Creativity, connoisseurship and change: the application of the connoisseurship model of qualitative evaluation to ms investigation into the development of creativity w primary school children and to the process of improving educational practice

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ABSTRACT

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CREATIVITY, CONNOISSEURSHIP AND CHANGE: THE APPLICATION OF THE CONNOISSEURSHIP MODEL OF QUALITATIVE EVALUATION TO AN INVESTIGATION INTO THE DEVELOPMENT OF CREATIVITY IN PRIMARY SCHOOL CHILDREN AND TO THE PROCESS OF IMPROVING EDUCATIONAL PRACTICE

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The research described within this thesis aims to integrate two radically differing approaches to investigating classroom life and to bring them together within one investigation in such a way that they inform and complement each other. These two approaches are the traditional, experimental, deriving from a scientific basis and the qualitative, illuminative, deriving from an artistic basis. A model of qualitative classroom evaluation known as Educational Connoisseurship and Educational Criticism is employed within a traditional experimental research design.

A second major aim is to document a substantial investigation into the development of creative or divergent thinking abilities in children of primary school age and illuminate some of the inter-relationships that exist amongst the development of creativity, curriculum development and approaches to the organisation of teaching and learning.

Finally, it is aimed to produce an end product which may be used as the basis for curriculum development work and the professional development of teachers and students in training. Qualitative and quantitative data presented are certainly of educational significance and may be used in in-service and initial training courses. The conclusions are well timed to inform the National Curriculum debate and contribute data that will be useful to all teachers who are considering approaches to the overall curriculum framework and methodologies that they may employ in the future.

It is concluded that it is certainly possible to harness and nurture divergent thinking abilities in primary school classrooms and that there is a definite relationship between teaching method/approaches to curriculum organisation and the development of children's creative potential.

It is also demonstrated that the combined use of the methodologies utilised would appear to have tremendous potential for deepening our understanding of classroom processes and for making informed recommendations about approaches to teaching and learning.

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VOLUME 1 OF TWO VOLUMES

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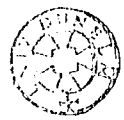

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DECLARATION

The author declares that this is her own original work. No material contained herein has been submitted previously for a degree of this or any other university.

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INTRODUCTION

"For the kind of educational science we need, we will have to design our own ship and sail it into the waters we seek to map.
For the language of criticism we need, the philosophical and political space must be provided for new forms of disclosure to be developed. Educational research will come of age when we muster the courage to move ahead in both domains so that we can, without qualification, doubt or hesitation, say with confidence that educational research truly does inform educational practice".

Elliot W. Eisner

The ideas and inspiration for this research derive from two major sources. In 1980-81 a small scale investigation was undertaken by the author which was concerned with curriculum organisation and the development of primary school children's creativity, or divergent thinking abilities. It was therefore concerned with academic theory derived from two distinctive areas of education, namely curriculum theory and educational psychology. This previous empirical investigation made a comparison between one class of children which completed a year's work based on a subject-orientated, non-integrated curriculum and a parallel class of children in the same school which completed a year's work based on a totally integrated curriculum. Tests of academic achievement and of divergent thinking were administered to both classes at the beginning and end of the year's work. At the end of this time, significantly higher scores on several tests were attained by the children who had followed the integrated curriculum. The sample used within this investigation was very small and the data obtained was entirely quantitative. Results nevertheless were interesting, suggesting that there may indeed be a relationship between curriculum development and the nature and nurture

of children's thought processes. Without doubt, the study raised many more questions than it resolved. It was concluded that a further and far more substantial investigation would be very worthwhile which embraced a larger sample size, that is, several classes and in different schools, and which attempted to illuminate reasons for the statistical outcome rather than merely presenting quantitative data as a conclusion in itself.

Shortly after the completion of this earlier investigation, the author was privileged to study for one year as a research student of Professor Elliot Eisner at Stanford University, California. Studies and research throughout this time focused on a model of qualitative evaluation of school classrooms being developed by Eisner, known as Educational Connoisseurship and Educational Criticism. This model aims to illuminate the subtleties and complexities of classroom life and reveal dimensions of teaching and learning situations which statistical data fails to address or identify. Whilst being very critical of traditional experimental investigations, Eisner clearly acknowledges that his own methodology may be used alongside or as an integral part of more traditional research designs. He suggests that

perhaps in an experiment, a treatment will produce an effect, but from the data derived, it may not be possible to ascertain why these results are achieved. The Connoisseurship and Criticism model may well aid in the interpretation of such results and in the formulation of further worthwhile hypotheses which may be investigated. To date no such combination of methodologies has been documented and no investigator has attempted a research design employing this model in English primary schools.

It seemed very obvious that as a result of these two experiences, namely the small scale experimental study and the exposure to Eisner's philosophy and methodology, that the two should come together and contribute to a far more substantial volume of research. From this inspiration, the present thesis evolved.

It has three major aims. The first of these is to attempt to integrate two radically differing approaches to investigating classroom life and to bring them together within one investigation in such a way that they inform and complement each other. These two approaches are the traditional experimental, deriving from a scientific basis and

the qualitative, illuminative, deriving from an artistic basis. In attempting to fulfil this aim, aspects of the originality of the study may be identified. It is probably the first attempt to employ the Connoisseurship and Criticism methodology in English primary schools, it is the first doctoral thesis to be produced in England which presents data arising out of this methodology, and it is perhaps the first attempt at integrating this model within a traditional experimental research design. All of these matters were discussed with Eisner and the Stanford research team and it was concluded that perhaps a doctoral research programme was a very appropriate forum for attempts at originality of this kind.

The second major aim is to document a substantial investigation into the development of creative or divergent thinking abilities in children of primary school age, and the inter-relationships that exist amongst the development of creativity, curriculum development and approaches to the organisation of teaching and learning.

