based Projects.

6. Age Limits on Entry to Retraining.

9.9.86

1. Apologies for Absence.
2. Minutes of the Last Meeting.
3. Matters Arising.
4. Year Two Funding.
5. Project Staffing.
6. Steering Committee - Progress Report.
7. Recruitment - Progress Report.
8. Term Two - Identifying schools for support teacher supply cover.
9. Any Other Business.
10. Date of Next Meeting.

3.10.86

1. Apologies.
2. Minutes of the last Steering Committee and Consultative Committee Meetings.
3. Matters Arising.
4. Progress Report - Paper to be tabled at meeting.
5. Future Developments.
6. Any Other Business.
7. Date of Next Meeting.

6.2.87

1. Apologies.
2. Minutes of the Last Meeting (copy enclosed).
3. Matters Arising.
4. Progress Report (to follow).
5. External Evaluator's Preliminary Report (copy enclosed).
6. Future Developments.
7. Any Other Business.
8. Date of Next Meeting.

8.5.87

1. Apologies for Absence.
2. New Members.
3. Minutes of the 29.1.87 and 6.2.87 meetings.
4. Matters Arising.
5. Progress Report (P Toft).
6. Future Developments (A Rogers).
7. Curriculum Development: Dissemination (P Toft).
8. School Based Curriculum Development: A New Approach (F Brown).
9. Teaching Placements: Autumn Term 1987 (P Toft).
10. Future Retraining Courses: Progress Report (I Anderson, J Clay).
11. Funding for Retrainees - 1987-39 (a) P Toft
    (b) I Anderson
12. Recruitment Video (I Anderson).
13. Any Other Business.
14. Date of Next Meeting.

9.10.87

1. Apologies for Absence.
2. Minutes of the 8.5.87 Meeting.
3. Matters Arising.
4. Progress Report (P Toft).
5. Evaluator's Report - Phase 2.
6. 1988-89 Funding: Current Position.
7. Timescale for Current Retrainees to Apply for Jobs (T Holland).
8. The EOC's Approach to DES Grants Issue (S Douglas).
9. Recruitment Position for 'Second-Run' Retraining (N McNicol).
10. Placing Retrainees in Schools: Spring and Summer Terms (R Robinson)
11. Communications between Colleges and Recruits (N McNicol).
12. November Conference (P Toft).
13. Any Other Business.
14. Date of Next Meeting: Friday 26th February.

26.2.88

1. Apologies for Absence.
2. Minutes of the 9.10.87 Meeting.
3. Matters Arising.
4. Progress Report (P Toft).
5. Dissemination of Project Findings.
6. Supporting Current Retrainees' Applications for Jobs.
7. Evaluation.
8. 'Second Run' Schemes: Crewe & Alsager and Edge Hill.
9. Any Other Business.
10. Date of Final Meeting: Monday, 4th July 1988.

APPENDIX 2

NORTH WEST

APPROACHES TO REDUCING TEACHER SUPPLY PROBLEMS:

The CDT support through change project Preliminary Report

Peter Toft

April 1987

TRIST

TVEI-RELATED IN-SERVICE TRAINING FOR TEACHERS

ACTION FOR JOBS

City of Manchester

APPENDIX 3

Education Department
Crown Square
Manchester M60 3BB
Telephone 061-228 2191

G Hainsworth MA
Chief Education Officer

Your reference
Our reference I/AER/MLB
Date 13 November 1986

If telephoning or calling please
ask for Mr Rogers
extension Direct Line:
061 234 7212

MR P TOFT - FOR INFORMATION

Mr N Dennis
Deputy Director of Education
Education Offices
Athenaeum House
Market Street
BURY

Dear Mr Dennis

Further to a visit from Peter Toft to your offices to explain the detail of the functioning of the CDT Support Through Change Scheme, I understand you wish that certain elements of the Scheme should be clarified by correspondence with the City of Manchester Education Authority. In particular I believe you wish to be convinced of the way in which the Scheme is funded. Essentially the City of Manchester have made a bid to GRIST funding to cover all costs of the Project Team's salaries travelling course development and teaching materials for the duration of the two year course. However, LEAs involved in the Scheme will have to meet the costs of supply salaries at the time of which the students operate within schools in your LEA. Also there will be costs for secondment of your teachers for one term updating courses and any relevant course fees and travelling expenses that relate to that secondment. It is not our intention to ask LEAs to meet any other bill within the Scheme. We did understand in the early meetings that we have with LEAs about the Scheme that colleagues were only able to consider partnership in the scheme if it did not cost them anything.

However, I must remind you that it is often being said that the reason that CDT teachers could not attend inservice courses was because LEAs had no supply cover who could offer specialist support in CDT. It should therefore be possible to if LEAs did have access to specialist CDT supply cover that they could then allow their CDT teachers to go on professional re-training courses. Therefore this particular scheme provides support that LEAs were asking for to enable them to respond to new initiatives in re-training. I may also add that the DES have agreed to extend all 385 courses for CDT teachers up to and including 1988 particularly for the duration of our scheme in our region, thus we have cleared all obstacles to allowing LEAs to provide proper professional support for teachers who are going through a very demanding time in terms of the range of changes that they are asked to consider.

I hope that this letter will support the information that has been given to you by the Director of the Scheme - Peter Toft, and the information of this letter is to the best of our knowledge, true and accurate. However it must be realised that the Scheme is unique in terms of its modes of operation and is therefore a pioneering effort, and while we have taken every opportunity to anticipate problems and try to cater for costings of

every kind throughout the Scheme, there is always a possibility of a mis-calculation which may cause us some difficulty and the need to re-think and re-adjust. You will of course realise that this particular project is not simply about meeting the needs of LEAs who have a shortage of CDT teachers, it is particularly focussed on the ability that we can demonstrate to operate a cooperative, consortium system. In that respect there is more interest at all levels in the success of this ~~of this~~ Scheme in terms of cooperation than perhaps there is in the ability of the Scheme to meet CDT shortage.

Manchester is hosting this particular programme because we have no shortage of CDT teachers, and in effect we have been able to maintain a surplus of teachers who we have been able to use creatively to provide a whole range of cover for developments within the city. The provision of four of our most senior CDT teachers to this programme as teacher advisors has in no way weakened the resources that we have to offer to children. Therefore, one of the special aspects of the Scheme that make it possible in the present climate is based around the fact that Manchester is in a unique position to help other LEAs to solve their problems regarding recruitment. Given that we are making a special effort to meet a rational shortage of CDT teachers within the Scheme, we have tried to make it clear to the DES that any bid that is made for GRIST funding to support the Scheme should not be deducted from a general bid that the Authority will be making with regard to other developments that it has in mind.

I do appreciate that this proposal is extraordinary with respect to its mode of operation, but since it has to work within the conventions that normally apply in operating LEAs, Colleges of Higher Education and a University. It has to be based on modes of operation that do not normally apply in any institution that is involved.

I hope that this explains the background to the project. Clearly many teachers are ~~not~~ committed to the two year project. We have come a long way to achieve full recruitment to the Scheme. It is particularly significant that a high percentage of those who applied were women, and it is also significant that more than two hundred people applied to make enquiries about the Scheme. It would therefore mean there is still a pool of people still available who may be attracted to future projects.

We look to your support in this matter.

Yours sincerely

A E ROGERS
DISTRICT INSPECTOR, CRAFT DESIGN AND TECHNOLOGY

UNIVERSITY OF SALFORD

Salford M5 4WT, England/Telephone: 061 736 5843/Telex: 668680 (Sulib)

Craft Design and Technology: Support through change Project : Peter Toft, Director

PNT/LM

25 June 1987

Mr N J Fitton, BA, FBIM, FRSA
Director of Education
Education Department
County Hall
CHESTER CH1 1SQ

Dear Mr Fitton

Cheshire's Participation in the North West CDT Support Through Change Project

I am writing to draw your attention to a problem which has recently been posed by Cheshire's participation in this regional project and to ask for your advice on how it might be resolved.

Cheshire was one of the LEAs which came together in 1986 to establish this project, which received TRIST funding in its first year. The Chairman of your Education Committee was very interested to hear of the project's progress when he visited our display at the C.V.C.P. 'Higher Education Working For Schools' Conference at the Royal Institution on 24th November 1986. The project aims to provide secondary shools with specialist Craft, Design and Technology supply cover in order to release CDT teachers for one-term updating courses. 36 teachers were recruited to join the two-year scheme in September 1986. They were attached to one of three Colleges of Higher Education (including Crewe & Alsager) to engage in a one-year retraining course. Interspersed between the three terms of this course are three terms of the supply cover mentioned above. Seven of the teachers are in receipt of discretionary grants from Cheshire.

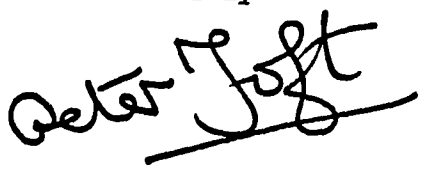
In September 1987 the teachers should embark on their second term of supply cover in schools. However, Cheshire has not been able to offer supply work to its quota of teachers for this term. Three other LEAs - Stockport, Tameside and Trafford - have taken on four of the teachers who might have worked in Cheshire and the teachers have accepted this despite having to endure fairly long daily journeys to work. However, two of the teachers who cannot travel far beyond south Cheshire are still without placements next term. Apart from losing a term's income - which will worsen the already dire financial circumstances referred to on the last page of the attached report - they may now not meet the course requirements of engaging in three terms of CDT supply teaching in order to receive the college CDT

/.....

certificate. As you will appreciate, this will place them in a difficult position, given that they have already committed a year to this retraining programme.

Could I therefore please ask you to consider the situation, and to advise me on ways in which it might be resolved?

Yours sincerely



PETER TOFT

cc Mr O Bailey - CDT Adviser for Cheshire, and member of the CDT Support Through Change Consultative Committee.

Professor G Carter - Dean of Faculty of Engineering, University of Salford, and Chairman of the CDT Support Through Change Consultative Committee.

Mr J Clay - Head of Art & Design, Crewe & Alsager College, and member of the CDT Support Through Change Consultative Committee.

Mr A Rogers - District Inspector, Manchester Education Department, and Project Officer of the CDT Support Through Change project.

Mr M Steels, HMI - Observer, CDT Support Through Change Consultative Committee.

APPENDIX 5

City of Salford
Education Department

Chief Education Officer
B. Grody, B.Sc.

Education Office, Chapel Street,
Salford, M3 5LT.
Tel. 061-832 9751 Telex 669806

My ref: SADV/AH/JR (please quote in any reply)
Your ref: PT/70/LM
Date: 28th October 1987

Subject: CDT Support through Change

Mr. P. Toft
Director CDT Support through Change Project
University of Salford
SALFORD
M5 4WT.

Dear Mr. Toft,

Thank you for your letter of October 19th in which you ask for confirmation that this LEA will be continuing to participate in the project 1st April to 31st August 1988. After discussion with my colleague Mr. Collinson, I informed Trevor Smalley that we would not be continuing with our involvement in the project.

I understand that at the outset there was a clear indication given that our involvement could only take place providing there was no financial commitment from the Authority required.

As an Authority we have made only limited use of the scheme and feel that there are other activities which must receive higher priority. I am sorry that we are therefore unable to provide the sum of £2,866.05 for the final term of the project.

Yours sincerely,

Anne Hillerton.

for the Chief Education Officer

When calling or telephoning please ask for
Miss A. Hillerton
Ext.313.....

All replies to be addressed to the Chief Education Officer

CHAPTER 12: THE SUPPLY TEACHERS IN THE PROJECT

12.1 SUMMARY

This chapter focuses on part of aim 2 of the project, namely to: "recruit qualified teachers from non-CDT backgrounds and retrain and employ them as specialist supply teachers to cover one term secondments of craft teachers to college courses designed to equip them to teach modern CDT" (see page 287).

The recruitment of the teachers within a limited timescale using a purpose designed strategy is examined. Barriers to entering the project - mainly financial - are considered as a means of explaining the high pre-course drop out of teachers.

The characteristics of the 36 teachers who started retraining with the project are then examined from the perspectives of: their own self-presentation during recruitment, the perceptions of the writer and his teacher adviser colleagues, the perceptions of the college heads of CDT department, and also the perceptions of the headteachers in whose schools the teachers taught during term 2 of the project.

Finally, the financial condition under which the recruits operated whilst at college and in schools is subjected to a critical analysis.

Although the teachers' post-project characteristics are evaluated, the chapter does not focus on the college retraining aspect of the project as this was part of the normal, and long standing, practices in the colleges, and to carry out such a sensitive

evaluation within this kind of collaborative project would have generated hostility within defensive college staff, keen to keep their internal problems out of the public eye of the consortium. Also, aspects of the employment of teachers in schools were covered under the collaboration theme in chapter 11. Only passing reference is made here, except that the perceptions of headteachers are evaluated.

It is concluded that the aim of recruiting teachers was partially achieved; the project failed, however, to bring about the major system adaptation necessary to have provided levels of financial support which would have reduced or even eliminated pre-course and mid-course drop out, both of which were very high. It is further concluded that the project was able to create the conditions in which non-CDT teachers could deliver effective CDT courses in schools, both within the project and, potentially, as fully qualified CDT teachers on leaving the project. However, the employment prospects for newly qualified CDT teachers in the region, at the end of the project, were not good and less than half of the retrainees had achieved full time permanent secondary CDT posts by the end of July 1988.

12.2 RECRUITMENT TIMESCALE

Each of the three colleges had long running one-year teacher retraining courses in CDT. Recruitment patterns varied from college to college, but students were generally allocated places much earlier than this project was able to do. Whereas the project officially started on 1 June 1986, two months later than originally planned (see chapter 10), it was customary at Edge Hill College, for example, for courses starting in September to be

fully subscribed by the end of February in the same year[1]. Although the other two colleges recruited later than this, they generally operated well in advance of the project timescale.

From an LEA viewpoint, when teachers were to be seconded for a year's full-time study, arrangements often needed to be finalised well before 1 June; this was usually essential to enable headteachers to appoint suitable temporary replacements in good time to prepare for the new academic year. Although Manchester was able to release six of its teachers to be retrained within the project, during the project's recruitment phase, no other LEAs were able to do this. For example, in Bury, secondments had already been finalised for the forthcoming year before the project had even started[2].

Accordingly, the writer had to design a recruitment strategy which would bring results very rapidly: to save time, recruitment was carried out centrally from the communications base at Salford University, rather than from the three colleges separately.

12.3 THE RECRUITMENT STRATEGY

The design of the recruitment strategy rested on two assumptions which were inherent in the project proposal[3]:

(a) firstly, that a pool of supply teachers, and of qualified teachers currently not teaching, existed in the region, from which individuals could be recruited to retrain within the project;

(b) secondly, that large elements of CDT could be effectively taught by able non-specialist teachers if they had access to well-conceived packages of teaching support materials;

furthermore, such people could eventually be retrained to teach mainstream CDT, if they combined exposure to and development of such packages, with a standard college retraining course.

Therefore, it was decided not to require candidates to be able to demonstrate CDT capability on entry to the scheme; the criteria used for their selection are outlined below.

Between 36 and 45 teachers were sought, to be distributed evenly amongst the three colleges. Originally it was inferred from the project proposal that the supply teacher lists, kept as a matter of course by staffing sections of the LEAs, would reveal many potential recruits. As the project commenced, the writer began to receive informal signals from LEA advisers that their supply lists had been denuded by other schemes, notably TVEI, in which many teachers were being released from the classroom for development work.

Because of this shortage, the writer decided to recruit from beyond the six original consortium LEAs (Bolton, Bury, Cheshire, Manchester, Salford and Stockport). This change was considered by the steering committee meeting of 24 July 1986. The minutes[4] noted:

"It was agreed that recruitment should take place from whatever source it is necessary in order to fill the course". *

Lack of time, the difficulties inherent in gaining rapid access to busy LEA advisers, and a shortage of local recruits, therefore

* my emphasis

gave rise to a change in direction (in this case, filling college courses became a temporary priority), which further supports the view discussed in the final chapter that innovation is based on transaction and that the social system in which the transaction occurs will necessarily cause the innovation to change.

Publicity was relatively extensive, costing £4000: this was considerably more than was available to colleges in their annual recruitment budgets. A publicity consultant was appointed to lodge press advertisements in north west local newspapers, and nationally in the Guardian. A copy of the advertisement and a list of those newspapers used is shown in appendix 1. Additionally, a mail shot was run, based on an extensive list of CDT contacts furnished by the head of CDT at Edge Hill College, and advisers in the consortium were asked to publicise the scheme in their internal LEA staff bulletins. A press release prepared by the writer and shown in appendix 2 led to a number of articles in the national press: the first enquiry received by the writer (17 June 1986) was in response to such an article in 'The Times' on the same day (appendix 3).

This publicity, together with information leaflets designed by the project team (appendix 4), intensive telephone counselling from the project communications base, and internal negotiations between the Manchester CDT inspector and his LEA staffing colleagues, led up to the recruitment phase. Interested teachers had been invited to contact the writer, whose secretary then forwarded information leaflets and an application form for the particular college at which the teacher had expressed an interest to retrain. The completed forms, and confidential references, were scrutinised by

the project team and the majority of candidates were interviewed at the University of Salford, with some Cheshire-based candidates being interviewed at Crewe and Alsager College. The criteria used to judge candidates had been derived from the assumptions embedded in the project proposal[5], namely that able and keen teachers of subjects other than CDT, or phases other than secondary, could be converted into effective secondary phase CDT teachers, given adequately supportive 'teaching packages' (see above). The criteria were: (1) level of effectiveness demonstrated in previous teaching; (2) and commitment to retrain for a new career direction within CDT.

12.4 THE RECRUITS

12.4.1 Early Casualties

Given the rapidity of development, and the uncertainty underlying this radical project, there was never a single point before the start of college courses in late September 1986 at which the writer, as director, felt that a full complement of teachers had come forward and that recruitment was therefore closed. Recruitment continued right through the summer vacation, and the communications base was manned during each working day by at least one member of the team. Consequently, 54 teachers accepted an offer of a place, subject to securing financial support, but before the retraining courses started, 18 of these had withdrawn. Figures 1 and 2 show a breakdown of details relating to these candidates. Evidence was derived by the writer from their application forms and his records of their interviews. It can be seen that four were offered alternative posts which were clearly perceived to be more attractive than the retraining programme; two withdrew for 'personal reasons',

Figure 1: WRITER'S SUMMARY OF THE CHARACTERISTICS OF THE RECRUITED TEACHERS WHO WITHDREW FROM THE PROJECT BEFORE RETRAINING BEGAN (CONTINUATION OVERLEAF).....