Finally, it is aimed to produce a thesis which is not an 'end in itself' but which may be used as

the basis for curriculum development work and the professional development of teachers and students in training. In other words it is intended to present data that will be of significance and use in in-service and initial training courses. The study was actually designed and organised before the advent of the Educational Reform Act and the National Curriculum for schools. Nevertheless, its conclusion would seem perfectly timed to inform the National Curriculum debate and contribute data that will be most useful to all teachers who are considering approaches to an overall curriculum framework and methodologies that they may employ in the future. It is firmly believed that the dissemination of data and informed conclusions contained within this thesis may go some way towards assisting teachers in a positive interpretation of the National Curriculum - that is, as an opportunity within a framework, to build on existing good practice in primary education.

The opening chapters of the thesis are an overview of the literature and research relevant to the key academic areas which underpin the whole and are inter-related within the empirical investigation. These include the concept of creativity, the

Connoisseurship and Criticism model of classroom evaluation and curriculum integration with particular emphasis on the aesthetic experience as a basis for integrated learning. The curriculum area of environmental education is then given particular attention as this is the basis for the development of the children's work which is documented within the empirical investigation.

The investigation itself is organised within the framework of a traditional experiment. A sample of children is selected and placed within an experimental setting. Children's creative thinking abilities are pre-tested and post-tested and statistical analysis is employed to ascertain whether there is any difference between pre- and post- treatment scores. Six classes of children are involved in the study, one in each of six different schools. These are sub-divided into three Experimental classes and three Control classes for the purpose of the experiment. During the year between the pre- and post-treatment testing the two groups of classes work according to very different styles of curriculum and classroom organisation. All work however, is based on the children's first hand experiences derived from visits to an environmental education

centre. At the termination of the experiment, research hypotheses are supported and conclusions drawn.

Within and alongside this traditional quantitative methodology, however, is interwoven the qualitative approach to understanding classroom life. The researcher and a research assistant take on the role of educational connoisseurs. Criticisms are written to try to illuminate the complex processes and inter-relationships occurring within the classrooms of the sample schools. Results are a vivid portrayal of the complexities of classroom life. Alongside the written words, is an accompanying video tape. This provides essential data necessary for analysing the classrooms and writing the final criticisms, and also serves the purpose of providing the reader with a source of referential adequacy when analysing the accounts.

Both methodologies and forms of data could have been employed independently of each other as sound approaches to educational research. Utilised alongside each other, they confirm research hypotheses, illuminate many of the complexities contributing to these outcomes, and identify other

phenomena that warrant further investigation. It is demonstrated that their combined use would appear to have tremendous potential for deepening our understanding of classroom processes and for making informed recommendations about approaches to teaching and learning.

Essentially this study is ambitious in the sense that it attempts to integrate two very different methodologies or paradigms. It is also extremely wide ranging, covering three major theoretical areas and a complex empirical investigation. The reader is asked to bear in mind the inevitable omissions and perhaps superficial treatment of certain theoretical aspects. In the limited words available, it is intended to demonstrate a working knowledge and understanding of the essential academic theory, application of this to an empirical investigation and an informed awareness of some measure of the inter-relationships that exist between the areas of curriculum theory and educational psychology.

Above all it is hoped that the entire work is interpreted as an original investigation undertaken in order to gain substantially improved insights into and knowledge of children's thinking

and learning, which may be of practical benefit to those who seek to improve the quality education in our primary schools.

CHAPTER 1

THE CONCEPT OF CREATIVITY

CHAPTER 1

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1.1 INTRODUCTION

The central problem with an attempt to make a comprehensive study of the field of creativity is where to start. A definition alone is a sufficiently large problem. The aim of this chapter, set within the context of a study which inevitably must include an overview of other key concepts and issues in education, is to highlight certain aspects of creativity, particularly those which have relevance for teachers of children. These aspects will be illustrated with reference to original material and research.

From the outset, it is useful to note that the literature dealing with creativity, its nature and its relationship to intellect and to achievement can be broadly divided into three groups :

i) That which suggests that creativity is a distinct and separate aspect of intellectual functioning, which is independent of conventional 'intelligence'.

ii) That which suggests that creativity is dependent on unique cognitive factors which function within a general framework or structure of intelligence.

iii) That which deals specifically with a process of 'creative problem solving' which may be viewed by many as being an essential and inter-related component of the 'umbrella concept' of creativity.

Without doubt, currently existing views on the nature of the concept of creativity are widely differing. As yet, there is no single agreed or unified theory of creativity available for interpretation by educators or psychologists working or researching in this field. As a scientific concept, therefore, creativity remains somewhat indefinite, if not amorphous or confused. Its definition clearly has to do with constructive originality, which may involve the manufacture or construction of a new product, the use of imagination where a novel combination of ideas is constructed, original synthesis of thought or the solving of problems in an original way.

In any study of the nature and meaning of creativity, it is almost impossible to separate the concept from the theories of intelligence, personality, learning and the general psychology of thinking. The forthcoming literature review suggests that creativity may be seen to share a rather vague relationship with these other long-

established educational and psychological concepts. Yet it is possible that one of the key factors contributing to the now widely accepted importance of creativity research is the fact that it does indeed relate to a number of other established fields of study. Furthermore, it could be claimed that work in this area has actually contributed to a breaking down of barriers and the discovery of common elements in fields of psychology that had traditionally been regarded as discrete units for research and analysis.

Certainly the concept of creativity has become increasingly important in academic circles, particularly since the 1960s, and it is now acknowledged as being an integral component of officially recognised educational research and practice. Despite its somewhat indefinite nature, the concept is regarded as being academically illuminating, and extremely useful to psychologists and educationists.

The following review of literature and research in the field confirms this rather indefinite quality of the concept, and reveals that there has been something of a changing emphasis in its interpretation in recent years. This emphasis has moved away from the notion of

creativity as the formation of an original end product and towards the belief that it is a thought process, which is not only shared by and available to all minds, but which is capable of nurture and development. This view clearly increases the significance of the concept to those involved in the education of children, and the organisation of classrooms and learning experiences.

1.2 TOWARDS A DEFINITION - THE CONCEPT AND THE PERSON

Creativity is one of the oldest concepts available for our consideration and understanding. In the first book of the Bible we read a story of creation - a process which lasted six days, resulting in the formation of an end product, the heavens and the earth. Other civilisations and religions have evolved and relate ancient stories of creation. Today, as the third millennium approaches, different and recent perspectives lead us to consider creativity in terms of the human mind, personality and behaviour rather than that which is a process attributable only to God or a supra human force. Nevertheless, both 'old' and 'new' perspectives on the subject share a definition that concerns "making" or "bringing something new into being." The precise nature of this 'birth' process has eluded and intrigued scientists and psychologists throughout many generations.

The paucity of study and research in this field throughout the first half of the twentieth century is notable. Academic psychology of this period seems to have considered the topic as unscientific, indefinite and perhaps all too laden with obscurity, legend and mystery.

The taking over of the word 'creation' by science from religion has been a long, slow process. In 1950 Guilford commented in an inaugural address to the American Psychological Association on "education's appalling neglect of the study of creativity", and also pointed out that of the 121,000 titles indexed in Psychological Abstracts up to 1950, only 186 are concerned with the topic of creativity.

In this address, Guilford suggested four reasons for "this appalling neglect", these being :

i) He considered that creativity had been disregarded as a separate field of enquiry because so many psychologists interested in mental measurement had assumed that it was largely a matter of intelligence.

ii) There is a methodological reason for neglecting creativity. Tests designed to measure intelligence had fallen into stereotyped patterns because of demands for objectivity and ease of scoring. Selecting of answers to questions from a number of given alternatives - as with multiple choice items of group intelligence tests - gives little or no scope for originality of thought.

iii) There was a problem in establishing a

practical criterion of creativity, since creative acts of an unquestioned order of excellence are extremely rare. Galton (1869) in an original empirical study of 'genius' claimed that throughout history the number of 'extraordinary geniuses' was not more than 400.

iv) Most experimental and theoretical study of learning has been restricted to simple instances of animal learning, avoiding the complex phenomenon of insight in human learning. This fact arose from the pervasive influence of behaviourism in psychology, which restricted the field to the study of observable external events and their effects. Concepts such as imagery were thought to be incapable of scientific measurement.

(Guilford 1950)

Since that date, there has certainly been a very great increase in the interest in and incidence of research into this and related subjects. Particularly in the 1960s in America, large scale studies have attempted to report on "the identification of the creative student" and "the nurture of creative talents and abilities." Well known and substantial reports from the United States include those of Mackinnon (1962), Taylor

et al (1960), Taylor and Barron (1963), Torrance (1963), Heist et al (1967), Guilford (1962), Getzels and Jackson (1962) and Wallach and Kogan (1965), many of which are referred to at greater length within this chapter.

Studies on a smaller scale were carried out by British and Continental research workers during this period, perhaps the most well known being that of Hudson (1966). Testing for creativity has also become an established field for development and research since the 1960s, and is accepted as an important integral part of educational packages designed to develop the creative potential of students, such as the Williams Total Creativity Programme (Cole and Parsons, 1974). Also, several researchers have pointed out the trend toward greater variety and availability of tests, as discussed at a later stage in this review of writing and research.

Khatena (1976) noted that creativity research over several decades has produced new theories, definitions and "measures that are finding greater acceptance through use, proper study and refinement."

As a direct result of this extensive work carried out during the 1960s, the concept of creativity has become an important and significant

component of educational, psychological and social research and practice; nevertheless, present day views on the nature of the concept still differ very widely and in many instances creativity is seen as being a facet of other major areas of study, namely intelligence and the testing of intelligence, the assessment of special aptitudes and abilities, learning theory, personality theory and the psychology of thinking. As stated by Freeman, Butcher and Christie (1971)

> "There is as yet no unified psychological theory of creativity available to the research worker or the educational practitioner."

Mary Meeker (1978) discusses the fact that the problem of defining creativity is one with which we still must grapple, and others of the more recent workers in the field - McMullan (1977), Lowenfield and Brittain (1987) - suggest that creativity is a complex three-dimensional concept whose definition is far from straightforward.

An investigation into some of the numerous attempts that have been made to define creativity or to describe a creative act or person confirms the multi-dimensional nature of the topic. It will be noted that definitions frequently fuse together

the meaning of creativity with the characteristics of those who demonstrate the ability. An attempt at clarification follows some examples below.

To further complicate matters, many concepts have often been used synonymously with 'creativity' - for example, 'divergent thinking', 'imagination', 'ingenuity', 'invention', 'discovery' and 'originality'.

According to one writer, creativity is

> "The process of change, of development, of evolution in the organisation of subjective life."
>
> (B. Ghiselin, 1952)

Louis Fliegler (1959) states that :-

> "during the creative act, man manipulates external symbols or objects to produce an unusual event common to himself and/or his environment."

Stein (Taylor, 1955) claims : "Three of the basic assumptions underlying our approach to the problems of creativity are as follows :

i) Creativity is the resultant process that occurs within the individual. In general one tends to judge the creativity of others in terms of "product" that they have produced, or stated differently, in terms of the

"distances" between what they have produced and the status of the field before they came upon the scene. Such an orientation causes us to overlook the fact that creativity is a process. It is a process of hypothesis formation, hypothesis testing, and the communication of results.

ii) Creativity is the resultant process of social transaction. Individuals affect and are affected by the environments in which they live. They do not interact with their environments without changes occurring in both directions.

iii) For purposes of our empirical research our definition of creativity is as follows: Creativity is that process which results in a "novel work that is accepted as tenable to useful or satisfying by a group at some point in time."