Name	Age	M/F	Qualifications	Subject	Occupation Last 3 Years	No. Years Full-Time Teaching	Most Senior Position	Reason for Withdrawal	Grant / Secondment
Mrs DA	34	F	Cert.Ed; BA	Home Economics	Housewife and Supply Teaching	3	Scale 1	Insufficient Grant (Bolton)	G
Mr MB	51	M	Cert.Ed.	Social Studies	Self-Employed	15	Youth/Community Officer	Accepted on Degree Course	G
Mr LB	30	M	Cert.Ed; BA	Environmental Science	Museum Curator	0	Senior Museum Assistant	Grant Refused (Bury)	G
Mrs MB	35	F	Cert.Ed.	Home Economics	Supply Teacher	7	Scale 2	Grant Refused (Wigan)	G
Mrs AD	33	F	Cert.Ed Primary	English	Housewife and Supply Teaching	4	Scale 1	2 years - too long	G
Mr MD	30	M	B.Ed.	Sociology	Adult Tutor and Supply Teacher (Sweden)	6	Adult Tutor (in Sweden)	Grant Refused - not resident in UK for past 3 years (Cheshire)	G
Mr JF	35	M	B.Ed.	Art & Design/ Geography	Geography Teacher	5	Scale 1	Secondment blocked by headteacher (Manchester): too late	S
Mrs BF	42	F	Cert.Ed; BA	English, Social Sciences	Vocational Tutor: MSC Training Workshop	1	Scale 1	Needed a wage to support family	G
Miss PG	23	F	B.Ed.	English	Temporary Probationary Teacher	1	Scale 1	Was offered teaching post	G
Miss VI	25	F	BA, MA, PGCE	Politics	Community Education Tutor	1	Lecturer 1 (Temp)	Insufficient grant (Manchester)	G

Continued from overleaf:

Name	Age	M/F	Qualifications	Subject	Occupation Last 3 Years	No. Years Full-Time Teaching	Most Senior Position	Reason for Withdrawal	Grant / Second-ment
Mr DJ	37	M	BSc; M.Phil PGCE	Social Science/ History	National Health Service	7	Lecturer 1	Insufficient grant (Cheshire)	G
Mr MJ	27	M	BA, PGCE	Geography/ History	Teacher, Secondary Remedial	5	Scale 2	Personal Circumstances	S
Miss SK	34	F	Cert.Ed.	Art & Craft	Teacher: Spanish Prep. School	13	Assistant Teacher	Grant: not resident in UK for past 3 years (Lancs)	G
Mr ML	32	M	BA, PGCE	Economics/ History	Teacher/ Supply Teacher	5	Scale 1	Insufficient grant and supply income	G
Mr BMc	30	M	Cert.Ed.	Geography/ History	Supply teacher	-	Supply	Reason not given	G
Mrs JM	39	F	BA; Cert.Ed.	Psychology (Primary)	Research Officer	4	Scale 1	Offered another post	G
Mr PR	?	M	?	History	Teacher	?	Head of Dept.	Offered another post	S
Miss GS	27	F	B.Ed.	English	Supply Teaching	-	Supply Teacher	Personal Circumstances	G

Figure 2: BREAKDOWN OF REASONS FOR REJECTION OF OFFER

Insufficient Financial Aid	10
Alternative Job Found	4
Personal Circumstances	2
Course Too Long	1
No Reason Given	1
	18

Insufficient Financial Aid = 56%

one because the two year duration was too long and one without advancing a reason. 56% of the sample of 18, however, withdrew because the level of financial support was not considered to be sufficient; in one case, a secondment was denied; in four other cases, grants were denied; and in five cases, the grant offered was insufficient.

Given the novelty of this project, the haste with which it was established, the multiplicity of extraneous but unrevealed influences on these individuals, and the very small sample size, it is not possible to draw generalisable conclusions. From the singular perspective of this project, however, it is clear that the financial support packages on offer were insufficiently weighty enough to induce a significant number of able candidates to accept the places offered.

12.4.2 The Recruits Who Embarked On Retraining

36 of the 54 candidates who were offered places reported to their colleges in September 1986. Details of their age, qualifications, background training, occupation in the three years prior to the project, reasons for entering the project, and their career destinations at the end of the project, are summarised in Figure 3 (female retrainees) and Figure 4 (male retrainees). Information for Figures 3 and 4 was derived by the writer from: (1) his scrutiny of the candidates' application forms; (2) his records of the candidates' interviews; (3) his records of the passage of these teachers through the project; and (4) where necessary, by corroborative discussions with the teachers themselves, their teacher advisers, and the college heads of department.

Figure 3: DETAILS OF THE FEMALE TEACHERS WHO ENTERED THE PROJECT (Continued overleaf)

Code No.	Age	Qualifications	TRAINING Main Subject Phase	Occupation Last 3 Years	Reasons for Entering Project	Completed Retraining	Reasons for Leaving Early	Position at end of project	College Course Grade
1	33	Cert.Ed	PE Secondary	Housewife/Supply Teacher: Secondary	Return to career after child rearing	Yes	-	Temporary Primary post: MPG	Distinction
2	49	Cert.Ed	Art Secondary	Technician and Adult Tutor	Sought permanent teaching career after other work	Yes	-	Temporary Secondary CDT Post: MPG	Pass
3	28	BA, ATD	Art Secondary	Teacher: Secondary	Career Advancement	Yes	-	Going abroad as missionary	Pass
4	37	Cert.Ed	Art Primary	Housewife/Supply teacher: Secondary	Return to career after child rearing	Yes	-	MPG CDT Post: Independent Secondary	Credit
5	41	Cert.Ed	Art Primary	Housewife	Return to career after child rearing	Yes	-	MPG CDT Post: Secondary	Credit
6	39	Cert.Ed	Biology Primary	Housewife/ Research Asst.	Return to career after child rearing	Yes	-	Temporary part-time Science post: MPG	Pass
7	34	Cert.Ed	Sociology Primary	Ship Cruise officer	Sought permanent teaching career after industrial work	No	Financial Reasons	Not known	-
8	32	BA, Cert.Ed	History Secondary	Housewife/child minder/Supply Teacher: Secondary	Sought permanent career after supply teaching	Yes	Left after 5 terms due to illness	Not seeking a post due to illness	Pass
9	36	BA, Cert.Ed	English Primary	Teacher:special	Sought permanent teaching career	No	Financial Reasons	Not known	-

Continued from overleaf:

Code No.	Age	Qualifications	TRAINING Main Subject Phase	Occupation Last 3 Years	Reasons for Entering Project	Completed Retraining	Reasons for Leaving Early	Position at end of project	College Course Grade
10	40	Cert.Ed	Art Secondary	Teacher: independent	Career advancement	Yes	Left after 5 terms for permanent post	MPG CDT post: Secondary	Dist.
11	39	Cert.Ed	English Secondary	Adult Instructor/Social work	Sought permanent teaching career after other work	No	Left during first teaching to take up non teaching post	Non-teaching post	-
12	43	NDD/Cert.Ed	Art Secondary	Housewife	Return to teaching after child rearing	Yes	-	Not seeking a post: reasons unclear	Pass
13	50	BA, Cert.Ed	Theology Primary	Supply Teacher: Secondary	Sought permanent teaching after supply teaching	No	Left before 1st teaching: lack of confidence in CDT	Not known	-
14	29	Cert.Ed	Drama Secondary	Clerical officer	Sought permanent teaching after industrial work	Yes	-	Not seeking a post due to maternity	Pass
15	37	Cert.Ed	English Primary	Housewife/Working for husband (part-time)	Return to career after child rearing	Yes	-	MPG Primary post (with CDT)	Pass

Figure 4: DETAILS OF THE MALE TEACHERS WHO ENTERED THE PROJECT
(Continued overleaf)

Code No.	Age	Qualifications	TRAINING Main Subject Phase	Occupation Last 3 Years	Reasons for Entering Project	Completed Retraining	Reasons for Leaving Early	Position at end of project	College Course Grade
16	42	BSc/Cert.Ed	History Secondary	Supply Teacher: Secondary	Sought permanent career after teaching abroad	Yes	-	Temporary MPG CDT Post: Secondary	Pass
17	32	Cert.Ed	Art Primary	Supply Teacher: Secondary	Sought permanent career	Yes	-	MPG CDT Post: Secondary	Dist.
18	29	Cert.Ed	Geography Secondary	Supply Teacher: Secondary/Clerk	Sought permanent career	Yes	-	MPG CDT Secondary post. N. Ireland	Pass
19	26	BA, PGCE	Architecture Primary	Teacher:Primary	Career advancement	Yes	-	MPG CDT Post: Secondary	Dist.
20	39	Cert.Ed. Dip.Adult Ed.	Science Secondary	Adult Tutor (Part time)	Sought permanent career	Yes	-	MPG CDT Post: Secondary	Pass
21	32	Cert.Ed	Art Secondary	Teacher:Special School	Career advancement	Yes	-	MPG Art/CDT Post: Primary	Dist.
22	30	Cert.Ed	PE Secondary	Teacher (HOD) Secondary	Career advancement	Yes	-	MPG CDT Post: Secondary	Pass
23	40	Cert.Ed	General Primary	Teacher:Primary	Career advancement	Yes	-	MPG CDT Post: Secondary	Pass
24	36	BA, Cert.Ed	Science Secondary	Residential Care Worker	Return to teaching career	No	Left midway - uneasy with teaching	Not known	-
25	39	Dip.AD, PGCE	Art Secondary	Supply Teacher/ Driver	Return to teaching career	No	Left midway - uneasy with teaching	Not known	-
26	46	B.Ed, Cert.Ed	History Secondary	Photographer	Return to teaching career	Yes	-	Not known	Pass
27	46	Cert.Ed	Science Secondary	Supply Teacher: Secondary/ Engineer	Return to teaching career	Yes	Left after term 5 to take temp. CDT post in home LEA	Temporary CDT Post: MPG	Pass

Code No.	Age	Qualifications	TRAINING Main Subject Phase	Occupation Last 3 Years	Reasons for Entering Project	Completed Retraining	Reasons for Leaving Early	Position at end of project	College Course Grade
28	34	Cert.Ed/Dip.Ed (Spec. Needs)	English Secondary	Teacher: Special Needs	Career advancement	Yes	-	Return to original post	Pass
29	43	B.Ed, MA	Drama/ Business Secondary	Supply Teacher: Secondary/ Taxi Driver	Return to teaching career	No	Left midway - uneasy with teaching	Not known	-
30	43	Cert.Ed	Science Secondary	Community Programme	Return to teaching career	No	Left after term 2 to take up temp. post	Retraining on similar programme at college	-
31	33	Cert.Ed	History Primary	Supply Teacher: Secondary	Sought permanent teaching career	Yes	-	Seeking a post	Pass
32	35	Cert.Ed	History Secondary	Supply Teacher: Secondary/Clerk	Return to teaching career	Yes	-	MPG CDT Post: Secondary	Pass
33	40	Cert.Ed	Social Studies	MSC Development worker	Return to teaching career	No	Left midway through project for financial reasons	Not known	-
34	43	Cert.Ed	English Secondary	Supply teacher: Secondary	Sought permanent teaching career	Yes	-	Temporary CDT Post: MPG	Pass
35	25	B.Ed, Cert.Ed	Art Secondary	Teacher:Secondary/Museum Officer	Career advancement	Yes	-	MPG CDT Post: Secondary	Dist.
36	30	Cert.Ed	Environmental Studies Secondary	Environmental Health: UK and abroad	Sought permanent teaching career	No	Withdrew in term 1: could not come to terms with CDT	Not known	-

Continued from overleaf:

For the reasons advanced at the end of section 12.4.1., this information can have very little predictive validity for other potential projects. For the purposes of the analysis of this project, however, a number of important comments can be made about the retrainees.

The age structure of the group, shown in Figure 5, is varied with a predominance in the 36-40 age range. This may reflect a mid-career decision on the part of a large number of retrainees (11 = 31%), although 7 (19%) entered below the age of thirty, either to seek career advancement, or to find a post having been unsuccessful in their first choice field. Length of teaching experience varied considerably (Figure 6) between 0 and 20 years, with a sizeable majority (28 = 77%) having 10 or fewer years experience. Similarly (see Figure 8), only 8 (22%) had taught in a promoted post above the basic scale 1 level; the two most senior people had been head of department and deputy headteacher abroad and were using this project to re-establish their careers in England. Significantly, in a heavily male oriented subject like CDT, 42% of the retrainees were women (see Figure 7).

The present study is not concerned to trace and evaluate the progress of these teachers through their college retraining course, although the heads of departments' general perception of their characteristics are examined in section 12.4.3. It has been assumed by the writer, for the purpose of this thesis, that the benefits derived by the retrainees from studying in the colleges, would reflect the long experience which each college had in successfully converting non-CDT teachers into CDT

Figure 5: Age Structure of the Retrainee Group

Age	No. of Teachers
25-30	7
31-35	8
36-40	11
41-45	6
46-50	4

Figure 6: Teaching Experiences In The Retrainee Group in Years

Year Duration	No. of Teachers
0	4
1-5	12
6-10	12
11-15	6
16-20	2

Figure 7: Teaching Experience Levels of the Retrainee Group

Level	No. of Teachers
None	4
Part-time or Supply only	2
Scale 1	22
Scale 2	4
HOD	3
Deputy Head	1

Figure 8: Gender Structure of the Retrainee Group

Men	21	58%
Women	15	42%

Figure 9: Distribution of Post-Project Career Destinations of the Retrained Teachers (at 25 July 1988)

	Permanent Secondary CDT Posts	Temporary Secondary CDT Posts	Other Permanent Teaching Posts	Other Temporary Teaching Posts	Unplaced	Non-Teaching Occupations	Not known
Men	8 (38%)	3 (14%)	2 (10%)	0	1 (5%)	0	7 (33%)
Women	3 (20%)	1 (7%)	2 (13%)	2 (13%)	3 (20%)	2 (13%)	3 (20%)
TOTAL	11 (31%)	4 (11%)	4 (11%)	2 (6%)	1 (3%)	2 (14%)	10 (30%)

teachers.

By implication from project aim 2 (page 286), however, the post-project career destinations of these teachers are seen to be important for any future attempt to use this model. Given that the teachers were asked to commit themselves for two years, and that in the main their financial support was poor (see section 12.6), the writer, his team, and consultative committee members took the view that it would be very important for the retrained CDT teachers to secure secondary school CDT teaching posts. The extent to which this had happened by July 29 1988 is revealed in Figure 9. Although the destinations of 30% of the original 36 teachers was not known at the end of the project, as the teachers broke contact, the figures for achievement of permanent secondary CDT teaching posts can not be regarded as at all satisfactory: 38% of the men achieved this position, and only 20% of the women . Three men and one woman were offered temporary appointments in CDT with the option of competing for permanent status during the following term as the jobs were to be advertised nationally. Partly as a reflection of changing interests (one man decided to move into primary teaching) but largely simply in order to secure a salaried position, 6 teachers (17%) obtained non-CDT posts. Two teachers - both women - entered non-teaching posts, and 4 remain unplaced: two of these are women with medical problems and one is not seeking a post for reasons which the writer cannot determine; the remaining man is seeking a CDT post. However, a more revealing analysis of the retrainees' post-project career success cannot be offered at the time of writing; further research conducted after a set time has elapsed is necessary to take account of

possible changes to the present situation which are likely to occur as the teachers establish themselves in career slots.

Notwithstanding this, a more revealing insight can be seen by examining Figures 10 and 11, which show the distribution of post-project career destinations in relation to the teachers' reasons for entering the project. Of the seven women who sought a position after child rearing, 83% were successful, although only three of these have permanent posts, and only two are in CDT at secondary level. On the other hand, of the seven women who entered the project seeking a permanent CDT teaching career after other occupations, only 1 (14%) secured such a post, and this was only temporary. It can be argued that the women returning from child rearing were more successful in achieving their objectives than those who were returning from other occupations. The writer - having taught all of the retrainees and discussed their characteristics in detail with the teacher advisers - believes that, in this project, the women returning from child rearing were of a higher calibre and more committed to a long term career plan than those who entered from other occupations.

A similar picture emerges from the male data shown in Figure 11. Three significantly sized groups can be seen in this chart. (1) those seeking a permanent career having tried unsuccessfully in the area of their original training; (2) those seeking a return to teaching, having previously dropped out; and (3) those seeking career advancement. Of the former, 5 (71%) are judged by the writer to have succeeded. Of the 2 that appear to have failed, one is, at the time of writing, being interviewed for

Figure 10: DISTRIBUTION OF POST-PROJECT CAREER DESTINATIONS OF THE RETRAINED WOMEN IN RELATION TO THEIR REASONS FOR ENTERING THE PROJECT

Code No	Return to Teaching from Child Rearing		Permanent CDT Teaching Career after Other Occupation		Career Advancement in Teaching	
	Success	Fail	Success	Fail	Success	Fail
1	✓					
2			✓			
3						X
4	✓					
5	✓					
6	✓					
7				X		
8				X		
9				X		
10					✓	
11				X		
12		X				
13				X		
14				X		
15	✓					
	83%	17%	14%	86%	50%	50%

Figure 11: DISTRIBUTION OF POST-PROJECT CAREER DESTINATIONS OF THE RETRAINED MALES IN RELATION TO THEIR REASONS FOR ENTERING THE PROJECT

Code No	Seeking a Permanent Career Having Tried Unsuccessfully in Area of Original Training		Seeking a Return to Teaching Having Previously Dropped Out		Career Advancement	
	Success	Fail	Success	Fail	Success	Fail
16	✓					
17	✓					
18	✓					
19					✓	
20	✓					
21					✓	
22					✓	
23					✓	
24				✗		
25				✗		
26				✗		
27			✓			
28						✗
29				✗		
30				✗		
31		✗				
32			✓			
33				✗		
34	✓					
35					✓	
36		✗				
	71%	29%	25%	75%	83%	17%

posts; the other has emigrated. In the middle category a reverse situation is evident: 6 (75%) have indicated to either the writer or their college head of department that they have no immediate intentions of attempting to re-build a teaching career. The third category consists largely (5 = 83%) of Manchester LEA seconded teachers: all but one of these have secured CDT posts in the city; one has returned to his original post, having failed his college retraining certificate in the first instance, and having only just passed a re-sit examination.

It would thus seem that this project has been a successful retraining vehicle for men in the first and third categories, but for those who entered to re-establish a career, it was relatively unsuccessful. It is the writer's (and his teacher adviser colleagues') hindsight view - subjective yet professional - that five of the six men who fall into this category had personality traits which did not readily equip them for a permanent teaching career.

12.4.3 Perceptions of the Retrainees in College

During the focused interviews described in section 11.3.5, the writer asked each of the three college heads of CDT department the following questions:

" 7. Are the teachers re-trained in your department in association with the original Support Through Change Project different in any way from those teachers you have retrained through your established one year courses? How?
(a) Before retraining; (b) After retraining."

" 8. To what extent are they now competent to teach CDT at Secondary level?"

The writer discussed the responses to these questions with the three project teacher advisers, who had regular and intimate contact with the retrainees, and found that they very substantially corroborated the perceptions of the heads of department. The views are summarised below.

(a) Characteristics on Entry to the Colleges

At Edge Hill College, one year students were practicing secondary school teachers from fields relating to CDT, eg science and art, who were combining retraining for CDT with the acquisition of an advanced diploma in education. Although some of the project retrainees were academically qualified to enter the advanced diploma course, they did not have the required length of teaching experience. They also differed in the sense that they were using the project as a re-entry vehicle into teaching. Finally, they were a mixture of primary and secondary trained teachers.

At Crewe and Alsager, the main difference lay in entry skills. Most conventional retrainees came to the college with good craft skills - many had in fact trained and practiced as handicraft teachers. The project teachers on the other hand were not expected to demonstrate CDT entry skills.

At De La Salle, conventional retraining courses, although generally aimed at teachers with some demonstrable skills, had frequently coped with teachers lacking in skills. Conversely,

at least six out of the eleven project retrainees had strong backgrounds in art, craft or architecture, in contrast to the remainder who came with no demonstrable evidence of capability related to CDT. Five of the eleven teachers at the college were Manchester secondees with secure employment prospects.

Six teachers at De La Salle, two from Crewe and Alsager and one from Edge Hill (25% of the project cohort) entered the project with CDT related art skills. The majority, however, entered the scheme with few related skills; similarly, 30 teachers (83%) were grant aided rather than seconded on full salaries, and they were more impoverished than the usual retrainees at all colleges (see section 12.5).

(b) Characteristics on Leaving the Colleges

At Edge Hill, in the final display of project work, on which teachers were assessed, there were two major differences: firstly, the general standard of work was lower than the advanced diploma students, which was to have been expected given the differences in starting points between the two groups; secondly, primary school backgrounds were still evident, according to the college's head of CDT, Anderson, reflecting the way the primary teachers had thought and designed more divergently than the secondary teachers throughout the course.