Maslow (1962) reminds us that all too frequently creativity is thought of in terms of products (the painting, the symphony or the colour scheme) and that creativity is falsely judged in terms of stereotypes (the artist must be far more creative than the shipbuilder). He makes a useful distinction between "special talent"

creativeness and "self-actualizing" creativeness. The former is concerned with very high levels of ability and achievement in certain fields, such as art, music and literature. It has little to do with the mental health of the creator. The latter is far more closely related to personality and may be described as an energy form, or having the flexibility and free energy to go about life's everyday functions in a creative or individual way. He goes on to say that

> "To the extent that creativity involves the process of construction and unification of synthesis, it depends upon character integration of that person ..... Self-actualizing creatives are less fearful than others, less fearful of other people and less fearful of themselves. They are more self-accepting and this makes it possible for them to perceive and accept reality to a greater degree."
> (Maslow, 1962)

In describing the creative person, Taylor (1963) also comments on the importance of divergent thinking (a concept investigated at further length below), especially in the production of ideas, fluencies, flexibility and originality. "Humor, fantasy and playfulness with ideas are also among the characteristics of truly creative persons." Other traits mentioned include curiosity, manipulation, questioning ability and

restructuring of ideas. Personality characteristics to which he refers are autonomy, independence, femininity of interests, dominance, self-assertion, self-acceptance, resourcefulness, radicalness and complexity of personality.

MacKinnon (1962, 1963) drew attention to his considered characteristics of creative persons as follows :-

> "They are intelligent, original, independent in thought and action, open to experience both of the inner self and the outer world, intuitive, aesthetically sensitive and free from crippling restraints. They also have high energy level, a persistent commitment to creative endeavour, and a strong sense of destiny which includes a degree of resoluteness and a measure of egotism."

In attempting to say what is meant by the term creativity, we must be clear that the term is used far too loosely in everyday conversation; it is sometimes imagined that unconventionality is in itself creative, and that when one person does something in a different way from the majority of others, then this act is a demonstration of divergent thinking. It is quite possible that a divergent thinker may be unconventional, but it is not the unconventionality that makes him or her creative.

In order to summarise a considerable amount

of diverse research into and writing about the nature and meaning of creativity, it would seem that definitions fall into one of four categories, as outlined by Rhodes (1961). It may be seen from the standpoint of the person who creates, that is, in terms of physiology and temperament, including attitudes and values; secondly, it may be explained by way of mental processes such as motivation, perception, learning, thinking and communication that the act of creating calls into play; the third area of definition focuses on environmental and cultural influences; and finally creativity may be understood in terms of its products - such as inventions, theories, paintings and poems. Any definition of creativity, however, must include the essential element of novelty. When creating, we are discovering and expressing an idea, artifact or form of behaviour that is new to us. As George F Kneller (1965) points out, however, novelty alone does not make an act or an idea creative. Relevance is also an important factor. Since the creative act is a response to a particular situation, it must solve or in some way clarify the situation that has caused it to arise.

"An act or an idea is creative not only because it is novel, but also because it achieves

something that is appropriate to a given situation."

An analysis of the writing and research concerned with each of these four categories reveals that by far the greatest amount of work has been concentrated on creativity as a mental and emotional process. An elaboration of this follows in section three of this Chapter.

An attempt to summarise very diverse thoughts and research into the nature of a creative person suggests certain traits that are common to various writings. Firstly, creative people seem to have what may be described as "free energy" which comes from within themselves, suggesting a high degree of psychological health in the sense that they are relatively free from anxiety and feel a sense of worth, well-being and security. Secondly, creativity is demonstrated by those who have been brought up in an atmosphere where creative drives have been encouraged and self-motivation has arisen from early successes. This suggests that parental relationships and attitudes are an all-important factor in the early years of a child's life. Roe (Taylor, 1957) writes to the effect that the encouragement and acceptance of a child by his/her parents can contribute to the development of highly creative

scientific talent. Roe also believes that it is difficult to find freeflowing creativity in a child who is overprotected or whose interests are restricted by parents. This point has vital implications for educators insofar as it reinforces the view that everyone has some measure of creativity, and that this ability is capable of being developed. Finally, it seems to be commonly agreed that those who demonstrate high levels of creativity are able to tolerate disorder or 'conceptual ambiguity' in their lives, and do not suffer from high levels of anxiety when faced with such disorder. Barron (1958) writes at length on this theme, following numerous investigations which show that creative people respond to order and disorder in different ways from those who lack creativity. His findings are that people with high levels of creativity tolerate a disordered situation (such as in a drawing) far better than others, and are able to find "unity in disorder." After numerous test items had been analysed, Barron concluded that creative people are less disturbed by surface imbalance.

As a result of his analysis, Barron developed five hypotheses which apply to creative people :-

i) They prefer complexity and some degree of

apparent imbalance in phenomena.

ii) They are more complex psychodynamically and have greater personal scope.

iii) They are more independent in their judgement.

iv) They are more self-assertive and dominant.

v) They reject suppression as a mechanism for the control of impulse.

(Taylor, 1955)

1.3 CREATIVITY : A MENTAL AND EMOTIONAL PROCESS

Probably the most significant and certainly the greatest amount of research on the subject has concentrated on creativity as a mental and emotional process. In particular, the concept has been contrasted with what is generally regarded as intelligence. Indeed the extent to which 'intelligent' and 'creative' describe different thought processes remains the subject of research and active debate.

> "Creative thought is innovative, exploratory, venturesome. Impatient of convention, it is attracted by the unknown and the undetermined. Risk and uncertainty stimulate it. Non-creative thought is cautious, methodical, conservative. It absorbs the new into the already known and expands existing categories in preference to devising new ones."
>
> (Kneller, 1965)

As Getzels and Jackson write about modes of thought (1962) :-

"The one mode tends towards retaining the known, learning the predetermined and conserving what is. The second mode tends toward revising the known, exploring the undetermined and constructing what might be. A person for whom the first mode or process is primary tends toward the usual and expected. A person for whom the second mode is primary tends toward the novel and speculative. The one favours certainty, the other risk."