At Crewe and Alsager, the project retrainees had been significantly more discerning about the perceived relevance of the college course than conventional retrainees and had wanted to influence how the course was operated. They had also been less trammelled by conventional approaches to the use of craft

materials, being prepared to engage in more adventurous thinking and designing than the conventional retrainees. They also required more flexibility because of family commitments. Academically, the final display of project work was varied. The project retrainees had not tackled a major project, as did the conventional retrainees, because the term by term sandwich nature of the course broke continuity. Clay felt that such a major project experience would have been helpful later as the teachers began to teach GCSE level projects in school. The external examiner also reflected this view in a meeting with the writer at the college on 22 March 1988: he was very critical of the discontinuous nature of the retraining element of the Support Through Change model and argued that it had evidently prevented the retrainees from achieving the depth of project work normally achieved by one year retrainee teachers.

A similar judgement was passed by Brown at De La Salle College. The final show of work revealed an engagement in numerous minor projects. For Brown, the teachers had only "dabbled" and their work was analogous to the foundation work carried out in lower secondary school projects. The discontinuity of the model prevented sustained and deep study over three terms with a consequent failure to show evidence of being able to "grapple with a project from beginning to end". Concomitantly, the teachers had a less thorough workshop capability, partly due to the discontinuous training, and partly due to an early concentration on the development of school-based teaching materials. On the other hand, this latter concentration had given the teachers a much clearer idea than conventional retrainees of how to motivate and teach school children through

CDT projects, albeit in the short term. This reflects the perceptions of headteachers discussed in section 12.4.4.

This is a particularly English view of what is required in CDT. A French approach to a similar problem, according to Heywood[6], is to retrain 7000 teachers with assorted qualifications, over a one year period. Unlike in English CDT, however, these French teachers will not have to acquire highly sophisticated manufacturing skills. These will not be required for the teaching of technology in French schools, given that there is no tradition, analogous to that in England, of craft teaching. Project work will predominate, and pupils will be required to make goods with a commercial orientation, using electronics, metals and plastics. Many of the 7000 retrainees are women.

(c) Teaching Capabilities on Leaving College

At Edge Hill, Anderson argued that: six of the eight teachers were from "good" to "outstanding"; one would have expertise, but only in a limited field; and the last would be an able supply teacher but did not have a very clear vision of the aims of CDT. All were better for the profession than traditionally trained people from industrial trades, who tended to have a rigid and linear pre-vocational approach to CDT, with little emphasis on its design and technological facets.

At Crewe and Alsager, the head of department's view was that the nine teachers who had lasted the course would become competent, especially with lower secondary pupils. However, they needed more experience to achieve the depth required for GCSE and particularly sixth form teaching. On the other hand, they were

not noticeably less capable CDT practitioners than conventional retrainees, for lower secondary teaching, and he felt that they were better teachers for having spent a great deal of course time developing and trialling school based projects.

Brown at De La Salle expressed a similar view: he argued that all could be "trusted absolutely" up to the end of secondary school third year (14+), that they would teach to this level well and would acquire the CDT skills for GCSE level teaching within "a couple of years". However, five of the eleven, he felt, were competent to teach GCSE at the end of the project. Six of these had entered with art training. All the retrainees were competent general teachers and left the college with a sound theoretical knowledge of CDT curriculum development and the ability to develop exciting project work.

The teachers thus differed from conventional retrainees to some extent on entry, by having in the main, fewer CDT skills. On exit they, again in the main, were perceived as competent lower secondary teachers who needed some time to enhance their skills. There was a general feeling that they were well equipped to develop school level CDT teaching materials and courses. The next section summarises the views of headteachers in this field.

12.4.4 The Retrainees' Experiences in School (Term 2)

Evidence on which this section is based was derived from the project director's diary, his records of planning meetings held weekly with his teacher adviser colleagues, and his focused interviews with headteachers of placement schools, conducted towards the end of this term.

There are some parallels between College teaching practice and the project placement, but the latter was much more complex. Firstly, schools were identified by LEA advisers primarily on the basis of which teachers in their authority would most benefit from a one-term updating course. This choice was partly determined by the general secondment negotiating machinery within LEAs; this varied in practice and in the time of year at which decisions are made. The choice was also determined by the in-service training needs of the school as identified by the headteacher and the head of CDT department, by the school's degree of timetabling flexibility, and also by the professional and domestic circumstances of the potential secondee.

Secondly, support teachers had to assume responsibility for, and to teach, classes effectively, whereas student teachers are largely under the supervision of the school's teachers. The placement of support teachers was therefore very much influenced by the extent to which their particular skills could be dovetailed into particular schools. Minimising travel distance was also a fundamental consideration.

Thirdly, if the placement fell through during term, the school would have lost its specialist CDT cover and support teachers would have lost their income.

It can be seen, therefore, that school placement was a complex and sensitive issue within the scheme, and perhaps more than any other aspect, was a major consumer of project team time.

Advisers in participating LEAs were asked to identify schools.

The project team then negotiated placements. By the end of term one, these had been finalised satisfactorily, and the following problems had been overcome.

Some teachers were unwilling to take up 1/86 secondment because they felt that the supply teachers could not adequately cope with their examination classes; some had other reasons for backing out, such as not wanting to travel to college in winter.

Supply teacher drop out led to some schools having only one rather than the intended pair; two supply teachers had to be placed alone in schools, on full supply rate, because they could not afford to continue on half supply rate.

In schools where falling rolls had reduced staff numbers, CDT departments were small and teachers often taught a second and third subject. In such cases, timetabling flexibility was minimal, and supply teachers were given more to do than they had been prepared for.

Some heads and deputies were unable or unwilling to adjust timetables to make use of supply teachers.

Supply teachers, some apparently on the verge of bankcruptcy, could not afford to travel very far. Travel expenses were not available. This caused enormous problems and eventually money was vired (after lengthy negotiations between the writer and the north west TRIST manager) from the 'Learning Materials' cost head (see page 352) to give some travel expenses. Without this, three supply teachers would have withdrawn from the project.

The absence of travel capability induced the project to seek placements beyond the consortium in Liverpool and Wigan (near to where support teachers lived), although the latter fell through because the LEA was unable to fund the operation.

Three schools agreed to participate only if teacher advisers could teach examination classes themselves. This was agreed, but reduced the team's flexibility to respond to needs arising in other schools.

Towards the end of the first teaching placement in schools, the writer carried out focused interviews with headteachers, for a variety of purposes relating to his formative evaluation of their work in schools, and of their preparation for this work and of general project operations. He asked the following questions, attempting to put them to the headteachers in a consistent manner throughout the whole exercise (see figure 11).

1. How did your school originally get involved in the scheme?

2. What concerns, if any, did you have about accepting the kind of supply cover offered by the scheme?

3. With hindsight, which of these concerns were justified? Please elaborate, if necessary.

4. What gap(s) in staffing is/are the supply teacher(s) covering this term?

Figure 12: INTERVIEWS WITH HEADTEACHERS CONDUCTED BY THE WRITER

	SCHOOL	LEA	DATE
1	Coney Green	Bury	3 April 1987
2	Deane	Bolton	20 March 1987
3	George Tomlinson	Bolton	23 March 1987
4	Hayward	Bolton	20 March 1987
5	Alsager	Cheshire	12 March 1987
6	Brookvale	Cheshire	24 March 1987
7	St Thomas More RC	Cheshire	26 March 1987
8	Cross Hall	Lancashire	19 March 1987
9	Longridge	Lancashire	23 March 1987
10	St Richards RC	Lancashire	19 Mrch 1987
11	Club Moor	Liverpool	24 March 1987
12	King David	Manchester	25 March 1987
13	Newall Green	Manchester	17 March 1987
14	St Paul's	Manchester	2 April 1987
15	Walkden	Salford	16 March 1987
16	Bramhall	Stockport	1 April 1987
17	Stockport School	Stockport	1 April 1987
18	Sale Moor	Trafford	27 March 1987
19	St Thomas More	Tameside	18 March 1987

5. How satisfied are you with the way these supply teachers have met the CDT needs of your pupils?

6. Would you please comment on the following aspects of the supply teachers' performance?
   General Professionalism;
   Teaching Methods;
   CDT Capability.

7. Are you aware of any developments in the supply teachers' CDT capability this term?

8. Could you please describe any problems caused by the presence of these supply teachers in your school this term?

9. Could you please describe any benefits that they have brought to the school?

10. Could you comment on the support they have received from:
    the school;
    the project team.

11. How far do you think they have stimulated curriculum development in the school?

12. How far do you think this will last when they leave?

13. With hindsight, could the project, or the school, or the CDT adviser have done anything further to help the school absorb this curriculum development?

14. Have you any further comments to make on:

    The supply teachers;

    The project model;

    The project management;

    Other.

A summary of the writer's analysis of headteacher comments about the supply teachers is shown in figure 13. The numbers in the left hand column correspond to the numbers in the same column in figure 12. Of the main prior concerns expressed by the fifteen heads who had reservations at the outset of the placement, the majority related to the capability of the supply teachers to teach specialist CDT effectively and safely (1, 2, 3, 4, 7, 8, 9, 10, 11, 17). Three heads had more general reservations about their overall teaching capability (13, 14 18). One was concerned about the unusual nature of the teaching packages, and one was uncertain about how his pupils would react to being taught by a pair of teachers in tandem. In the event, the writer has drawn the following conclusions from his interviews with headteachers, which were cross-checked with the perceptions of the teacher advisers (then visiting each school weekly):

(1) 11 heads were very satisfied with the quality of specialist CDT supply cover which was offered (58%);

(2) 8 heads were satisfied (42%);

(3) none expressed dissatisfaction;

(4) in 13 schools, the supply teachers offered some teaching which was significantly in advance of that being offered within the mainstream CDT timetable (68%), which reflects

Figure 13: SUMMARY OF WRITER'S ANALYSIS OF HEADTEACHER COMMENTS ABOUT THE SUPPLY TEACHERS IN TERM 2:

Source: Interviews held in March/April 1987

LEVEL OF SATISFACTION WITH SECONDARY SUPPLY COVER OFFERED

Main Prior Concern	Very Satisfied	Satisfactory/ Satisfied	Unsatisfactory/ Not Satisfied	Modern Teaching Offered More Than The Department Normally Does	Weak on Tech Skills
1 Level of technical skill		/			/
2 Disruption to pupils' studies		/		/	/
3 Disruption to pupils' studies	/				/
4 Ability to teach specialist CDT	/			/	/
5 Nature of 'Packages'	/				/
6 None	/			/	/
7 Level of technical skill	/			/	
8 Disruption to pupils' studies		/		/	
9 Ability to teach examination CDT		/			
10 Ability to teach examination CDT	/			/	
11 None	/			/	
12 None		/			
13 Nature of teachers	/			/	/
14 Teaching quality		/			
15 Loss of HOD		/		/	
16 Pairing of teachers	/			/	/
17 Workshop safety		/		/	/
18 Capability of teachers	/			/	/
19 None	/			/	

the views expressed by the college heads of department noted in section 12.4.3.

(5) and finally, in 10 schools, the head believed that the teachers had insufficient workshop and technological skills to effectively deliver mainstream CDT teaching.

This time consuming exercise was not carried out for the placements in terms 4 and 6; instead, teacher advisers monitored teaching under the writer's direction. Their reports, and the comments made by advisers in the interviews considered in section 11.3.3., led the writer to believe that the teachers' performance and CDT teaching capability improved in each term.

12.5 FINANCIAL SUPPORT FOR THE RECRUITS

Thirty of the teachers received discretionary grants from their home LEA for the three terms of study and supply salaries whilst they were teaching in the remaining three terms. The remaining (seconded) teachers continued to receive their standard salary from the Manchester LEA. The former group have been persistently and vehemently critical of the financial 'package' they received during this project: section 12.5 examines this problem in two parts; (1) the discretionary grants; and (2) the supply salaries, using evidence from the writer's project director diary, his correspondence with grant awarding bodies, and a questionnaire which he constructed and issued to the teachers.

12.5.1 The Discretionary Grants

Grants are made available through LEAs in which students live, although funding and governing regulations are controlled by the DES. When the project teachers were being recruited, there were

two types of grant. Firstly, within the mandatory grants category, "LEAs in England and Wales are required by law to pay these grants, but only to students who are attending courses specified as designated, and who are eligible, that is, they satisfy the qualifying conditions"[7]. Secondly, discretionary grants are for courses not "designated", but "each local authority decides its own policy on these, and it is virtually impossible to lay down general rules and conditions"[7]. The grant normally covered: tuition fees and maintenance, and for 'mature' students there were additional maintenance allowances, eg. for maintaining a home, being over 26 years old and having earned "at least £12,000 from employment during the three years before the start of the first academic year of the course"[8], and having dependents.

At the outset of the project, telephone conversations between Rogers and HMI Hicks (the staff inspector for CDT) had led Rogers to an early belief that the project would attract mandatory grants, which LEAs would be obliged to pay, together with the £1200 bursary which was then on offer to encourage students to embark on initial training for teaching in teacher-shortage subjects. Early advertisements issued by the writer reflected these assumptions. However, college members of the consultative committee expressed uncertainty about these arrangements and the writer wrote to the Further and Higher Education Branch 3 (Student Awards) of the DES on 17 June 1986 to seek confirmation. The letter stated that:

"The problem which I need an urgent solution for is this; the project has started two months late, yet we have to recruit between 36 and 45 qualified non-CDT teachers to start retraining

in September 1986. Recruitment will hinge on the financial package that we offer. We anticipate that many of these teachers will be women, perhaps with primary experience, who have reared families, are now seeking a return to full employment, but are not able to find posts which mesh with their initial training..... "

"During terms 2, 4 and 6, they will receive supply salaries from the LEAs in which they are teaching. During terms 1, 3 and 5, they will be students and, it is assumed, eligible for the standard student grant. I also understand that this can be supplemented by the £1200 CDT bursary: Mr Tony Rogers (Manchester LEA Inspector for CDT ...) has discussed this with Mr George Hicks (Staff Inspector for CDT) and has been told that the normal restriction of the bursary to unqualified people can be waived for this project. This will be essential if we are going to attract candidates to the scheme."

"Because candidates will be "qualified" I understand that they will only be eligible for discretionary grants. This will create insurmountable problems of co-ordination between the project and the LEAs, and may require lengthy negotiations with LEA officers for which there is now insufficient time."

The letter went on to request that mandatory grants and the bursary be awarded to teachers recruited to the project.

Twenty-three days after this letter was sent from the project, a reply, dated 11th July from DES Further and Higher Education Branch 3 stated that;

"Mandatory awards are made under the Education (Mandatory Awards) Regulations 1985 and these Regulations provide, among

other things, that such awards are only payable in respect of "designated" courses. The courses currently designated include courses of initial training for teachers and also certain specifically named courses of teacher training. However, the Support Through Change Project is not specifically designated for mandatory awards purposes and it is not regarded by this Department as a course of initial training for teachers. Therefore students involved in the project would not be eligible for mandatory awards."

After a range of confused telephone conversations between the writer and DES officials, G Hicks indicated by telephone on 7 July that our support teachers were ineligible for the bursary, and that he could not understand how Rogers had interpreted their previous telephone conversations as a confirmation that the bursary would be awarded to project recruits.

However, a letter from Teachers Branch 1 (8 July) indicated that the retraining elements of the two year courses were poolable and therefore able to recoup course and registration fees and 100% of any discretionary grant award. This letter, together with intervention by consortium advisers within their LEA grants departments cleared the paths for the award of grants.

Obtaining discretionary grants proved to be extremely difficult for applicants from outside the consortium of original LEAs. Three applicants were refused grants from Cornwall and Wigan because these LEAs had higher priority areas to support with discretionary grants. Wigan, for example, had a policy of awarding these to enable people without job qualifications to

qualify: this therefore excluded qualified teachers, even though they might not be able to find work in those fields for which they were qualified. One teacher, however, did receive a grant from Wigan. On questioning this, the writer was told on the telephone by a member of the LEA's grants department that this grant had been awarded by mistake.

Other LEAs, notably Lancashire and Norfolk, awarded grants to seven retrainees only after considerable pressure from the project, the consultative committee, CDT advisers and local councillors. These awards were made by appeals sub-committees only after the college courses had started, placing these applicants under considerable stress. The writer attempted to gain an overview of the grants problems being faced by teachers by asking each to submit a written account of their difficulty, what they had done to ease it, and the effects of this corrective action. The response reproduced below from a teacher based at Edge Hill College and claiming a grant from the Lancashire LEA, epitomises the problems faced in LEAs beyond the consortium in which CDT advisers had not alerted grants personnel to the unusual nature of these grant applicants.

"Grants - Lancs County Council

1. I was offered a place on the course in July and immediately applied for a grant. Lancs did not acknowledge receipt of my application despite my enclosing a stamped, addressed card for this purpose.

2. After numerous requests during late August and early September as to the fate of my grant application, I was informed

that a grant "was unlikely" (early September). At this point I enlisted the help of my county councillor.

3. An enquiry the week before the course started produced the answer that the matter was to be referred to the appeals sub-committee on the day which the course began. I was informed on that day (15.9.86) that a grant would be paid.

4. Since starting I have encountered a number of problems:

    1. The assessment of the grant at the wrong rate.
    2. An advice being received with the incorrect amount on it.
    3. Slow transit of the cheque from County Hall to the college.

Many of these were resolved, finally, by a visit to County Hall. At present (28.10.86) I am still awaiting a supplementary payment to bring the grant up to the correct level."

When the LEATG system came on stream in the financial year following the start of the project, LEAs came to hold more power in determining how they would spend their INSET fund allocations. Under the new system, discretionary grants for retraining began to be charged to the budgets of individual subjects. Advisers in the consortium indicated to the writer in interviews conducted in January 1987 (see figure 1, chapter 11) that they would be spending future LEATG money on their existing teaching force, not on discretionary grants for retrainees. This view became even more firm as north west CDT advisers began to believe that there was no shortage of CDT teachers in the region: they increasingly felt it would be morally reprehensible to recruit mature (and therefore probably immobile) teachers to be retrained for posts which did not exist. They therefore

offered little if any support to the colleges which mounted a second run of the project (see section 11.6).

As noted in section 12.4.1 a number of recruits withdrew when they discovered the low grant residue after deductions relating to spouse's income and/or their ineligibility for the mature student allowance. For example, a female candidate withdrew days before the course began when she discovered that her grant offer of £241 per term was not even sufficient to pay for a childminder. Despite her husband's high salary, the family's finances were already too stretched for her to embark on the programme without greater financial support. In another case, from a total grant of £1304, £616.66 was deducted; despite this, however, the teacher continued in the project (see appendix 6). These and similar examples within the project, would suggest that those candidates whose spouses are wage earners - mainly women - were discriminated against by this grant system.

Some recruits were not eligible for the mature student allowance because they had not earned £12,000 during the previous three years. Again this appeared to disadvantage people who had been unemployed or engaged full-time in housework. Both areas, however, seemed to the college heads of department to be potentially rich recruitment sources. The recruits generally resented their ineligibility for the £1200 bursary, especially as they rubbed shoulders with students from industrial or university undergraduate backgrounds at college who were in receipt of this bursary.

The widespread resentment felt by the grant-aided retrainees was

expressed throughout the project. The response of one of the Cheshire LEA-based Crewe and Alsager teachers, reproduced below, captures this expression accurately.

"The initial explanation of the funding for the Support Through Change participants was given as follows:-

1) Basic Grant of £1901
2) Mature Student allowance of £740
3) Bursary £1200

plus travelling expenses (in my own case 200 miles per week - approx. £10 in petrol). It was on this premis that I and many of the other students applied to be accepted on the course."

"After making successful application the reality of the funding to many students emerges thus:-

1) Basic Grant is means tested, therefore many students are not entitled to the full £1901.
2) I and many more of my colleagues are not entitled to the mature student allowance because we have not earned the requisite amount during the previous two years.
3) The interpretation of the bursary rules have been such that we have not qualified for this extra money even though we are retrainers on a CDT course.
4) No travelling expenses are being paid."

"In my own case, I am therefore entitled only to a means tested £1901, not the £3841 initially anticipated."

"This funding situation is most unsatisfactory for a group of mature professional people who have both family and financial

commitments to meet, and whose retraining course is designed to assist in the retraining of others (hence 2 years in penury not one!). The Government is perportedly throwing money at the CDT teacher shortage, yet every rule has been interpreted to ensure that we, the students, get the worst possible financial deal. This has culminated in a great deal of discontent and uncertainty."

Thus these grant-aided teachers felt increasingly stretched financially during their first term in college. Most made individual representations to their LEAs, in some cases through their elected councillors. Finally, on 3 December 1986, a teacher from Crewe and Alsager College wrote a letter to her member of parliament (see appendix 7). The letter was signed by ten teachers from the Crewe and Alsager project group. The member of parliament passed the complaint on to a Minister of State in the DES, Walden. Rumbold, the minister responsible for teacher training, replied on 17 February 1987 (see appendix 8) indicating that: discretionary grants are the responsibility of LEAs; the bursary was not targeted at teachers who had already qualified to teach; and the Manpower Services Commission was not obliged to enhance support for the project's retrainees. This letter signalled the end of attempts by individuals connected with the project to seek improved financial support for this cohort of teachers. Shortly after receiving a copy of Rumbold's letter, the teacher who had drafted the original complaint to her member of parliament left the project for financial reasons and took up a non-teaching post.

Finally, the situation deteriorated, as the advisers predicted

(see above), for the second run of the Support Through Change retraining model (from 1987-1989). Both Crewe and Alsager and Edge Hill Colleges had received NAB funding to appoint a full time course tutor and purchase materials for the second scheme; they also received generous supplementary grants from the MSC to launch a publicity and recruitment drive - both colleges appointed a temporary CDT publicity officer. The colleges both recruited well and offered sufficient places to fill a group (of 15 teachers) in each college. In September 1987, four only reported to Crewe and Alsager: each had a discretionary grant. Eight teachers reported to Edge Hill; one was seconded, three had discretionary grants, and four were self-supporting. Both colleges have since decided not to offer a third run of the retraining model (see 11.6.2) despite the request from NAB to Crewe and Alsager to bid for NAB funding to mount a third run during 1988-90[9].

12.5.2 The Supply Salaries

The project proposal[10] indicated that teachers would be employed as "supply teachers" during terms 2, 4 and 6. In terms 2 and 4 they were to work in pairs to cover a single teacher's timetable and receive half pay; in term 6 they were to teach a full timetable, alone, and receive full pay.

It quickly became apparent at the start of term 2 that this proposal did not match the administrative complexity encountered by the project. A number of unforeseen factors bore on the situation. Firstly, some LEAs, as a matter of policy, placed the temporary teachers on a one-term contract. The Cheshire adviser, for example, had supported this for teachers employed

in his school because such a contract entailed holiday pay and sick pay in case of absence due to illness. The daily rate on such a contract in Cheshire was significantly lower than the supply rate, but taken together, teachers who taught for a full term on the supply rate (and were therefore not eligible for holiday pay) received a similar total remuneration to those who were employed on a full school term contract.

However, the Lancashire LEA placed one teacher on a contract which only matched the duration of the college one-term course on which the seconded craft teacher was studying. College terms were significantly shorter than school terms, generally, by up to three weeks. In this LEA, the permanent teacher taught at his school when college was not in session, rendering a supply teacher unnecessary. This supply teacher was thus paid at the lower 'contract' rate, but only for 55 days of the college term instead of the 70 days of the school term (with holiday pay). As a result he earned £890 during the term in contrast with a colleague in another school who earned £1211. Also, in Bolton, which paid teachers on supply rate for the duration of the short college term only, the supply rate was not significantly greater than the contract rate.

To gain a clearer view of the nature of the problem than that formed from the complaints of individual teachers, the writer drew up a questionnaire. It was issued to the 27 teachers receiving temporary salaries at this time. 17 replied, giving a response rate of 63%. The questions asked are reproduced below.

1. Which LEA did you teach in?

2. Were you releasing someone for secondment, filling a vacancy, or teaching in other circumstances?

3. Did you teach alone or with a partner?

4. Please name the kind of contract you were on (eg. supply, short term contract).

5. Please state the exact term dates you worked, from beginning to end.

6. Please state the exact term dates the school worked, if different from 5.

7. How many days off did you have, if any?

8. Please state the exact total gross pay (before any deductions) you received for the term. (If you still have not had final payment, please estimate the total.)

9. Please state the deductions, estimated if necessary, for any time off.

10. How many increments did you receive?

11. Outline any hidden financial implications of your type of contract, eg. loss of unemployment benefit rights.

12. Please describe, concisely, any problems you encountered and what steps had to be taken to resolve them.

Figure 14 shows a breakdown of that information, derived by the writer from the questionnaire responses, which is pertinent to the issue under scrutiny here. In particular, the amounts paid to each teacher for the term, together with the daily rates, are

Figure 14: WRITER'S BREAKDOWN OF TEACHING SALARIES RECEIVED BY THE PROJECT TEACHERS IN TERM 2

LEAs	Bolton	Bury	Cheshire	Lancs	Liverpool	Manchester	Salford	Stockport	Trafford
No. of Non-Seconded Teachers	5	2	6	6	1	1	2	3	1
Teacher 1: Nature of Payment	Supply	No Response	Contract	Contract x*	Contract*	Supply *	Supply	Contract *	Contract
Days Worked	50		65	50	61	65	52 +	65	65
Amount Earned	£850		£1250	£890	£1304	£1476	£1308	£1010	£1300
Daily Rate	£17		£18	£18	£21	£23	£25	£16	£20
Teacher 2: Nature of Payment	Supply	No Response	Contract	Contract			Supply	No response	
Days Worked	50		65	62			55		
Amount Earned	£802		£902	£1211			£1277		
Daily Rate	£16		£14	£17			£23		
Teacher 3: Nature of Payment	Supply		Contract	No response				No response	
Days Worked	50		65						
Amount Earned	£1068		£1303						
Daily Rate	£21		£20						
Teacher 4: Nature of Payment	Supply		Contract	No response					
Days Worked	50		65						
Amount Earned	£1213		£1226						
Daily Rate	£24		£19						
Teacher 5: Nature of Payment	Supply *		No response	No response					
Days Worked	50								
Amount Earned	£1200								
Daily Rate	£24								
Teacher 6:			No response	No response					

* A teacher working alone on full pay - here the sum has been halved to enable comparison with teachers receiving half pay.

NB These figures derive from the teachers' questionnaire responses. They have not been corroborated with LEA administrative records, but the 'nature of payment' was corroborated by telephone discussions between the writer and each LEA adviser.

+ This teacher had 3 days unpaid sick leave.

x This teacher given a contract for college term only.

significant. In this context, the teachers' salaries varied under the influence of three factors:

1) their age, teaching and relevant industrial experience which determined their incremental level;
2) the length of time for which they were paid;
3) the nature of payment, ie. supply, full-term contract, or short-term contract (college term).

Considerable variations were evident as a result of factor 1, which was to be expected given the large variation in length of previous teaching service (from 0 to 20 years - see figure 6) and in age (see figure 5). The variation in daily pay, partly explained by incremental level, was between £14 and £25. The third factor was found by the writer to be impossible to quantify precisely because of the extreme complexity of teachers' salary calculations vis-a-vis contractual arrangements and the reluctance of LEA officers to divulge information. He believes, however, that it significantly influenced pay in that some LEAs - Cheshire, Liverpool and Manchester - seemed to pay considerably higher salaries than Bolton, Salford and Lancashire to teachers with similar lengths of experience. The length of time during which salaries were paid generated the most hostility, however, from some teachers. Some LEAs paid for 50 days work and others paid for 65; the latter thus paid for a third more days than the former, and this reflected internal LEA policies.

In response to numerous expressions of injustice from the teachers, the writer drew these discrepancies to the attention

of the 8 May 1987 consultative committee meeting. Despite offering expressions of sympathy, advisers in the less generous LEAs like Bolton were unable to make changes as these salary levels reflected policy decisions made at higher education officer level. During terms 4 and 6, a similar discrepancy was evident. Realising that this would happen in term 4, the writer and his teacher adviser colleagues decided, in the face of a contrary recommendation from the 8 May 1987 consultative committee*, to place all but two of the teachers alone in schools, rather than in pairs, so that they could receive full rather than half salaries. Thus, again a significant aspect of project policy had to be altered in response to unforeseen events and low system adaptability.

12.6 CONCLUSIONS

The conditions under which the teachers were recruited, and the financial barriers to their take up of course places, or secure passage through this project, can thus be seen. Their similarities with, and differences from, conventional retrainees in college, and non-specialist supply teachers in school, can also be seen. Whereas the project only partially succeeded in its recruitment and retention objectives, it was demonstrably more effective in organising supply teaching placements (with some necessary transactions precipitated by system rejection, or changing conditions), and in supporting teachers so that they

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* The minutes of this meeting include the following:

"After much discussion, it was agreed that the retrainees should receive advice and counselling, and only in cases where they were capable of teaching alone should they be allowed to do so, providing that sufficient placements could be found". (Item 9)

could provide a satisfactory quality of specialist CDT supply cover.

With regard to the performance of the supply teachers of CDT in schools, the colleges and headteachers clearly had contrasting views, (although there was some convergence in the acceptance of modern CDT practice). Generally the headteachers' views were heavily influenced by their duties to offer immediate and effective teaching to pupils. On the other hand, the colleges took a longer term view, focusing on the potential and professional growth of the retrainee teachers. Reconciling these two views demanded much effort from the project team and future users of the project's strategy will need to be prepared to deal with this conflict of interests.

The financial penalties incurred by many of the teachers were severe and reflect, in the writer's view, two phenomena: that (1) the project was insufficiently powerful to bring about the wide-ranging nature of system adaptation in LEAs and the DES in the short timescale of its operation; and that (2) the immense complexity of financial arrangements for the teachers, both as college students and LEA supply teachers, was either naively unforeseen, or underestimated, by the project initiators and members of the consultative committee; these members were in the main professional educators lacking the kind of financial influence or the timescale within their bureaucracies which were required to effect adaptation.

12.7 REFERENCES

1. Information divulged by Anderson, head of CDT at Edge Hill College, in a discussion with the writer after the 30 June 1986 steering committee meeting.

2. Information divulged by Heath, CDT Adviser for the Bury LEA, after the 16 June 1986 steering committee meeting.

3. Rogers, AE, and Toft, PN, 1986, 'TVEI - In-Service Training - CDT Support Through Change - A Pilot Scheme', Manchester Education Department.

4. CDT Support Through Change Steering Committee - Minutes of the 24 July 1986 Meeting.

5. Rogers, AE, and Toft, PN, 1986, Ibid.

6. Heywood, John, Dublin University, in a private communication to the writer, August 1988.

7. Department of Education and Science, 1986, 'Grants to Students - A Brief Guide for 1986-7', London: DES, page 2.

8. Department of Education and Science, 1986, Ibid, page 4.

9. Information divulged by Clay at Crewe and Alsager College, and Anderson at Edge Hill College, during interviews with the writer on 10 June 1988 and 9 June 1988 respectively.

10. Rogers, AE, and Toft, PN, 1986, Ibid.

APPENDIX 1

LIST OF NEWSPAPERS IN WHICH ADVERTISEMENTS WERE RUN

Chester Chronicle
Crewe Chronicle
Congleton Chronicle
Stoke Evening Sentinel
Macclesfield Express
Shropshire Star
Bury Times
Ormskirk Advertiser
Wigan Observer
Middleton Guardian
Stockport Messenger
Bolton Evening News
The Universe
Manchester Evening News

Bolton Evening News (5 insertions)
Ormskirk Advertiser
Manchester Evening News

Manchester Guardian

APPENDIX 2

COPY OF THE ADVERTISEMENT FROM "THE UNIVERSE"

North West Region Initiative
Bolton Bury Cheshire
Manchester Salford Stockport

Re-Train for Craft Design Technology

An opportunity for qualified teachers to specialise in CDT Teaching. Previous work in this field is not essential but commitment and enthusiasm are.

Very good prospects for future employment in this shortage area

Places are offered at: Crewe and Alsager College of Higher Education; De La Sale College of Higher Education; Edge Hill College of Higher Education.

The course will follow a six term programme, consisting of alternate terms in College and working as a Supply Teacher in schools. Remuneration whilst at college will consist of Student Grants and a Bursary and pro-rata salary scales whilst teaching.

For further information please contact Peter Toft, "CDT Support Through Change" Director, Maxwell Building, University of Salford, Salford M5 4WT. Telephone: 061-736 5843 Extn 271.

Please state the college to which you would prefer to apply to re-train.)

APPENDIX 3

PROJECT LAUNCH PRESS RELEASE PREPARED BY WRITER

CDT SUPPORT THROUGH CHANGE PROJECT - UNIVERSITY OF SALFORD

SHORTAGE OF CDT TEACHING SKILLS BEING TACKLED BY NEW SCHEME IN NORTH WEST

Qualified teachers are being retrained in Craft Design and Technology (CDT) and existing CDT teachers will have their skills updated under an innovative training programme which was launched in September this year.

The scheme involves collaboration between 3 colleges of Higher Education, representatives of six local education authorities, Salford University, Her Majesty's Inspectorate and the Manpower Services Commission.

CDT is increasingly recognised as a vitally important area of both the primary and secondary school curriculum; however, there is a shortage of CDT teachers and also a pressing need to update the skills of existing CDT teachers. A major barrier to retraining is the difficulty of recruiting specialist CDT supply teachers to cover for teachers released for retraining; the new scheme aims to overcome the problem.

The project, which has received initial funding of £85,000 through the TVEI Related In-Service Training (TRIST) scheme, will run for just over two years. The Project Director, Peter Toft, is based at the University of Salford. A Teacher-Adviser is attached to the CDT Department of each of the three Colleges of Higher Education (De La Salle, Crewe & Alsager and Edge Hill). Staff of the colleges are fully involved in re-training and are supported by the Teacher-Advisers. CDT Advisers/Inspectors from each of the scheme's LEA's will also make major contributions.

Under this scheme, 36 qualified non-CDT teachers have been recruited and are currently being re-trained at the three Colleges mentioned above. They are from diverse backgrounds, including the primary sector, and women form a significant number (over 40%). They are following a six-term programme. Each teacher is based at one of the three Colleges.

In term one, they will receive introductory training in CDT education in the Colleges. In term two, they will work in pairs as 'Support Teachers' in schools from both Consortium and non-Consortium LEA's. Each Support Teacher will release a CDT teacher who will then spend the term in College undertaking appropriate specialist up-dating. The Support Teams will teach CDT but will not initially need access to specialist workshop skills.

In term three, the Support Teachers will return to College for further training, followed by term four in different schools, again working in pairs to release individual CDT teachers for specialist CDT retraining. Terms five and six will follow a similar pattern, except that the Support Teachers will engage more in mainstream CDT activity, much of which will involve the use of machinery, equipment and tools, and in the final term they will work individually, teaching full classes and releasing CDT teachers on a 1:1 basis.

The following goals should be realised at the completion of the project, in July 1988:

1) 36 newly qualified CDT teachers will be seeking employment.

2) 72 CDT teachers will have engaged in a one-term up-dating course.

3) A significant amount of new curriculum material will be generated within the schools in which Support Teachers operate.

4) A bank of experience concerning the effects of institutional collaboration in tackling intractable teacher supply problems will be available for national use.

If all goes to plan, the radical approach underpinning the new scheme could be adopted to help solve teacher shortages in other subject areas such as Business Studies, Mathematics and Physics.

APPENDIX 4

SAMPLE OF PRESS ARTICLE DERIVING FROM WRITER'S PRESS RELEASE
(SEE APPENDIX 3)

Scheme aims to train teachers in technology

The Times 17/6/86

By Our Education Correspondent

Qualified teachers are being recruited to retrain in craft, design and technology and existing teachers will have their skills updated under an innovative scheme being launched in the North-west.

The project, which has initial funding of £85,000, will run fortwo years and will be based at Salford University.

Up to 36 non-CDT teachers will be recruited between June and September to re-train as CDT teachers.

It is expected that they will come from primary as well as secondary schools and that there will be a significant numbers of women.

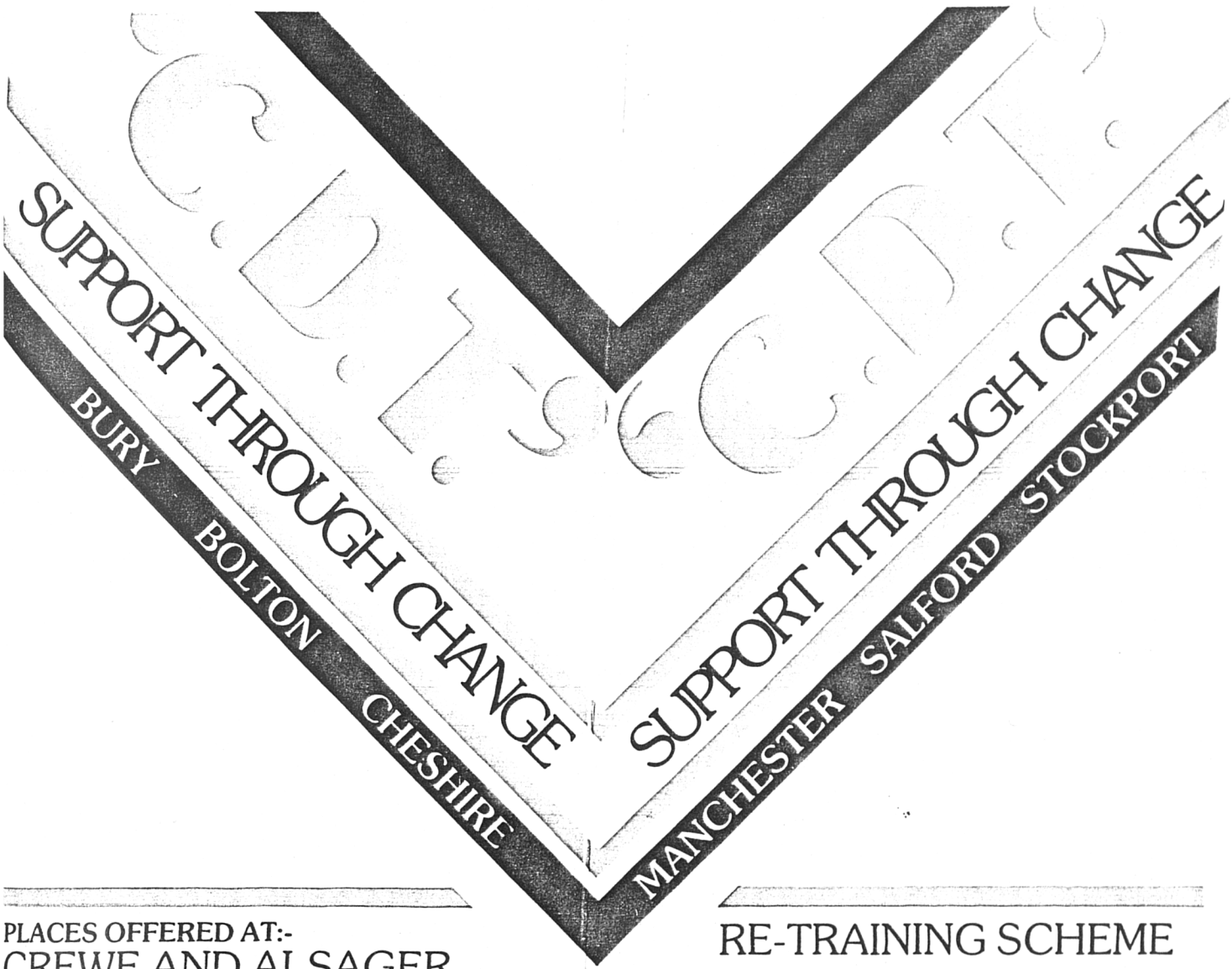
Craft, design and technology is recognized as an important part of the school curriculum, but there are too few CDT teachers and a need to update the skills of current teachers.