Certain research workers have called these two kinds of thought "divergence" and "convergence", notably Guilford: others regard them as "growth" and "safety" (Maslow, 1963) or "openness" and "defensiveness" (Rogers, 1961). Non-creative or divergent thinking is largely measured by an intelligence test, usually calling for a single correct answer. The testee is required to remember, recognise and solve, but not to invent or explore. In no way does he have to speculate or to contribute original thought. Many educators considering creativity as a facet of general intelligence have pointed out the grave limitations of intelligence tests as measures of creative ability. This was discussed as early as 1940 by Witty, and more recently by Thurstone and Guilford (1962). The fact that some high IQ students do poorly in school and some lower IQ students do very well indicates that intelligence, as conventionally assessed, is not the only quality which contributes to achieving success.

In a study by E Paul Torrance (1962), it was found that if gifted children had been classified on the basis of intelligence testing alone, then about seven out of ten of the most creative would have been excluded. Thus "the correlation between intelligence and creativity is high, but not

absolute." (Kneller, 1965). Children with low or even average IQs tend toward lower or average creativity. The opposite, however, is not necessarily true : a high IQ does not necessarily mean that a pupil will have a high measure of creativity. On the other hand, as E. Paul Torrance points out (1964) although not in itself a sufficient condition of high creativity, a high IQ would seem on the whole to be a necessary one.

"Few people are highly creative who are not also highly intelligent."

Indeed, it has been estimated (Walleen, 1967) that an IQ of at least 120 is generally necessary for high creativity, the level varying according to the nature of the creative activity.

Probably the best known research to produce systematic evidence suggesting that creativity and intelligence are separate entities was that of Getzels and Jackson (1962). Children of widely differing ages whose IQ was over 130 were studied. Two sub-groups were formed within the sample, one of highly creative children (as determined by scores on a battery of tests of creativity, including ones devised by Guilford and Cattell) who were relatively less 'intelligent' than the others, and a second group made up of

exceptionally 'intelligent' children as compared to group one but who were lower scorers on the tests of creativity. The two groups were compared on various other characteristics, including school attainment, home background and degree of conformity to expected values. Some interesting results were found including the fact that the 'highly creative' children seemed to come from 'less academic' families, to hold less conformist beliefs and to 'over achieve' in school work (relative to their IQ). The co-workers more importantly reported correlations between tests of creativity and correlations of these tests with IQ. A comparison of these correlations reveals critical evidence suggesting that creativity and intelligence may be considered as separate traits, even though the resultant statistics were not as conclusive as they might have been.

The theoretical work of Mednick (1962) has established the basis for a number of tests of creativity that are concerned with providing unusual associations and relationships. Mednick defines the creative process as

"the forming of associative elements into new combinations which either meet specified requirements or are in some way useful."

A study by Wallach and Kogan (1965) which used Mednick's work as a theoretical base also aimed to clarify whether or not a dimension of thinking called creativity could be established independently of the dimension of thinking we call general intelligence. Wallach and Kogan (after Mednick) predict two different types and rates of 'associative production'. Subjects are presented with stimulus words. A relatively uncreative person could be expected to respond with a large number of usual, common or stereotyped associations which will diminish rapidly. A highly creative person, on the other hand, will produce 'associates' to the stimulus word for a longer period of time, and will eventually suggest unusual, rare and ultimately unique associates in their response. Tests were scored according to the overall number of responses (fluency) and the uniqueness of the responses. The co-workers then examined the correlations amongst these creativity measures and compared them with correlations between creativity and intelligence. Data derived from the study established a definite distinction between creativity and intelligence.

Hudson (1966) undertook a very similar study in England when he tested two groups of boys of above-average IQ and ability. He described his groups as 'convergers' and 'divergers', arguing that these were more realistic terms than 'creative' and 'intelligent.' Rather like Getzels and Jackson, Hudson investigated various characteristics of the two groups. His results revealed differences in personality traits as well as in cognitive style. His findings confirmed the view that cognitive style is not the same as basic IQ.

Hasan and Butcher (1966) on the other hand undertook research whose results were very different from Getzels, Jackson, Wallach, Kogan and Hudson. They subjected children in Edinburgh to a battery of creativity tests and to tests of verbal reasoning, English and numeracy. They also collected teachers' ratings on the children's 'desirability as a pupil.' Their results totally failed to separate intelligence from creativity: indeed, the correlations between the two were as high as they might have been if creativity tests had been administered on the two occasions. Other researchers have confirmed similar findings (Edwards and Tyler, 1965).

Cropley (1966) concludes that

> "It would be wrong to argue either that convergent and divergent thinking cannot be distinguished from each other factorially, as some authors have suggested, or that they are completely independent of each other as has been suggested by others.....It is unacceptable to think of creativity as a separate basic intellective mode."

Burt (1962) critically reviewed Getzels and Jackson's work and asserted that investigators agreed that

> "in all of them (creative activities), general intelligence is an essential and indeed the most important ingredient."

Wall (1960) was particularly concerned with the education of very gifted children, stating that creativity results from a "well-stored mind" and that relatively high intelligence is necessary for this. Wall is suggesting that children with a high level of intrinsic interest and a wide background of experience are far more likely to make creative generalisations. Several American reports produce evidence to support this viewpoint (McNemar 1964, Gardner 1964 and Wallen, 1964).

In summary, therefore, a rather confused picture is revealed. It would seem that there is a strong probability that creativity 'overlaps'

with intelligence, as measured by conventional tests. Certainly it seems unrealistic to make a total separation between the two. Studies in which the traits were in fact separable seem to have been undertaken with samples of very high ability students. Various people have suggested a logical conclusion to this evidence, which is that creativity and intelligence become progressively more distinct from each other as ability levels increase. Studies by Yamamoto (1965) and Haddon and Lytton (1968) confirm this theory. Other workers in agreement include Meer and Stein (1955), McClelland (1958), Anderson (1960), Mackinnon (1962) and Barron (1963).