The scheme is part of the new technical and vocational training programme. It involves collaboration between three colleges of higher education, representatives of six local education authorities, a university, Her Majesty's Inspectorate and the Manpower Services Commission.

At the end of the project in 1988 there should be 36 newly qualified CDT teachers and 72 CDT teachers who have been on an updating course.

APPENDIX 5(A)

COVER OF RECRUITMENT LEAFLET DESIGNED BY PROJECT TEAM TO WRITER'S SPECIFICATION



PLACES OFFERED AT:-
CREWE AND ALSAGER,
DE LA SALLE,
EDGE HILL,
COLLEGES OF HIGHER EDUCATION

CO-ORDINATED FROM SALFORD UNIVERSITY

RE-TRAINING SCHEME
NO PREVIOUS CRAFT
DESIGN TECHNOLOGY
EXPERIENCE NECESSARY

CO-ORDINATED FROM SALFORD UNIVERSITY

APPENDIX 5(B)

CONTENTS OF RECRUITMENT LEAFLET DESIGNED BY PROJECT TEAM TO WRITER'S SPECIFICATION

If you are a qualified teacher with good classroom experience in any field or age range and –

Left to have a family and cannot get back into teaching
OR need a change of direction
OR are uncertain of your future prospects in your field
OR are about to be re-deployed

THIS COULD BE FOR YOU

What will C.D.T. retraining offer you besides a satisfying teaching experience?

A real opportunity for employment in this shortage area. A maintainance and tuition grant to help cover retraining costs. Half supply rates while support teaching in schools leading to full supply rate in the final term.

What is C.D.T.

Craft design and technology offers a real opportunity to channel childrens' enthusiasm for making and doing through designing, problem solving and realisation in a wide variety of materials.

At the same time C.D.T. can also make a contribution to the wider task of preparing pupils for life at work, at home and at leisure in a technological society.

What does the Re-training scheme consist of?

A six term programme based in one of the three colleges:

Year 1

Term 1 – Introductory training in C.D.T. education in the college of your choice.
Term 2 – Practising your skills in schools working in pairs as SUPPORT TEACHERS using teaching packages prepared in college.
Your support in schools will release C.D.T. teachers from those schools for specialist up-dating.
Term 3 – Return to college for further re-training.

Year 2

Term 4 – Support teaching in schools.
Terms 5/6 – Will follow a similar pattern but you will engage in more mainstream C.D.T. activity using machinery, equipment and tools. In the final term you will teach full classes to release a C.D.T. teacher for specialist up-dating.

How do you apply?

By letter or telephone direct to:

Peter Toft 'C.D.T. Support through change' Director
Maxwell Building
University of Salford
Salford, M5 4WT
Telephone: 061-736 5843, extension 271.

APPENDIX 6

Cheshire County Council

Education Department

County Hall
Chester CH1 1SQ

Neil J. Fitton BA FBIM FRSA
Director of Education

C HEYES
94 PORTREE DRIVE
HOLMES CHAPEL
CHESHIRE
CW4 7JB

NOTIFICATION OF GRANT 1980/87
Form 3c/16

DATE 2/10/86

Student Number 934773

Discretionary Award - Mandatory Rates
Independent Student

Crewe & Alsager Coll of H E
Draft/Design/Technology Cert/Dip.
Period of Award Sept 86 - July 88
Residence Type 'Elsewhere' Rate (see accompanying notes)

		£
Basic Maintenance Grant.....		1340.00
Maximum Grant.....		1340.00
Less Spouse's Contribution of.....		616.66
Net Grant payable by the Authority.....		723.34 plus 'Approved' Fees
Termly Instalments:-	AUTUMN.....	390.99
	SPRING.....	332.35

APPENDIX 7

11 St Mark's Street
King's Court
Dukinfield
Cheshire
SK16 4PH

3 December 1986

Andrew Bennett
House of Commons
London

Dear Andrew Bennett

We are a group of mature students following a two-year, partially MSC funded, retraining course in Craft, Design and Technology set up within a North West Regional Consortium. A high priority in government policy is to redress the imbalance of sexes in CDT - at Crewe & Alsager College more than 50% of course members are women.

At the outset of the scheme we were led to believe that there would be a bursary of £1200 plus travelling expenses in addition to the grant and mature students' grant. We soon found, however, that the DES did not consider us eligible for the bursary because we are qualified teachers; had we come directly from working in industry to retrain we would automatically have received it.

Our main complaint is that the DES is discriminating against us as retrainers, in spite of continual media publicity concerning the great shortage in this area and the government's declared commitment to encouraging people to retrain. In addition, we feel that TRIST has a responsibility towards us since it was they who cut the original bid for the project by 50% and recommended the refusal of the bursary and travelling expenses to the DES.

As a result, many of us now find ourselves in an acute state of financial hardship with no safety net to fall back on. In the past month alone four course members have withdrawn from the project for this very reason.

We trust that you will be able to make representations on behalf of ourselves and the many others throughout the country who find themselves in a similar position.

Yours sincerely

Jane Blackburn.

Carole Gutteridge.

SLB

GWAR/0140/0012

DEPARTMENT OF EDUCATION AND SCIENCE
ELIZABETH HOUSE YORK ROAD LONDON SE1 7PH
TELEPHONE 01-934 9000
FROM THE MINISTER OF STATE

Andrew F Bennett Esq MP
House of Commons
LONDON
SW1A OAA

17 February 1987

Dear Andrew

Thank you for your letter of 18 December to George Walden enclosing this one from a group of teachers who are taking part in the CDT Support Through Change retraining course. I am replying as teacher training falls within my area of Ministerial responsibility.

First, I should explain that the principal responsibility for in-service training rests with local education authorities, as the employers of teachers. It is for each authority to determine its priorities for training and the amount of assistance which it will provide for teachers undertaking training. This power extends to teachers not in their employment, to whom they may make discretionary student awards. At present, authorities are able to recoup some of these costs through the inter-authority pooling arrangements. From April, pooling will be superseded by the new Local Education Authority Training Grants Scheme in which training for teachers of Craft, Design and Technology, including the retraining of teachers who initially trained in other subjects, has been designated as a national priority area and therefore attracts a preferential rate of grant. Grant allocations in national priority areas may be topped-up from authorities' allocations for local priorities or from their own resources.

The £1,200 bursary is intended to encourage intending teachers of mathematics, physics and CDT to enter initial teacher training through one-year, and a limited number of two-year, courses in these subjects. The scheme has been narrowly targeted to the area in which we judge the money available for it can be most effectively used, that is recruitment to initial teacher training rather than in-service training or the retraining of already-qualified teachers.

Finally, I am advised that in April 1986 the Manpower Services Commission, which is responsible for the TRIST programme, received a formal proposal for the "CDT Support Through Change" project, requesting a contribution from the Commission towards the development costs. This proposal, which reflected discussion with MSC staff about the type and scale of development likely to attract support through TRIST, was acceptd in full subject to the condition that any other necessary funding for the project would be made available from other sources. It was on that basis that Manchester local education authority, on behalf of the regional consortium of six authorities, accepted the offer of MSC funding in June 1986. The Commission therefore considers that there are no grounds for the suggestion that it is under some obligation to provide financial assistance for course members.

Yours sincerely

ANGELA RUMBOLD

CHAPTER 13: AN APPRAISAL OF THE CDT SUPPORT THROUGH CHANGE INNOVATION

13.1 SUMMARY

The final chapter of section three draws together those aspects of the innovation examined in this thesis. It does so for two purposes:

(1) to appraise the innovation; and

(2) to consider its potential for future use.

The latter purpose, therefore, focuses this chapter onto the fifth aim of this innovation, noted in section 9.3, namely to:
"determine the potential of the project's strategy for other regions and shortage subjects."

Reduced to bare essentials, the action researched in this section can be expressed as follows:

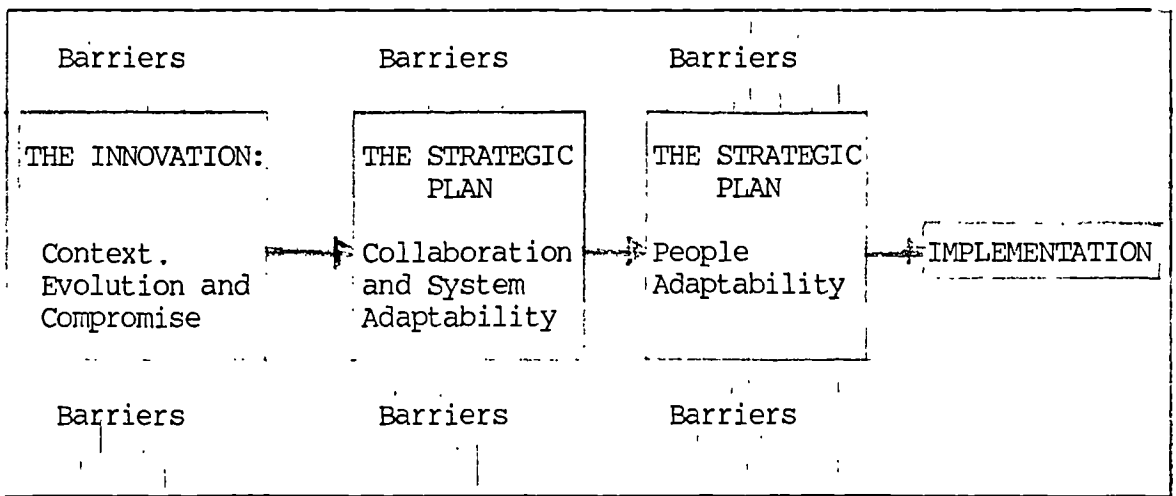


Figure 1: Writer's Conception of The Action Researched in This Section

Although the elements in this simplified process are tightly interlocked, vary in relation to one another in complex and unpredictable ways, and are subject to differing interpretations,

it is necessary to identify factors from each which influenced progress made in the events with which the section three case study has been concerned. They are appraised separately below and implications for future potential users of this strategy are considered.

13.2 THE INNOVATION

13.2.1 Context

The innovation grew over a period of seven months from conception to launch. During this period it was heavily influenced by elements of the context in which it grew.

Firstly, it was conceived when there was a widely held belief in a national quantitative shortage of CDT teachers. The figures discussed in chapter 9 suggest that this shortage did indeed exist. That the shortage did not stretch to the north west, however, was only gradually perceived by participants in the project during its first year. Had the project initiators foreseen (a) how so few teaching vacancies would occur in 1988, and (b) the extent of the teacher surplus in some LEAs, the writer doubts that the project would have started in the first place, in its final form. Clearly, manpower forecasting is exceedingly difficult because of (a) the multiplicity and complexity of the variables which have to be considered and, (b) in the writer's opinion, the poor access to information experienced by personnel at various levels of the education service. The advisers, for example, clearly lacked concrete information about their own short term CDT staffing needs at the project's inception. In the focused interviews, described in section 11.3.4, the writer attempted to determine how each LEA

diagnosed its staffing needs for CDT. The findings are summarised in figure 2.

	Method of Predicting Vacancies	Profile of CDT Teacher Characteristics
Bury	Forecasts from pupil numbers (LEA)	Yes
Bolton	Forecasts from pupil numbers (LEA)	Yes
Manchester	Forecasts from pupil numbers (LEA) plus 'curriculum protection' policy (LEA)	Yes
Oldham	Schools calculate needs based on pupil numbers	No
Salford	Schools calculate needs based on pupil numbers	No
Stockport	CDT overstaffed for next 5 years	No
Tameside	Forecasts from pupil numbers (LEA)	No
Trafford	CDT overstaffed for next 5 years	No

Figure 2: Writer's Summary of His Findings Relating to LEA Advisers' Methods of Determining Future CDT Staffing Needs

The situation varies between LEAs. In some, the adviser had only an informally gleaned anticipation of future staffing needs because the LEA's staffing department tended to retain this kind of data. In others, advisers were kept aware of the staffing figures, to varying extents. Few LEAs had a systematically constructed profile of the characteristics of their CDT teaching force to use in predicting likely vacancies and training needs (although most advisers claimed to know their teachers and departments well enough to make such predictions). In those LEAs which had - Bury, Bolton and Manchester - this information was not regularly updated because of a lack of time, and, in the

writer's opinion, a failure to see how useful such data might have been to aid long term planning. Falling school rolls and other major perturbations currently afflicting the education service, may explain a tendency towards crisis management and away from strategic planning. It has been a fundamental assumption of the writer, however, in this study, that careful strategic planning is rarely without benefit, providing that planning is sensitive to local needs. Trow distinguished between open systems planning and prescriptive planning. The "difference in these modes of 'planning' is between planning the specific size, shape and content of an educational system, and planning the structure or form of a system of higher education which is best able to respond to the combination of secular trends and unforeseen developments ...."[1]. According to Heywood, Trow questioned whether central agencies could "function in ways that sustain and increase the diversity in higher education ... (and if) so, what governing and funding structures would have that effect and what principles of operation would govern their activities."[2]. Analogously, the writer concludes that a flexible yet systematic attempt to build a detailed local picture of the CDT manpower situation is required, not just to help LEAs plan ahead more effectively than, for example, the college heads of CDT departments think they do (see section 11.3.5), but also to enable the DES to paint a more sharply focused regional picture of CDT manpower requirements than they currently appear to. Such a regional picture would, arguably, be of more practicl use than the national figures discussed in chapter 9; it would also promote a more accurate targeting of initiatives such as the CDT Support Through Change Project. These would then need to be able to

operate with sufficient flexibility to respond to local circumstances whilst aiming for agreed goals.

In the introduction to section 3, Stake's acclaim for 'naturalistic generalisation' was noted. He argued that "relating the findings of the case study to ... knowledge of the situation"[3] in general would help researchers to generalise from singular case studies. Despite the problems inherent in this argument, discussed in the introduction to section 3, it would seem that the findings of the present study reflect the wider conclusions of Chilver vis-a-vis the poor quality of management information systems used for manpower planning in education. Thus, Chilver argued[4]:

"6.6.3 We have been surprised to find how out-of-date, partial or inadequate is the statistical database available. For example, no-one can put an accurate figure on the number of teachers in England and Wales, broken down by salary and scale/incentive allowances, who were actually in service in 1988 or even 1987; the latest figures, themselves only just emerging, date back to March 1986. Neither can anyone say exactly what was the total salary bill for teachers for the last financial year, nor therefore the baseline for the coming one; the figure of £6,942 million which we have adopted (see Appendix 6) is based on extrapolations by the DES and the employers which incorporate a fairly wide margin of error. It is not possible for schools, LEAs or central government to manage the system properly without these figures. We believe that the following information, on a financial year rather than academic year basis, should be available to the parties concerned; number of teachers in each sector (primary, secondary and special schools)

at each scale and salary point; distribution of incentive allowances and London allowances by salary point; and details of pay bill baseline (excluding non-salary items) for each of the next three financial years. Individual LEAs were able to produce for us most of this information accurate to October 1987, and we consider that it is not acceptable for the nationally-collated figures to run two to three years behind. We recommend that the employers and the DES should jointly consider what changes may be appropriate in the timing and content of regular school-by-school surveys, so that accurate data for salary purposes can be made available within the year of collection ....."

"6.7.1 Better management information systems would enable account to be taken of changing requirements for teachers, both in an individual school, across the LEA and nationwide. As we have noted in paragraph 3.3.4, there is no current assessment of the number of teachers required, whether in particular sectors, areas, or specialisms or overall; and there are no national guidelines as to appropriate group sizes or timetable hours for individual subjects at particular ages. In our view, some definition of staffing requirements on the basis of a given curriculum must be attempted; otherwise there is no framework within which to determine priorities for the deployment of teachers."

Any attempt to increase the sophistication of manpower information available to decision makers concerned with the supply of CDT teachers and thus qualitative improvement, will need to avoid the trap which Marris[5] revealed in perceptions of the supply of graduate engineers in Britain. Given the widely

and repeatedly levelled claim that this country is in short supply of engineers, and that this shortage was firmly linked to deficiencies in the university sector suppliers, he found in a scrutiny of the July 1984 DES Statistical Bulletin "a table of international comparisons of the proportions of graduations in different fields ... The shocking secret was that Britain had a higher proportion of science and engineering graduates than any other country ... including Japan, the US and Germany". Further investigation with polytechnic careers officers and administrators revealed, however, that many of these graduates were from overseas, suggesting that "foreign students are much more prone to study engineering than home students"[6]. Apparently, British students felt that careers in engineering yielded relatively low financial rewards in Britain, whereas foreign students felt the reverse about engineering career prospects in their home countries. Marris concluded that if there is an actual shortage of qualified engineers in Britain, this must be because of low pay and status, rather than any anti-technological bias in the universities. Analogously, if there is a quantitative shortage of CDT teachers, and this shortage is linked to low pay and status (a link frequently made by teachers' unions in the late 1980s), then retraining non-CDT teachers for CDT will only temporarily cure symptoms and not the long term cause of shortage.

Secondly, experiences of CDT teacher 'qualitative shortage' varied between LEAs. The views summarised here reflect those expressed by the LEA advisers in the interviews noted in sections 11.3.3 and 11.3.4. In four LEAs - Bolton, Stockport, Tameside and Trafford - the teaching force was predominantly

craft-oriented. It's training requirements were for (a) major attitudinal shifts towards acceptance of modern CDT and (b) the acquisition of basic CDT skills. Coincidentally, in three of the LEAs, the CDT adviser was an Art and Design specialist; in the fourth (Tameside) he was an advisory teacher lacking in seniority in the eyes of CDT teachers. In each case, in the writer's opinion, the advisers were in a weak position to offer in-house training. Because of this, and of the need for fundamental basic training, it suited these LEAs to send teachers to the professional CDT centres in the colleges of higher education for retraining. In contrast, Cheshire and Manchester advisers believed (a) that many of their teachers had advanced some way into modern CDT and (b) that the quality of the college courses was too poor to bring about the updating which their teachers required. Having these views, and the capacity to mount extensive in-house training, they chose not to send teachers to the college professional centres for qualitative improvement. Midway between these extremes lay Bury, Lancashire, Oldham and Salford. Each LEA perceived a major need for updating, but advisers chose a "mixed economy" of in-house and college-based updating. This arguably reflected a broad span of training need including: (1) at very basic levels for very traditional teachers requiring intensive college teaching; (2) advanced training for curriculum leaders and heads of department, a speciality of the one term course at Edge Hill College; and (3) varied tailor-made in-house programmes. The varied and complex nature of qualitative updating needs between the participating LEAs can thus be seen.

A third contextual influence on the innovation was the system

for INSET, and in particular its state of fundamental change at the time. Peters and Waterman[7] found that individuals and groups within companies often held onto outdated views of their environments after they had changed. Many individuals and groups frequently wished to preserve the status quo (dynamic conservatism - see section 3.5.1), and many work under the kinds of pressure, or with a narrowness of vision, which discourages them from viewing their work in a wider context. Consequently the implications of change, or of not changing, are frequently not immediately understood.

This innovation was established by a number of individuals, including the writer, with varying depths of understanding of the INSET system and its changes. The product champion, however, and his immediate colleagues who came to form the consultative committee, had only a partial understanding of how the system was about to be radically changed.

The intentions behind the development from the 'uncapped pool', through TRIST to the LEATG system, relating for example to the elimination of certain long courses which HMI deemed to have become obsolete, or encouraging colleges to become more responsive to the training needs of school teachers, or developing the systematic identification of training needs, were hidden from the project initiators. LEATG subsequently became a major disruption to the project, as outlined in chapter 11.

Thirdly, the project genesis was rapid so that TRIST timescales could be adhered to. This, together with the need to seek funds from various sources, made the innovation more complex than it

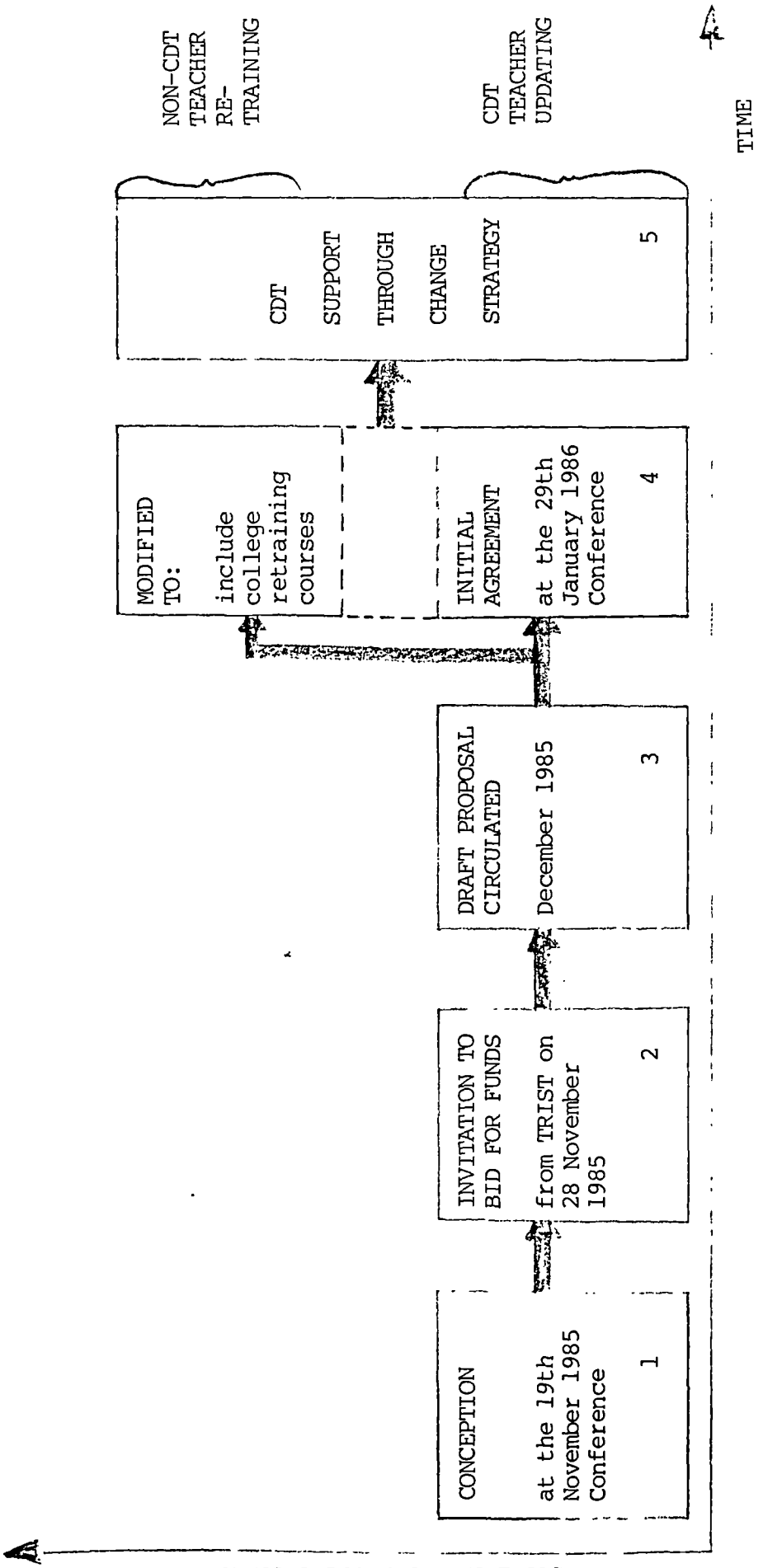
need have been, rendering it more difficult to manage.

The perceptions of teacher shortage (quantitative and qualitative), the availability of TRIST funding, external exhortation for institutions to collaborate, and the presence of a product champion willing to steer an idea along a tortuous course, combined to propel the innovation forwards. Yet within the same environment, barriers to innovation were constantly evident. Frequently, attempts to surmount these barriers forced the innovation to change character and deviate from its path towards its five goals.

13.2.2 Evolution, Compromise and Discontinuity Management

The innovation did change in character as it evolved from an idea in November 1985 to a strategy in April 1986. Figure 3 shows five phases in its evolution between these dates. To give the retrainees financial support for their studies, the strategy had to be expanded to embrace the formal retraining of non-CDT teachers for CDT, as well as facilitating the updating of existing CDT teachers. With hindsight, this expansion, agreed on to save the innovation from an early demise and without an accurate knowledge of the regional manpower situation, generated the problems the retrainees came to face in securing employment at the end of the project. This clearly discouraged the LEA advisers in the north west from supporting the second attempt to use the two year strategy at Crewe and Alsager and Edge Hill Colleges.

Figure 3: WRITER'S CONCEPTION OF THE GROWTH IN THE SCOPE OF PROJECT GOALS AS THE STRATEGY EMERGED



Similarly, obtaining funds to pay the salaries of the three teacher advisers gave rise to compromise within the host LEA. TRIST funding was not offered for this cost head, and it was too late in the summer of 1986 to seek NAB funding for the colleges to appoint them as lecturers for September 1986. Money was only found by exploiting a loophole in the INSET funding system. Yet, when LEATG came on stream, Manchester was left to pay the salaries of these teachers for the final thirteen months of the project. This severely denuded the city's INSET budget for CDT, and was seen by Rogers and his senior INSET inspector as poor reward for the intensity of support he and his LEA had given to the scheme.

The innovation continued to be subjected, throughout its life, to disruptions from various sources. Each of these led to compromise, rapid adaptation of procedures and a perceptible shift away from project goals. The major disruptions or discontinuities are shown diagramatically in Figure 4.

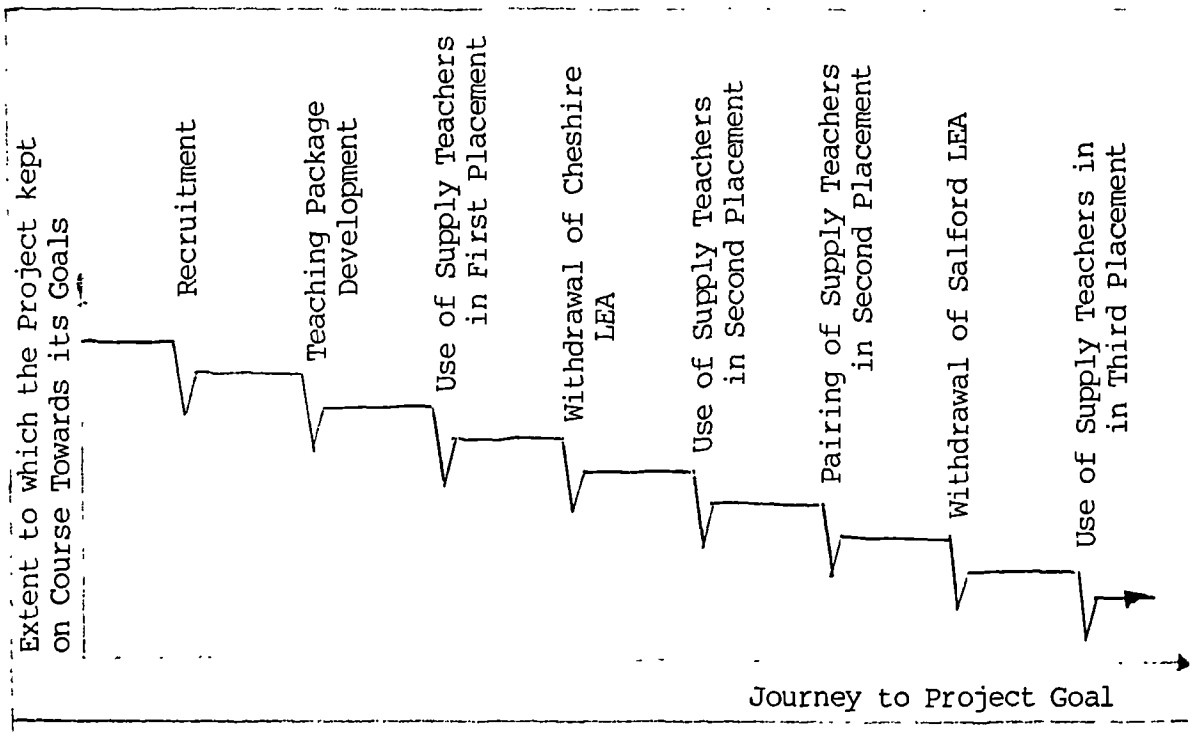


Figure 4: Writer's Notional Conception of the Disruptions (Major) which caused the Project to Deviate in its Journey to its Goals (not quantified)

Firstly, when it became apparent that it would not be possible to recruit the target number of non-CDT teachers for retraining from within the consortium, teachers had to be recruited from beyond in order to ensure that the college retraining groups each reached a viable size. Even so, the Edge Hill group barely achieved this with an initial intake of nine teachers. The unusual nature of the scheme, and the lack of consortium representation from these outlying areas, made it difficult for some teachers to persuade LEA administrators, and sometimes elected members, to award discretionary grants. Also, teachers recruited from, for example, north Lancashire - which was not in the early consortium - had to be found placements in Lancashire to keep their daily travel within acceptable limits. Consequently, Lancashire had to be persuaded to employ these individuals as CDT supply teachers.

Secondly, the consultative/steering committee was to have supported the project team in the production of modern and lively teaching materials for the use of the retrainee teachers in schools. Some advisers, such as Heath from Bury, had expressed a desire in early negotiations with Rogers to influence and modernise CDT teaching by this kind of intervention. However, although this intention was enshrined in the project proposal document, and despite repeated requests from the writer during the three early steering committee meetings, this support did not materialise. Given the speed of development needed, and the heavy workload of advisers, this, with hindsight, was an unrealistic project ambition. As a substitute, a group of heads of CDT departments from schools in the Manchester LEA was convened by Rogers to engage in a major

brainstorming activity. From this, a number of themes emerged which formed the basis for the project team to develop 'teaching packages'. Similarly, Rogers' original intention had been to furnish non-CDT supply teachers with trialled 'teaching packages' in kit form so that they could effectively deliver CDT lessons without a great deal of background knowledge. This, however, ran quite counter to the long-term teacher education perspective of the colleges. Their heads of department made it very clear at the early consultative and steering committee meetings that these 'packages' were not to be handed over to the retrainees as finished products simply to be used in schools: they were to be used to educate the teachers so that they would eventually acquire the professional skills of creating their own teaching materials. The resulting compromise - of the project team developing 'teaching packages' and then using them as starting points for further development by the retrainees in college - proved to be in the long-term best interests of the retrainees and the innovation. It also encouraged the collaborative development of teaching materials in each college group: this led to many variations on each of the project team's themes which enriched curriculum development throughout the project. At its most sophisticated, this technique produced, from Brown's perspective as head of department at De La Salle College, a quality of teaching materials which far surpassed that normally developed by his retrainees[8].

Thirdly, the withdrawal of two LEAs, in particular Cheshire where seven of the Crewe and Alsager retrainees lived, severely disrupted the allocation of teaching placements. As a consequence, the writer had to actively seek placements in other

LEAs, not primarily to facilitate release for secondment of craft teachers from the recipient schools, but simply to find supply work - and hence income and experience - for the project retrainees. On these occasions, the project aim of facilitating one-term secondments for updating was clearly subverted by the need for expedient reaction to externally imposed disruption.

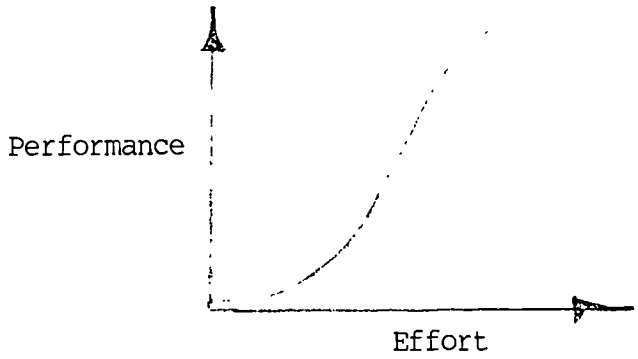
Fourthly, in the second placement, most of the retrainees were not employed, as planned, in pairs. Given the dire financial straits some of them were in, it was decided to find single, fully paid, placements for all but a small minority who lacked teaching confidence.

Finally, during each placement, a number of LEAs and schools chose to employ the project supply teachers for reasons other than facilitating the secondment of craft teachers to one term updating courses in the colleges. Each of these compromises tested the capacity of the consortium to maintain its collaborative spirit. This is discussed below.

Managing such discontinuity within the project required flexible performances from individuals and organisations. Where such adaptability in the face of a changed environment surfaced, as for example, in Rogers' performance in drafting and redrafting project proposals, it gave rise to goal achievement, although goal definition usually shifted. On the other hand, where adaptation did not occur, for example when the Salford LEA was unable or unwilling to contribute to central project costs as funding changed from TRIST to LEATG, goals (in this case Salford's continued exploitation of project benefits) ceased to

be achievable. These phenomena reflect Foster's[9] identification of the need for organisations to be effective learning systems in order to continue to exist in a competitive climate. He showed how products and a company's learning in relation to products, evolved through S-curves. A slow start gives way to rapid expansion, to be followed by eventual tail-off and decline (see figure 5).

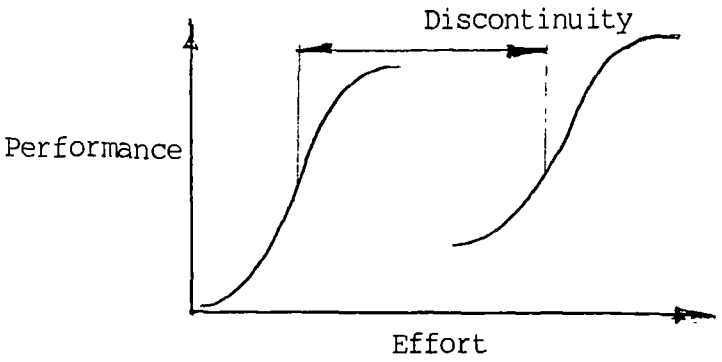
Figure 5



As the curve slows down, alternative questioning to determine if there are other ways of achieving performance is required yet, according to Foster, "too often we don't ask those questions. Behind conventional management wisdom is the implicit assumption that the more effort put in, the more progress that results. In fact, this is only the case in the first half of the S-curve. In the other half it is wrong. To compound things, it is hard to see what is happening when it is happening because most companies do not keep records of technological productivity."[10]

Successful companies make efforts to know where they stand on the S-curve, and to shift to a new product or system, and therefore a new S-curve. Foster argued that S-curves usually occurred in pairs (see Figure 6).

Figure 6.



Successful companies also are able to manage their passage through the concomitant discontinuities, largely by researching into where they stand at any one point on an existing curve. The resulting information enables them to recognise a need to transfer and its appropriate time scale. Often, in order to manage this discontinuity, they have to move from one technology to another just when the former technology is at its most productive point on the curve. Thus, this "dilemma captures the dimensions of the fourth era of managing technology which companies must now enter. It involves knowledge building, analysis, and the calculation of limits. And it ... requires .. the conviction and courage to realize that sometimes it is necessary to cut off your arm."[11]

Discontinuity management was an essential precondition for the success of the CDT Support Through Change project in goal attainment.

13.3 SYSTEM ADAPTABILITY, COLLABORATION AND THE STRATEGIC PLAN

13.3.1 Collaboration

The institutions which joined the consortium were used to working as discrete and relatively independent bodies. The act of

collaboration, in response to an external MSC exhortation, was thus not naturally easy for the institutions to accept. All were represented by individuals. Each of these was not however, in the writer's opinion, simply a delegate from the institution: rather, each had his or her own extensive professional agenda, largely relating to the development of CDT education within his or her own sphere of influence. Their 'ownership' of this development conferred deep job satisfaction and each thus had a degree of autonomy which was worth protecting. Yet the project, with its external funding, goals developed jointly on behalf of organisations with divergent perspectives on the project, and the intrusions of an externally appointed full time project team, had the potential to dissolve autonomy as it strove to weld individuals with different frames of reference into a team with common goals.

The problems of promoting collaboration can thus be glimpsed. Each participant was restrained from collaboration by an inextricable combination of personal ambition and institutional custom and practice. Because it is so difficult to disentangle these two barriers, they are analysed together below.

Firstly, the writer assumes, after Schon[12] (see section 3.5.1), and for the reasons advanced above, that organisations and individuals will frequently strive to preserve the status quo. This act of dynamic conservatism serves to protect them from the threats which are inherent in change. Being persuaded to work with parties who normally work for separate and even competing establishments, or compromise on custom and practice to meet project goals, militated against collaboration. Individuals from

each establishment, except for the full time project team, all continued to do their normal jobs whilst the project ran. It is fair to assume, therefore, that the project generated extra work and required additional commitment from each participant. It also generated various disruptions for participants to cope with, whether relating to discretionary grants, or persuading reluctant headteachers to employ project supply teachers, or simply leaving work for half a day during a busy schedule to attend a consultative committee meeting. It was particularly difficult for some consultative committee members to (a) persuade their superiors to release funds or (b) commit their organisations to adapt in order to accommodate the project. In some encounters between committee members and their superiors, the lack of contractually binding agreements within the project clearly prevented certain kinds of adaptation as officers, seeking to make financial savings and not identifying with project goals, locked onto the project as a dispensible commodity.

Similarly, within each particular type of institution, there were differences of philosophy, management and administration. Barriers created by these differences surfaced as differing perspectives on, and different requirements of, the project were articulated. Sometimes these were not compatible. For example, the colleges needed long term planning in order to successfully mount their standard courses, whereas some LEAs did not seem to be capable or willing to plan so far ahead. Also, LEAs wanted flexible school-focused training and some advisers did not believe that the colleges could deliver this, (a) partly because of the colleges' customary long term planning requirements and (b) partly because of a perceived lack of school experience of some of their

staff. They therefore set up in-house training schemes.

Promoting the required synchronised meshing of these contrasting participants was only possible with the expenditure of a great deal of energy to establish communication channels, negotiate, provide secretarial support, and draw upon consultative committee members' time. The energy required might have been less had participants been asked to perform the sort of goal clarification exercise outlined by FitzGibbon and Heywood (see section 11.5) although the writer believes that this would have revealed such major differences between the participants that his 'foot-in-the-door' approach to development (see section 10.5) would have been prevented by an early freezing of attitudes.

Despite its energy costs, however, collaboration clearly promoted goal achievement, and although this cannot be construed as total goal achievement, the project consortium has, in the writer's opinion:

1) raised the profile of CDT at senior officer level in some LEAs and enabled advisers to draw modern practice to their attention;

2) created a limelight atmosphere which has stimulated some participants;

3) enabled Colleges of Higher Education, to an extent, to pool ideas to enhance their own courses and school based curriculum development;

4) strengthened communication (and in some ways, hostility) between LEA CDT advisers and college heads of department;

5) enabled a complex placement of supply teachers in schools in ten LEAs to proceed relatively effectively;

6) promoted the development of modern and popular CDT 'teaching packages';

7) and also attracted good calibre teachers to retrain for CDT, 42% of these being women, (although their employment prospects in the region are not as attractive as participants believed they would be at the start of the project).