Finally, no overview of the nature of creativity and intelligence would be complete without further reference to the substantial and elaborate work of Guilford and the Aptitudes Research Project at the University of Southern California. Guilford's view of the nature of intelligence differs remarkably from most other accounts. His theory of multiple intellectual factors is outlined in a well-known paper 'Three Faces Of Intellect', published in 1959. A further account of Guilford's theory is provided in his more recent book, 'The Nature Of Human Intelligence' (1967). His theory is that

intelligence is fragmented into over one hundred independent components or facets; that is, multiple intellectual abilities exist which, taken collectively, may be interpreted as intelligence. The relevance of this theory to the present discussion is that creativity is a subsidiary element within the model as a whole. The Structure Of Intellect model (Guilford, 1959) evolved from attempts to classify the forty or so established factors of intellect and to predict new ones. The model classified abilities in three ways :-

i) Content (the ability to see a difference between visual forms, numbers and meaningful objects.)

ii) Product (a difference between relations and classes and other such mental structures.)

iii) Operation (a difference between processes such as memory and understanding.)

In total Guilford and co-workers identified around seventy intellectual factors, including abilities involved in creative behaviour, especially 'divergent-production' abilities which are concerned with the generation and development of ideas. Divergent Production is one of five categories of operation identified. The others in this group are cognition, memory, convergent

production and evaluation. These five kinds of operations are carried out on four possible kinds of contents (figural, semantic, symbolic, behavioural) and may lead to one of six kinds of product (units, classes, relations, systems, transformations, implications.) Thus he argued that there are three main dimensions to intellect - 'operations', 'products' and 'contents' - and that all three basic dimensions are needed to fully describe an intellectual task.

> "One needs to know i)what kind of material is being processed (contents) ii)what is being done to it (operations), and iii)what kind of result this leads to (product). Hence any intellectual task will elicit particular kinds of operations which are carried out on the contents of the task and lead to a certain kind of products."

The model as a whole clearly distinguishes therefore between 'convergent' thinking - where there is one right answer, which is determined by information given - and 'divergent' thinking which involves the generation and development of ideas about information which is given. Guilford suggests that

> "In divergent production we are looking for logical possibilities. In convergent production we are generating logical necessities."

One of the key ideas arising from this research is that in a typical problem-solving situation (see section 1.4) creative thinking generally involves both convergent and divergent abilities. In other words, the solution of a complex problem involves the sequential use of the two types of thinking. It is also suggested that in everyday life, intellectual abilities are rarely used in isolation from each other. They may combine, and are not necessarily specific.

> "They can be conceived as generalised and generalisable skills, each with certain limitations, but each playing roles in its own area, as witness the fact that any one test for a factor is made up of a list of specific items, all different, from a potentially very large pool, and also the fact that there can be some variation in kinds of items that also involve the factor."

As a result of his research, Guilford devised a number of tests of divergent thinking/creativity. These are based on the notion that there are certain factors of intellect which are important to creativity : for example, sensitivity to problems, word fluency, ideational fluency, semantic flexibility, associational fluency and originality. For each factor which he regarded as important in creativity, Guilford designed one or more appropriate tests. For

example, to test for sensitivity to problems, he has suggested the 'Seeing Problems' test, which requires subjects to list problems which might arise in connection with some common object, such as a tree. Other well known tests include the 'Multiple Grouping Test', the 'Ideational Fluency Test', 'Plot Titles' and 'Possible Jobs'. (See also Section 1.7) He suggests that tests of divergent-production abilities make substantial and unique contributions to predicting academic performance. Other researchers have since developed similar concepts to that of 'divergent-production', notably Getzels and Jackson (1962) and Yamamoto (1964).

Creativity, therefore, has been the subject of considerable investigation, leading to a great interest in our knowledge of the kinds of mental processes demonstrated by individuals recognised as having the ability to produce novel or original solutions to the problems which confront them. Some of these processes are best described as thinking skills or strategies, and are often identified as facets of intelligence. Such strategies include 'convergent' and 'divergent' production. A further comment on the general use of the terms 'creativity' and 'divergent thinking' would seem relevant at this stage. A great deal

of the work connected with divergent thinking has been reported by the relevant authors (including Guilford) as involving investigations into creativity. It would seem that the term 'creativity' is coming to have a highly circumscribed meaning in the field of psychological measurement, although some psychologists (and indeed educators) still use the term very loosely. Although the concept is a very difficult one to use because of its lack of precision, the term has definitely become increasingly accepted by both psychologists and educators as referring to "an intellectual mode characterised by thinking of the divergent kind" (Cropley, 1967). Thus the term means something very like what Guilford refers to as 'divergent productions' rather than what the layman considers to be "creative" (in the sense of an artistic production).

It should also be stressed at this stage that creativity should in no way be regarded as a single quality or ability. Defined as a mental process, the term stands for a group of related abilities such as fluency, originality and flexibility of thought. As Torrance points out (1964) in response to tests, some people show themselves to be primarily fluent, some mainly

original, and so on. It is only because these abilities are often demonstrated in conjunction with each other, although in differing degrees, that a justification can be made for grouping them under the single term of "creativity".

1.4 CREATIVE PROBLEM SOLVING

A most important question to be pursued in the context of this study is "How is creativity related to problem solving ?" A discussion of this question clearly follows on from, and is intertwined with, the ideas expressed in the seminal research outlined above which is concerned with creativity as a mental process. It also leads us to consider new areas of research and issues which have been hotly debated by recent writers in the field. Once again it must be stressed that, as so much has been written on this subject, to attempt any exhaustive analysis is unrealistic.