Collaboration to bring about system adaptation within the project was initially heavily dependent on the product champion, Rogers, who managed the early formulation of the project. Thereafter, the writer and his team had to frequently intervene to enhance and maintain communications and co-operation. Success in this collaborative venture has partially depended on the extent to which the team recognised and came to terms with the ambience of each participating institution and the goals of its members, and worked to surmount communication barriers to project goal achievement.

13.3.2 System Adaptability and Power

There was an evident, if varying, will to adapt within the consultative committee. Some system adaptation consequently took place. On the other hand, the systems did not always adapt to meet the innovative needs of the project. Adaptability is a value-laden concept, and clearly some innovations can be rejected on logical grounds, or on grounds of quality. Yet the writer believes that this particular innovation was established to serve the interests of the participating organisations, and

in terms of value, it deserved their support. As chapters ten, eleven and twelve have indicated, this support was received to varying extents, although this had to be repeatedly and powerfully advocated.

This reflects Handy's (see section 3.6.3.) argument that certain educational bureaucracies like LEAs and the DES, which are subject to complex political influence, are 'before-the-event' control systems and, as such, are more conducive to the status quo than the innovation. Although product championship, a full-time project team, and the collective efforts of the consortium participants did succeed in bringing about innovation in this climate, the writer concludes that a more focused concentration of power, such as that which would have arisen had the project been given the funds, and control over them, which were in any case spent under its banner (see figure 7, chapter 11), would have made goal achievement more satisfactory. The power conferred by financial control would have made it possible, he believes, to induce LEAs and colleges to enter into externally funded, contractually binding agreements demonstrating long term commitments to project goals. This in itself, however, would have required significant system adaptability, especially in the DES.

13.4 PEOPLE ADAPTABILITY AND THE STRATEGIC PLAN

This section focuses specifically on the adaptability of the retrainees within the project. They were recruited in unusual circumstances, according to a tight schedule, and by a team with no prior full time experience of teaching and administration in higher education. Early confused signals relating to financial

support, together with a generally poor level of such support, precipitated a significant drop out rate, both before and during retraining. (The latter, however, was also partly a reflection of the inability of some of the retrainees to adapt to CDT, or of the project's and colleges' capability to induce this adaptation). Although the project did retrain twenty-six teachers, considerable energy and system adaptation was required to bring this about.

Within college, the retrainees, apart from those who dropped out, were in the main able to adapt to CDT as an academic endeavour, although one teacher came within a mark of failing the retraining course examination at Edge Hill, and one teacher failed his first attempt, requiring a re-sit in order to pass at Crewe and Alsager. Heads of department generally regarded them as good professional teachers, in the main. Some thought divergently, which is clearly an asset in designing. Because of their non-CDT backgrounds, however, and the discontinuous nature of the retraining within the project strategy, few achieved a depth of design project involvement which conventional retrainees are expected to achieve. Generally, however, the heads of department felt, on exit from the colleges, that the retrained teachers were well prepared for CDT teaching, even if only initially for lower secondary courses.

In schools, perceptions were more complex. Headteachers required competent and dependable specialist CDT teaching as a base line. Some also expected an influx of new ideas and some small-scale curriculum development. This was generally achieved, but the depth of achievement depended considerably on (a) the personal professional calibre of the supply teacher and (b) the scope given to that person by the CDT department in the school.

School CDT departments had a multiplicity of reactions to the teachers. Some resented the intrusion of a newcomer; some saw their LEA adviser's desire to retrain one of their members as an indirect criticism of the department. In other schools, the modern approach to CDT was suspected; this was further exacerbated by the use, in the early placements, of non-traditional and non-resistive craft materials such as card and light plastics. These were incongruous in departments dominated by traditional cabinet making, engineering metalwork and technical drawing. In some of these schools, the supply teachers were made to feel unskilled and inadequate, not just by traditional craft teachers, but by pupils, who wondered why they were not allowed to use the normal craft machinery when being taught by the supply teachers. The upshot of this was a strong demand for more craft skills teaching back at college, particularly at Crewe and Alsager. In each college, however, there was a reluctance to teach craft skills formally, in isolation from design project work. This philosophical choice clashed, in the writer's opinion, with the requirements laid on the retrainees - when in school - to be competent to use, and teach pupils to use, tools and machinery safely.

LEA advisers often had other perspectives. In some cases they wanted specialist teaching cover; in others,though,they wanted new ideas to be implemented in the presence of permanent teachers who were not modernising, using as an excuse the difficulties of teaching CDT with their pupils. Some headteachers also had this hidden agenda.

The retrainees themselves varied between those who welcomed the three supervised teaching placements (and the concomitant

salaries) to those who saw them as a burden to be shouldered whilst they retrained for a new career. The child-centred atmosphere of the inaugural conference held at Salford University just prior to the start of retraining in the colleges, had the effect of alerting the teachers to child-centred approaches to CDT desired by such advisers as Rogers (Manchester), Holland (Bolton) and McNicol (Stockport). However, when the teachers entered college they rapidly began to complain that CDT was not being taught there as a child-centred activity, but as an activity concerned more with products. This perception was reinforced during the first teaching placement, as the supply teachers came face to face with having to perform professionally in front of colleagues with good manufacturing skills. The project had been formed on the premise that non-specialist teachers could rapidly be brought to a state of being able to teach aspects of CDT effectively with the support of 'teaching packages'. The assumption was that, for safety's sake, only light hand tools and non-resistive materials would be used in the first two teaching placements. Despite an early acceptance of this assumption, the teachers soon came to believe that it was vital for them to acquire advanced craft skills if they were to be accepted as equals and not 'dilutees' by CDT teacher colleagues. This tension was constantly evident in all the placements.

Despite their mainly non-specialist backgrounds, the lack of expertise which derives from tradition in this kind of retraining in the colleges, the discontinuous nature of their training and the varying expectations of the teachers, those who completed the course demonstrated adaptability in themselves, and the capacity to engender adaptability within the project. Moreover, the

concentration on the development of teaching packages equipped them to perform well in schools, more so than the standard one year retraining courses.

13.5 THE PROJECT STRATEGY

13.5.1 The Potential of the Project Strategy

Section three of this thesis documents action research designed to test the hypothesis

"that the five aims of the project can be strategically implemented through managed collaboration between specified agencies whilst revealing insights, through systematic study, into the detailed forces impinging upon CDT teacher supply in the north west region."

The five aims of the project are detailed in section 9.3, but in summary they relate to:

(1) effective collaboration within a consortium;

(2) supply teachers for CDT;

(3) developing college courses for retraining;

(4) curriculum development in schools;

(5) the potential of the strategy for other regions and subjects.

For reasons advanced, the writer has focused his research onto aims 1, 2 and 5, although 3 and 4 have been partially evaluated indirectly. It is concuded that:

(1) effective collaboration was brought about, particularly within those parts of the consortium which remained in the project to the end, although certain elements of this aim

relating to supply teacher finance and deployment in schools left much to be desired; the achievement moreover required greatly increased effort at all levels of the system and a central project team which may not be accepted as affordable or cost-effective in future manifestations of this model;

(2) it was possible to induce adaptability in the majority of non-CDT teachers recruited for retraining; however, of the fifty four teachers who were offered places, only twenty six eventually qualified to teach CDT (47%); of this twenty six, at the time of writing, only 42% had obtained permanent secondary CDT teaching posts, and two of these were outside the north west (Kent and Norfolk); generally, however, the college staff who retrained the teachers and the LEA staff who employed them on placements were satisfied with their CDT teaching capability and highly satisfied with the quality of specialist supply cover compared with the generalist supply cover normally available;

(3) the colleges were able, to an extent, to adapt their courses to the special needs of these non-CDT retrainees;

(4) some small-scale curriculum development did take place; its success depended not just on the supply teachers but also, fundamentally, on the reactions to their work by CDT staff in the recipient schools;

(5) the achievements of the project include: (a) goal attain-

ment, to an extent; (b) the testing of certain general activities such as consortium collaboration and organising placements, the lessons from which will have generalisable significance to groups attempting to use this strategy in other regions or for other shortage subjects; and (c) the discovery of certain insights into problems of collaboration in this context, in connection with the potential of this strategy for other projects.

Firstly, as the general uncertainty about the quantitative manpower requirements of LEAs became apparent, and enquiries revealed the relatively unsophisticated attempts made by professionals in the LEAs to accurately predict need in the medium and long terms, the writer concluded, as a matter of urgency in these days of rapid systemic change in education, that attempts need to be made to improve the management information systems to which decision makers at local and national levels have access.

Secondly, collaboration is possible in this context, but certain barriers have to be overcome. In essence these stem from a combination of the <u>will</u> (or lack of it) and the <u>capability</u> (or lack of it) to collaborate in pursuit of a common goal. A collaborative framework is necessary with which each participant can identify. The loyalty shown to the collective idea will then be influenced by an impossible-to-quantify interaction between (a) what each participant gains from the exercise and (b) the extent to which all participants feel an overriding loyalty to the group. Also, collaboration requires more management rather than less, and this needs to be costed into any similar exercise.

Finally, when participants come together like this, the writer believes that leadership is a key factor in retaining focus and drive. This would have been far easier to achieve had the project had greater control over all funds spent under its banner. At a minimum level, central funding control would have enabled the project to give financial rewards to participants. At a maximum, although possibly politically unacceptable, level in times of local/central government tension, the project may have been further empowered to impose financial penalties on those whose collaborative efforts did not match agreed levels of effectiveness. Clearly such an approach is used in industry and, arguably, as the education system shifts towards consumer domination away from producer domination, which is the government's apparent intention at the time of writing, the imposition of financial penalties might become increasingly acceptable in such a context*.

According to Heywood[14], Kinsman had identified three types of personal philosophy prevailing in Britain. The sustainers

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* Hoyle[13], referring to Clark's American study of collaborative development, quoted Clark's summary which, by analogy, supports this argument:

"The pattern of influence sums up as follows: it was set in motion from the top, by a federal agency and a private national committee. Its object was to affect grass roots educational practice which was seen as a national weakness. This flow of influence is downward, through a chain of independent groups and organisations who find it in their interest to enter the alliance or compact. A federal agency provides the funds; a private non-profit group receives the money and develops a new course; commercial firms carry the new materials to all corners of the existing decentralised structure; dispersed universities and colleges train teachers in all regions of the country to the new materials; existing local authorities adopt the materials and allow their teachers to reshape the local courses. Decision making in this pattern, right down the line, is heavily influenced by the prestige of expertise."

"cling to existing standards of living"; the outer-directeds strive for success and achievement; and inner-directeds are preoccupied with self development and a balanced way of life. Kinsman argued that in Britain the third philosophy was increasingly influential: its individualistic requirements made management more difficult. He also argued managers require a more sophisticated appreciation of this, and better developed capabilities within a fragmented "co-creation" style of management. The writer's experience as manager within this project reflects Kinsman's views. Lacking the power to control which would have derived from centrally directed funding, he found that reconciling the needs and characteristics of all participants required a great deal of sensitivity, tact, and a willingness to engage in 'horse trading'.

Whilst considering future potential, the limitations of action research, and drawing generalisations from singular case studies, need to be sharply in focus. This innovation was conducted with both success and failure, and in the process certain insights were revealed. These are only singular, however. On the other hand, it is possible to make certain naturalistic generalisations, for example about the paucity of management information systems in educational manpower forecasting here and in general terms, or the importance of product championship and leadership here and in excellent American companies. This strategy, the writer believes, has strong future potential for CDT if certain conditions can be met - these are outlined below. However, it is by no means clear that the retraining sandwich model would work for other shortage subjects like Business Studies, French, Mathematics and Physics.

Arguably, each would require its own dedicated pilot study, particularly designed to determine whether the model is appropriate to the academic structure of the subject.

13.5.2 Issues To Consider In Further Action Research

This section presents a distillation of key issues for future action researchers who are attempting to grapple with qualitative and quantitative teacher shortage. The issues derive from the literature reviewed in chapter 3, and from the findings outlined in chapters 9 to 13. They are expressed below loosely within Comino's four stages of strategic planning, noted in 3.5.4: (1) formulate objectives; (2) devise a plan to achieve objectives; (3) implement and control the plan; and (4) review continuously to determine how well the plan is being implemented and controlled, and how far the objectives continue to be relevant. Within these categories, questions are asked; clear answers to these will be required for future action researchers and innovation managers, in this context, to operate effectively.

(1) Formulating Objectives for the Innovation

(a) What are the precise characteristics of the present CDT teaching force in the region, in quantitative and qualitative terms?

(b) What strategies can be adopted to determine these characteristics if they are not already known?

(c) Which organisations are to be involved in the innovation, and what, precisely, do they expect to gain

from involvement? What expertise and resources can be contributed?

(d) What forms of teacher updating are currently acceptable in the LEAs which are to participate? How are these likely to change during the proposed life cycle of the innovation?

(e) What is the nature of the prevailing system for funding INSET, and how is it likely to change during the life cycle of the innovation?

(f) Can representatives, at appropriate levels of seniority (relating to financial control and decision making), be drawn from each participating organisation, to draw up acceptable objectives, timescales and criteria for the evaluation of achievement?

(g) Can these objectives be communicated effectively to the various parties involved, ie. the funding agencies, LEA officers and advisers, LEA staffing, supply salaries and grants awarding departments, college heads of CDT and admissions administrators, school headteachers and heads of CDT departments, parents, pupils and the teachers to be updated and retrained?

(h) When objectives have been formulated, do they match the requirements and characteristics of each participating organisation? Where mismatches occur, what can be done to minimise the disruption they could cause?

These questions need careful consideration before useful objectives can be precisely stated. Once stated, a plan should be devised. However, given that all human endeavour is necessarily experimental, and, on the assumption that the future cannot be absolutely predicted, it must be recognised that circumstances may require a change in the objectives, the plan or its implementation, just as the CDT Support Through Change project did: hence the need for continuous review.

(2) Devising A Plan

The formulation of objectives should embody intentions, or a vision of what is to be achieved, where, when and with whom. The plan should enable the gap between intention and eventual outcome to be bridged. Clarification of the following will promote the design of an effective plan.

(a) Can funding be drawn together into a single cost-centre under the control of a project manager?

(b) If not, can a small sub-committee, which meets frequently, be empowered to control spending?

(c) Can sufficient time be allocated to develop teaching support 'packages' before retraining commences?

(d) Can advisers be given time to contribute to the design and trialling of these 'packages'?

(e) Can a contractually binding arrangement be used to prevent participants abrogating responsibility by with-

drawing from the scheme before it is completed?

(f) If the answer to (e) is yes, what guarantees can be issued to participants regarding the continued meeting of their own organisational requirements?

(g) Can each LEA employ on temporary contracts (or nominate their own staff) teachers who can be retrained and then guaranteed placements in the authority?

(h) Can LEAs plan ahead to ensure they achieve maximum benefit from the scheme's placements through its whole life cycle?

(i) Would it be preferable to retrain non-CDT teachers during a one year, continuous course, then employ them for three terms in year two as supply teachers, and finally issue them with a certificate at the end of year two?

(j) Can the plan, and its implementers, respond rapidly to unforeseen events?

(3) Implementing, Controlling, Reviewing

(a) What kind of managerial and operational staffing will be required to implement, control and review the plan?

(b) How can they gain credibility in the eyes of each participant?

(c) What training and other support will they require?

(d) What financial and office resources will they require?

(e) Would it be advantageous to lodge them in a high profile, but professionally neutral institution, such as a university?

(f) Have sufficient funds been made available for sound and thorough external evaluation?

(g) What are the resources and expertise that each participating organisation is to bring to the project, and how can they be effectively integrated?

(h) What is required to promote collaboration between disparate organisations and individuals?

(i) What is required to predict and manage discontinuities? How can external evaluation yield information to promote effective discontinuity management?

13.5.3 Conclusion

The CDT Support Through Change Project was conducted with objectives, a plan, and a means of implementing, controlling and evaluating this plan. There were deficiencies in each of these areas, as can be inferred from the need to answer the questions posed in 13.5.2. This was to be expected, given that it was a unique project carried out by relatively inexperienced individuals. As such, it experienced success and failure, and

generated new insights into the nature of the techer supply problem and into ways of solving it. These insights have been documented in this study, and if they are read in conjunction with the questions posed in 13.5.2, the writer believes that future innovators in this field will be able to begin some way in advance of the innovators who established this project in 1985 and 1986.

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SECTION FOUR: CONCLUSION

CHAPTER 14: STRATEGIC PLANNING AND THE MANAGEMENT OF INNOVATION IN SCHOOL TECHNOLOGY

14.1 SUMMARY

The research documented in this thesis rests on a dual assumption, firstly that innovation needs to be enhanced within national industry in order to generate the wealth needed to sustain our culture and secondly that technological education at school level needs to be boosted to contribute to national prosperity and balanced personal development. Just as innovation management in industry needs to be improved, so it does in the sphere of school technology.

The two case studies of innovation management which comprise sections two and three of this thesis are summarised and reviewed. It is concluded (1) that they contribute specific aspects of knowledge to our understanding of the processes of innovation in school technology and (2) that they give rise to four broader generalisations, each compatible with those reviewed from the literature in chapter three. These are: that objectives will be distorted transactionally as innovations move from intention towards outcome; that innovators must clearly define and understand their objectives in order to defend them from drift; that collaborative endeavours need strong central incentives and control; and finally, that communications within innovations need to be simple and clear.

14.2 THE RELATIONSHIP OF THE PRESENT STUDY TO CONTEMPORARY SCHOOL TECHNOLOGY

This thesis documents research which was concerned generally with the role of strategic planning in the management of innovation, and specifically with the extent to which two innovations in school technology were effectively managed.

The research was firmly rooted in the findings from two literature surveys. The first survey focused on the contexts - cultural, epistemological and professional - within which school technology was evolving. Conclusions from the survey are summarised below.

Firstly, in the late nineteen eighties, Britain remains in the advanced industrial international community but its economic and technological progress continue to be subverted by certain negative cultural forces. These include: a historically pervasive, gentry-oriented, anti-industrial value system; the twin cults of the 'practical man' - who disdains formal training and qualifications - and of the 'educated amateur' - who lacks specialised professional skills; and the relatively high rewards received by people working in finance compared with those working in the technological spheres of industrial manufacturing.

Secondly, Britain has experienced relative economic decline for at least a century, and this decline is related to the negative forces noted above. In the face of accelerating technological innovation taking place within major industrially competing nations, Britain's capacity to create the wealth required to maintain and develop its civilization and culture, and to promote individual well-being, will continue to erode unless it innovates

more effectively. Assuming that wealth creation is a worthy goal, and that successful industry creates wealth, it follows that industrial innovation should be promoted. Present government policies seem to be designed to create a climate in which innovation might flourish.

Thirdly, British culture thus rests on technological foundations which need strengthening. If the British people finance education to help induct students into their culture and to develop their individual potentials - a dual assumption on which this thesis rests - then it can be argued that students need to derive technological awareness and capability from their general education. This argument is clearly supported by the present government's decision to incorporate Technology in the compulsory national curriculum for state education in the 5 to 16 age range. The writer believes that, providing certain levels and qualities of people and system adaptation can be effected, school technology education will: (a) improve technological awareness and capability in the general population, which will in turn support national efforts to regenerate industry and its capacity to create wealth; and (b) raise the quality of learning in schools by making it more active, and by complementing traditional goals of learning <u>that</u> something is the case, and why <u>(propositional knowledge), with</u> goals of learning how to be <u>effective and to achieve</u> (capability).