Any attempt to reduce 'creativity' to one single all-embracing conceptual model necessarily waters down or even washes out the subtle nuances of the multiplicity of theories, findings and experiences to which the term refers. Nevertheless, some general characteristics of the creative process have been shown to exist, and creative problem solving may be regarded as a subset of Rhodes' (1961) "mental process" category of creativity in which he identifies the complexity of thought involved, stages engendered in the process and aspects of the creative act as applied to an exercise in creative problem

solving.

To the 'lay' person it would probably seem that the term "creative problem solving" includes discrepant activities.

> "Would it not appear that the problems of mending a broken heart and pioneering a scientific discovery require dissimilar modes of solution; the former residing in the affective domain, the latter in the intellectual ?"
> (Palmer and Catford, 1983)

It is possible that the focus of these issues may be dichotomised in this way and that one might approach the solving of the broken heart problem in a purely "emotional" vein with feelings, fantasy and an alogical viewpoint, and the solving of the second problem "intellectually" with an analytical, logical and sequential viewpoint. In creative problem solving, however, it would seem that there is no distinct separation between these different approaches. There is, instead, an interweaving of them.

Ghiselin's The Creative Process (1962) and Rothenberg and Hausman's The Creativity Question (1976) include seminal, descriptive and explanatory accounts of individuals' creative acts, including creative problem solving, in both aesthetic and scientific domains. In a majority of accounts it is precisely the apparent

paradoxical union of determined (linear) and undetermined (spontaneous) mental processes that brings about successful and creative solutions to problems. For example, W.B.Cannon (1976) (in Rothenberg and Hausman) emphasizes the role of "hunches",

> "sudden revelations - really unearned grants of insight,"

in scientific advancement. Amy Lowell (1952) expresses the need for both in her creative writing :

> "The first thing I do when I am conscious of the coming of a poem is to seek paper and pencil. It seems as though the simple gazing at a piece of blank paper hypnotises me into an awareness of the subconscious."

To consider further the question of there being two types of thought involved in creative problem solving, reference to the work of philosophers illuminates the potential for harmony in what appears to be a paradoxical union. In philosophical writings, our understanding of, and dealing with the world is frequently described in terms of a dichotomy or harmony of two groups of attributes. The Chinese philosophy of Tao, for example, asserts that opposing forces permeate all

existence, and that optimum functioning, which would include creative problem solving, involves maintaining balance between these forces in a creative dynamic tension. The forces are described as 'yin', the feminine, receptive, dark, emotional; and 'yang', the masculine, aggressive, light, intellectual. Here, the two modes of thought are subsumed in a philosophy that does not simply identify two cognitive styles, but greatly expands the concept of dual approaches. An understanding of this vision of interrelation of two modes of thought involves the use of metaphor (thought being 'feminine' or 'dark') as does a similar duality described by Nietzsche (1911). Nietzsche writes of the worlds of Dionysus (inspirational, ecstatic, unstable) and Apollo (orderly, direct, the patron of intellectual pursuits) and clearly emphasizes not gods, but the necessity for them to come together and to appreciate one another's differences in order that their differing strengths may augment each other to create the most effective way of being.

William James (1950) also identifies two aspects of our thoughts, 'percepts' (direct experience of the world or primary thought) and 'concepts' (more refined secondary thought). He

writes :

> "we see that, for some purposes the one, for other purposes the other has the highest value. Who can decide offhand which is absolutely better ? ..... We must do both alternately, and .... not limit (ourselves) to either any more than a pair of scissors can cut with a single one of its blades."

This view reinforces the necessity of the harmonious use of both types of thought. It is a view described by philosophers and supported by scientific evidence, as the following material illustrates.

It would seem that during creative problem solving (which may be the solving of any type of problem, be it scientific, aesthetic, mathematical or personal) there is a period between completing initial attempts at a solution to a problem confronting the individual and arriving at a successful idea for a solution. Countless attempts have been made to explain this interstice in writings about problem solving procedures and concepts. The literature suggests much disagreement as to whether there is a general model of creative problem solving. Researchers such as Wallas (1926), Koestler (1964), Arieti (1976), Vargiu (1977) and Motamedi (1982) suggest that there is one form. All of these theories

describe a series of stages. For example, Wallas's theory describes an initial preparatory stage when the individual does all the conscious work possible towards solving the problem. This is followed by a stage of incubation when the problem is 'forgotten' or left alone. During this time, ideas may 'germinate' without any conscious assistance from the problem solver. Finally comes an illumination stage, when inspiration occurs and an idea can be elaborated into a successful and acceptable solution.

Catford (1983) builds upon Wallas's four stages, and sub-divides his initial stage of preparation into two, readiness and frustration. This leads to the following understanding of the progression involved :

i) Readiness This being a conscious stage involving the germinating of an idea. There is a sense of contentment with the status quo, coupled with a sense of expectancy concerning the solution of the problem under consideration. This stage is marked by a systematic gathering of the ideas, materials etc that are seen as necessary to the solving of the problem.

ii) Frustration Here it becomes apparent that the problem may not be solved as easily as anticipated. A sense of doubt creeps in as fruitless attempts at analysis fail to yield a simple solution. Many approaches are investigated : indeed there is often feverish activity here, as the individual pursues known paths to solution, certain that success is just around the corner. The final part of this stage is a giving up, frequently in despair.

iii) Incubation At this stage the problem's solution is in what the Chinese refer to as the 'Wu Wei', the fertile void. Having started the solution process attention is turned to something else, releasing our conscious attention from the issue. Our intuition is released. Koestler (1964) states :

"Language can become a screen which stands

between the thinker and reality. This is the reason that true creativity often starts where language ends."

This paradoxical act of relinquishing effort at solution in order to allow for solution is perhaps the key to creative problem solving.

iv) Illumination This is the exciting phase of creative insight, the "Eureka!" Suddenly the solution seems obvious. There is a sense of discontinuity here, as the solution is known, but one cannot trace logical steps to it.