Fourthly, although the Education Reform Act of 1988 requires an enhancement of school technology education, this is only an intention. As in all social systems, there is a significant gap to bridge between intention and eventual outcome, and generally, the outcome will not precisely mirror the intention because it

will have been modified - transactionally - in the innovatory journey from intention to outcome. The inertia embedded in the three interlocking contextual sub-systems - cultural, epistemological and professional - will tend to slow down and distort progress. On the other hand, in the belief that individuals and organisations can exercise degrees of 'free will' and are not rigidly pre-determined, there is capacity within our culture to surmount barriers and implement innovations.

At the time of writing, political, economic and technological innovations are being proposed and implemented in various parts of the national framework, including the education system. A fundamental tenet of the present study is that school technology, as one such innovation, can be promoted providing that it is effectively managed.

Thus, a second literature survey was made, to focus on the management of innovation in three pertinent fields: curriculum development; innovation diffusion; and industrial management. The gap between our intentions and eventual outcomes was further highlighted here as a key issue to resolve. It was seen to relate to an evident gap between human technological and emotional adaptivity, the latter generally lagging behind the former because of our strong innate and culturally engendered needs for emotional security and stability.

Gaps between intention and outcome in school technology are evident at different layers of the education system, but attempts to bridge the gap are increasingly being made, for example through TVEI development programmes. Strategic planning was identified as

a prime requirement for effective innovation at each level. A four stage process of (1) setting objectives, (2) formulating a plan to achieve them, (3) implementing and controlling the plan, and (4) continuous review, was examined as a strategy to aid achievement. However, the need to be prepared for the irrational and unforeseen, and to capitalise on serendipity, was acknowledged.

Within the context of this mode of strategic planning, a cluster of tactical aids to overcome barriers and promote achievement was examined. These included: managing communications within networks of individuals; promoting people adaptability by, for example, clarifying values, offering incentives, negotiating, conferring personal meaning, effectively leading, supporting individuals and product champions, promoting collaboration, and sensitively managing sequences of events within the strategic plan, with particular cognisance of the way progress frequently follows S-curves of development.

It was concluded that essential concomitants of innovation in this context are (1) <u>people adaptability</u> and (2) <u>institutional adaptability</u>. The extent to which strategic planning will facilitate innovation will depend on the levels of people and institutional adaptability which are engendered and sustained.

Within this dual context of technology education and innovation management, action research was identified as an appropriate way in which to pursue the present study. Two forms were selected to link into the two case studies of innovation management which comprise the core of the thesis. The "teacher-as-researcher"

model was used with the Manchester Concept Base CDT innovation; the "simultaneous-integrated" model was used with the North West CDT Support Through Change innovation.

The research carried out was thus applied and developmental; the two innovations were implemented and evaluated within parameters derived from the literature. Although action research into the operations of social systems such as education is problematic because of (1) the sheer complexity of the variables, (2) the fundamental penetration of individual and organisational values, (3) the imprecision of control in research which must follow action, and (4) the occurrence of the unforeseen, it is possible to generalise by comparison with other studies and the literature. This was carried out within both case studies in order to evaluate the contribution each made to the development of knowledge about the evolution of school technology.

14.3 THE CONTRIBUTION OF THE CASE STUDIES TO OUR KNOWLEDGE ABOUT THE MANAGEMENT OF INNOVATION IN SCHOOL TECHNOLOGY

14.3.1 The Manchester Concept Base CDT Project

As indicated in the introduction to section two of the present study, the hypothesis tested in this piece of "teacher-as-researcher action research was:

"that a concept base approach to CDT education can be developed and implemented by teachers collaborating, and being aided by the LEA CDT inspector, within the course of their professional duties, whilst insights are revealed, through systematic study, into the detailed forces impinging upon this innovation in the Manchester LEA."

In outline, the three major findings were:

(1) that as a system of starting points for CDT teaching, the innovation can be developed and implemented, providing certain barriers are surmounted and resourcing is increased;

(2) that the innovation taken as subject content, or even more so, as a cross-curricular organiser of learning, is problematic;

(3) in times of turbulence and rapid change, the innovation requires more effective strategic planning for widespread implementation.

It is possible to generalise from certain of the findings of the project, in particular by relating them to published findings from previous innovations, surveyed in chapter three. The generalisations are set out below within the four stages of the general strategic planning cycle adopted throughout the thesis: (1) objectives; (2) plan for objectives attainment; (3) implementation and control of the plan; (4) review.

Firstly, with regard to the setting of objectives, where these were clearly and simply stated, as they were prior to the formulation of two teaching packages by the pilot working party, evidence of achievement was readily recognisable. In a broader sense, however, they were not clearly stated, or even well understood. CDT in the city lagged behind the best of national good practice and the innovation - with its focus on making to meet human needs, on cross-curricular organisation, and on open-ended active-learning - represented a major potential leap forwards for its predominantly traditional craft teachers. The

innovation was brought to Manchester by its product champion, Rogers, in an undeveloped form. As such, its lack of clear objectives made it difficult for teachers to understand and the tensions and confusions witnessed during attempts to develop and implement aspects of the innovation arguably reflected the conclusions about the need to effectively communicate to potential adopters highlighted in the literature (see section 3.5).

For the innovation to have been more successful in this sense, the writer concludes that its objectives required a more obvious meshing with currently accepted and developing policies and ideologies, at a time when much development was taking place in school technology. This might have required a distortion of the innovation which could have been tolerated providing that a long-term incremental approach to its development was acceptable and that its objectives evolved within the intentions of the innovators; such a distortion, however, would have enabled the innovators to sail along the prevailing developmental currents, with their widely acceptable definitions of what counts as school knowledge, such as TVEI and GCSE. This would, additionally, have pre-empted the rarely articulated, but perceptible view, especially within the examination board, that the innovation represented the inspector's personal 'empire building', a view with which the writer disagrees but which he nevertheless detected.

Furthermore, greater philosophical coherence was required (a) in terms of the extent to which the concept bases were project starting points, knowledge, or cross-curricular themes and (b)

in terms of logical relationships between learner motivation and studying aspects of the 'human condition' through active methodology.

Philosophical confusion, lack of simple and clear objectives, and divergences from increasingly centralised definitions, and their localised interpretations, of what counts as school knowledge were evident. They combined with ineffective and unpersuasive communications to invite the closure of the project in the face of the refusal of the examination board to accredit its GCSE syllabus. Other factors in this closure are commented upon below; from the point of view of objectives, however, greater clarity was undoubtedly required.

Secondly, with regard to the formulation of a plan to achieve objectives, the writer, as director of the pilot project, planned to achieve the objective of using and evaluating strategies to bring about concept base approaches to CDT in the city. Manchester was a large and well-funded LEA. It had a sophisticated provision for INSET and a highly paid cadre of inspectors together with machinery for curriculum development in TVEI and the city's Education Development Service. Rogers, the CDT inspector who brought the innovation to the city and acted as product champion and mentor to the development group, firmly believed in the professionalism of teachers and in his responsibility to help them feel 'ownership' of innovations in which they participated. This, together with major demands on his time from other parts of his role, militated against the formulation of a detailed plan, with timescales, resource identification and criteria for evaluation. With hindsight,

this would have been difficult given the relative small scale and unofficial nature of the project, and the traditional autonomy of schools. However, the writer believes that more impact would have been made on Manchester CDT by this innovation had a detailed plan been conceived within conventional machinery for development in the city, notably TVEI and the Education Development Service. In particular, TVEI has as a prime objective the promotion of equal opportunities for girls and boys, and the encouragement of more girls to study technology. The links between this innovation and 'issues-based' curricula designed to appeal to girls (see section 5.3) arguably would be an effective entry point for concept base CDT into TVEI machinery. Once established here, it would be possible to participate in mainstream planning, not just in Manchester but throughout the north west region, thus enhancing synergy. The recently published North West TVEI document 'Technology For All'[1] supports this argument with its orientation towards issues in technology education.

Thirdly, with regard to implementation and control, the innovation also suffered from its lack of detailed planning. The innovation's pilot phase was implemented by a working party chaired and jointly controlled by the writer, with particularly strong control emanating from the inspector. In addition, a high school department operated independently of the working party, very much under the control of its head of department. The failure to induce collaboration between the two groups, whilst reflecting the presence of 'ownership', arguably reduced the innovation's early impact. In its latter stage a combined group sought to achieve external examination accreditation. Of

the various barriers erected against achievement, the constraints of the external examination system and the increasingly bitter industrial action in schools combined to eventually suspend development. Notwithstanding this, certain achievements were evident, and these were connected to the deployment of certain tactics to overcome barriers: their effects mirrored the findings from the literature reported in chapter three. As a radical and demanding innovation, it required collaboration between talented and committed teachers. They needed effective leadership to engender high group productivity and a variety of intrinsic career and promotion related incentives. Individuals were made, by Rogers, to feel that they were participating in an important avant-garde activity and were members of a 'winning team' receiving regular positive reinforcement. When their actions bore fruit, for example in the development of teaching materials, individuals felt, and expressed, surges of satisfaction which prompted increased effort.

However, the writer believes that greater use could have been made of other tactics such as: the encouragement of internal competition between school CDT departments; further developing communication networks within the LEA and beyond; promoting more precisely focused, and monitored, experimentation in schools where able and sympathetic CDT teachers were employed; and finding ways to demonstrate the innovation, in practice, so that teachers could evaluate actuality rather than descriptions of what might be.

Finally, those individuals involved were clearly highly

committed and perceived intrinsic and extrinsic benefits to be derived from participation. To spread the innovation more widely, amongst teachers without such commitment and talent, would require the generation of incentives of a different order, such as release from teaching for development work and money for the purchase of materials and equipment. Arguably, both forms of incentive could be obtained from within TVEI machinery. On the other hand, the 1988 Education Reform Act may well place a mandatory onus on teachers, who are currently reluctant to modernise, to be more innovative in order to meet the curricular goals which the Act sets for them.

Fourthly, with regard to continuous review of the objectives, plan, and its implementation, review actually featured prominently at all phases of the innovation. On the one hand the various development groups conducted a constant soul-searching exercise in the face of doubt and uncertainty. On the other hand, the project was reviewed by the writer during his personal research. However, there are at least three areas in which the writer believes that greater efforts to review would have paid dividends. Firstly, determining the views of headteachers, and explaining the innovation to them, would have helped the group to penetrate one major power centre given that headteachers have much experience, and a great deal of control over what constitutes the curriculum, and particularly the teaching methods, of their schools. Secondly, a closer scrutiny of national trends towards central definition of subject content would have given the group a more accurate basis from which to evolve its GCSE syllabus. Finally, engaging the services of an educational philosopher would, arguably, have enabled the group

to resolve some of the philosophical inconsistencies which lay at the heart of this innovation.

Clearly, any future attempt to promote concept base CDT in the city would benefit from an effort to fill these holes in its strategic plan. However, given the size of the gap between current CDT practice in the city and the vision enshrined in the innovation, a prolonged and intensive management of the strategy would be required for effective implementation. At the time of writing, the writer believes that the TVEI curriculum development movement provides the most appropriate machinery with which to facilitate such implementation, but recognises that the impending national curriculum may render this obsolete, or at least change its orientation.

14.3.2 The North West CDT Support Through Change Project

As indicated in the introduction to section three of the present study, the hypothesis tested in this piece of 'simultaneous-integrated' action research was:

"that the five main aims of the project can be strategically implemented through managed collaboration between specified agencies, whilst revealing insights, through systematic study, of the detailed forces impinging upon CDT teacher supply in the north west region."

In outline, the three major findings were:

(1) under certain conditions, the five project aims were achievable in the region;

(2) differences in the goals and customs of individuals and

organisations rendered collaboration difficult;

(3) poor management information systems in the region did not reveal that the quantitative shortage of CDT teachers - an assumption on which the project had been evolved - was illusory.

As in the previous section, it is possible to generalise from certain of the findings of the project, in particular by relating them to published findings from previous innovations, surveyed in chapter three. The generalisations are set out below within the four stages of the strategic planning cycle adopted throughout the thesis: (1) objectives; (2) plan for objectives attainment; (3) implementation and control of the plan; (4) review.

Firstly, with regard to the setting of objectives, the project began operations with five very clear aims to achieve. These aims had expanded during the evolution of the project to incorporate retraining non-CDT teachers to qualified CDT teacher status. This was necessary to ensure that they would receive financial support, given that TRIST was unable to support them. As such, the compromise also reflected poor manpower intelligence in the region as it later became apparent that there was no need in the region to increase the quantity of CDT teachers. Within its strategic plan, however, the project did have clear and well understood objectives: one of them was simply based on a false premise.

Secondly, the project had a well thought out - in outline - plan to achieve its objectives. Its multiple sandwich nature was

widely acclaimed as an exciting attempt to combine the achievements of a number of major objectives together. A detailed timescale was coupled with explicit sub-sections of activity for each participating organisation to carry out under the central co-ordination of the project director and his consultative committee. However, it rested on certain assumptions, or misconceptions, which led to great difficulties in implementation and control including: that there was a demand in the LEAs for the college one-term updating courses; that members of the consultative committee had sufficient authority in their base organisations to be able to induce their adaptation to the innovation; that the DES would ensure that retrainees in a national shortage area would receive adequate financial support; and that the new funding system for INSET would facilitate the complex collaborative interactions within the project. The repercussions from failure to predict the problems generated within these spheres induced, in what initially had seemed to be a sophisticated and well thought out plan, a number of serious operational problems which are summarised below.

These problems surfaced during attempts to implement and control the plan, the third stage of the strategic planning model adopted. Firstly, collaboration was considered to be essential to pool resources to solve a difficult cluster of problems. Indeed collaboration of a high order was induced and this led to significant goal achievement. However, its occurrence depended on product championship of an intense nature, it was generally accompanied by disruption for the collaborators, and it was

always easy to emasculate because the central project team did not have control over the bulk of the money spent within the project. Secondly, the recruitment and retraining of non-CDT teachers to teach CDT effectively was conducted with some success - given the generous resources allocated for recruitment and the development of curriculum support packages - indicating that a degree of people adaptability was brought about. However, at system level, adaptability was not so well achieved as the DES in particular, together with certain LEAs, were not able to furnish levels of financial support seen to be adequate by the grant-aided retrainees. Thirdly, with regard to the future potential use of the project strategy, it became clear during implementation that the new funding system for INSET, designed to encourage schools to accurately identify their training needs, led to fragmentation and discouraged collaboration between LEAs and colleges. When this was coupled with the differences in management styles, personal goals and institutional customs, the dynamic conservatism within the system came sharply into focus. The promotion of synchronised meshing between disparate people and systems, based on their adaptation, therefore required a high level of energy expenditure initially from the product champion and latterly from the project team and consultative committee members. This goal conflict may have been reduced had participants, early on, had the opportunity to articulate and negotiate their specific goals within the consultative committee. On the other hand, it is doubtful if participants would have recognised the nature of some of their 'hidden' goals at the outset, given that these evolved in response to such unforeseen - in detail - events as the new funding system for INSET. The writer believes, however,

that synchronised meshing would have been far easier to achieve had greater central control of funding, and hence incentives, been in his possession as project director.

Fourthly, with regard to the review process within the strategy, as in the Manchester concept base project, participants constantly reviewed their efforts given that they were all carrying out novel and uncertain tasks. The writer also regularly carried out evaluation exercises as part of his personal research activity. However, there are at least four areas in which the writer believes that greater efforts to review would have paid dividends. Firstly, careful market research to determine quantitative manpower requirements would have discouraged the project's originators from incorporating an unnecessary teacher re-training element in the scheme. Secondly, given the increased levels of INSET needs diagnosis and freedom to pursue alternative models of INSET provision conferred by the LEATG system, advisers and college heads of department would have potentially reduced the mismatches between need and provision had they conducted a combined survey of INSET needs, required delivery methods, and the colleges' and LEA's joint and separate capacities to meet needs appropriately. Thirdly, given the large amount of taxpayers' money spent on a project like this - estimated by the writer at over £1.5 million - officials in the DES's Teacher Training Branch would arguably promote greater cost effectiveness if they reviewed ways of concentrating central financial support to minimise conflict and abrogation of agreements within. Fourthly, with hindsight, greater efforts should have been made by the writer and the consultative committee to determine the extent to, and the

directions in, which compromises and discontinuities were deflecting the project away from its goals, and to follow by taking stronger corrective action.

Any future attempt to use this retraining model would benefit from an effort to resolve these problems within the strategic plan. One essential precondition, however, overrides the others in the writer's opinion. It would be particularly beneficial, in striving to bring about this level of collaboration and synchronised meshing, if system level changes were made within the DES. This of course has implications for national policy, although the writer recognises that such a project can only be regarded as a minor consideration within the scale of policy formulation conducted within such a large government department as the DES.

14.3.3 Overview

This study has been concerned with the operation and evaluation of two case studies of innovation management in school technology, carried out within parameters of the literature of innovation, and in recognition of the contextual backcloth of technology education. As such, specific conclusions relating to the contribution each study has made to our knowledge about innovation processes in this domain have been discussed in this chapter. It is possible, however, to express certain broad generalisations, common not only to the findings of each case study, but also to the literature reviewed in chapter three. These are set out below by way of a conclusion to this thesis.

Firstly, innovation requires a journey from (a) an intention to

(b) a desired outcome. The journey from (a) to (b), within a social system, will inevitably be accompanied by transaction and drift and will inevitably require people and system adaptability. The success of the innovation will be directly proportional to the extent to which transaction and drift can be replaced by adaptation.

Secondly, the journey from intention to outcome will always imply the formulation and understanding of objectives. However, given that all human endeavour can never be more than experimental, at least until such time as futures can be accurately predicted, innovators must accept the inevitability of discontinuity leading to drift. Their success as innovators will depend on their response to this drift, in particular their capability to take corrective management action. This has implications for their awareness, flexibility, ability to respond appropriately, and willingness to negotiate, keeping their objectives at the forefront of consciousness but accepting that some compromise may be necessary.

Thirdly, to induce people and systems to adapt to collaborative activity requires either appropriate incentives or sufficiently prestigious or powerful leadership, or both. Without this kind of focus for participants, it is difficult to see how they can be co-ordinated and transformed into an effective goal oriented unit.

Finally, no matter how strong the leadership or incentives, how deftly innovators negotiate transactions within their journey from intention to outcome, or how sensitive and flexible they

are, unless the objectives and rationale for the innovation are clearly and simply communicated, there will be an ever-present danger of their being misunderstood or rejected.

14.4 SUGGESTIONS FOR FUTURE WORK

This study contributes to growing knowledge about innovation management in school technology in the ways identified in this chapter. In doing so, it highlights a number of areas which would be profitably investigated by future action researchers and innovators in the field. These can be summarised as follows:

Firstly, the objectives of the innovation need careful definition and clear understanding. As this will depend on the contextual barriers to, and opportunities for, the innovation, innovators might investigate the characteristics of the context of their proposed innovation before they begin, and continuously as they proceed. This may include an analysis of different perspectives on the context if collaboration between different parties is envisaged.

Secondly, and following from the first, innovations will follow a route from intention to outcome. Given the inevitable forces acting to distort the innovation on this journey, it would be profitable (a) to investigate the potentially distorting forces, and their strengths, on the proposed journey and (b) develop fallback positions within the strategic plan to manage discontinuity and drift.

Thirdly, given that an innovation is likely to disrupt the individuals and organisations in which it seeks to induce

adaptability, an analysis of their motives and traditions, together with an identification of incentives which might help to induce adaptability, should help to reduce conflict and resistance as the innovation proceeds.

Finally, the more precisely agreed criteria for the success of the innovation can be defined at the outset, the easier it will be to set up reliable and valid evaluation procedures with which to judge the innovation.

14.5 REFERENCES

1. North West Region TVEI Co-ordinators, 1988, 'Technology for All'. Rochdale LEA TVEI Centre.