"It is as if a veil was lifted or one is transported to another extremely lucid world where the solution has existed all along."

v) Verification Here there is a re-entering the world in which one started grappling with the problem, with a great deal more maturity or insight. The idea is given form;

> finishing touches and readjustments are conducted in the light of actual reality.
>
> Catford (in Palmer and Catford, 1983)

Newell and Shaw (in Simon, 1979) outline a model of linear progression where the problem solver passes through a continuous and analytical linear convergent progression from an initial stage of identifying a problem to a final stage of solving it. The "good" problem solver passes to the final stage more rapidly than others because he or she is able to see the potential outcomes of several of the stages in between and effectively combines them, reducing "problem space" which is search time plus search area.

Parnes (1967) and Osborn (1953) both use the term 'creative problem solving' to mean "brainstorming", when solutions are found by generating divergent, discontinuous and superficially random ideas. In their view the "good" problem solver has an ability to use trial and error procedure to generate many useful (if unusual) ideas that are original yet perhaps far-fetched. It is these unusual ideas that are often

the successful ones in the final solution to the problem.

A very different approach, articulated by Houston (1972) reflects on an individual's states of consciousness. By expanding the limited range of normal waking consciousness an individual can form solutions, often in symbolic or imagistic form. This expansion may result from movement, sound and quieting techniques such as relaxation and guided imagery training. With an 'expanded consciousness', an individual may encourage the generation of solutions to a problem, often helped by visual imagery.

Other researchers believe that one cannot possibly generalise about creative problem solving (Gardner, 1984). Koestler (in Rosner and Abt, 1970) stresses that scientists are involved in creative problem solving, but that writers slowly develop ideas from "milestone moments." As discussed above, E.P.Torrance (1965) and J.P.Guilford (1950) have identified a variety of factors of creative thinking, not all of which must be present for an act to be considered problem solving. Others have identified various levels of creativity, depending on factors such as the novelty of the solution, the range of possible solutions, the type of problem, or the variety of

skills that are necessary to solve the problem, or if indeed any one skill will actually solve the problem. The particular variety of creative problem solving involved will be different for each level and the factors concerned (Stein, 1983).

Clearly then, there is disagreement about the nature of the act that may be termed creative problem solving, yet one thing which seems definite is that there is a period between an individual recognising the problem and the time when a solution is identified. The term problem solving may be defined as

> "the effective transition from the first to the second of these states .... a process which has meaning for the individual and involves some kind of invention or new and useful ordering of elements .... It is a continuous and divergent process which involves incubation inasmuch as incubation accesses alternate modes of knowing."
>
> (Catford, 1984)

It may be regarded, therefore, as the passage from 'not knowing to knowing'. Research into the subject, as suggested above, reveals a lack of clarity in terms of whether there is one type or many. For convenience of review and analysis, it would appear that key writing and research in this field can be divided into two major

categories. Firstly, there is that which is concerned with understanding the process or procedure of solving problems, dealing with external factors or those which are related to the problem itself. Secondly, there is that which is concerned with the person of the problem solver.

1.4.1. Procedure and Process

Within this general heading it is possible to identify various sub-classifications, namely the Behavioural Associationist approach, the Gestalt approach, the Cybernetic approach and the Analogy approach. The behavioural model of problem solving (Thorndike in Watson, 1963) sees all learning as a result of the continued application of trial and error associations between stimuli and responses. Associations between ideas form the basis of thinking and creative thinking, as viewed by followers of this tradition, is the development of more and more unique associations. Mednick (1962) who designed a Remote Associations Test for Creative Thinking, claims that a person who is solving problems creatively is

> "forming .... associative elements into new combinations which either meet specific requirements or are in some way useful."

The brainstorming techniques of Osborn (1953) and Parnes (1962) referred to above, is sympathetic to the associationist viewpoint. This approach is logical insofar as it begins with the known and gathers ideas/associations that will become the stimuli for creative problem solving, but it clearly lacks clarification of the processes that

actually generate solutions and takes absolutely no account of the problem solvers' motivation or inner experience.

The Gestalt approach emphasizes the value of the thought process. Wertheimer (1959) and others have established that we seem to have an internal sense of wholeness that causes us to see meaningful connections between possibly disparate elements in the field upon which our attention is directed. This process is not conscious. Problem solving is seen as resulting from insight, or from a cognitive transformation of a perception of the pervading situation. Wertheimer (1959) suggests that it is necessary for the problem solver to "step back", to remove his/her ego from the problem and to establish a new perspective on the problematic situation by "examining the structural relationships amongst the parts of the problem, and the relation of the parts to the whole." One element of the situation would lead to a solution. He is in fact stating that "the whole is rather more than the sum of the parts." This approach is rooted in visual perception and acknowledges the suddenness of insight: "Aha," the problem is solved. It does not, however, really seem to explain this insight and once again it does not take account of the internal processes of the

problem solver, including motivation, emotions and inner experience. Einstein criticises Wertheimer's work eloquently:

> "Combinatory play (of images) seems to be the essential feature in productive thought ... Professor Max Wertheimer has tried to investigate the distinction between mere associationist or combining of reproducible elements and between understanding. I cannot judge how far his psychological analysis catches the point."

A third approach to problem solving may be termed the cybernetic model. This involves the conscious application of heuristics in the formulation of the nature of the problem. Dewey (1933) outlines heuristics in the process of problem solving and argues that "a problem well put is half solved." Today the information-processing model of creative problem solving is widely used (Simon 1979, Greeno 1978), reflecting the idea that the brain functions in the same way as a computer. This model has its roots in the behaviourist/stimulus-response tradition, but is more complex insofar as it includes the feature of transforming information. The brain receives information and processes it, involving various mechanisms which transform, encode, retrieve and transmit information in a linear fashion between long and short term memory. Much of Greeno's

research (1978) was into the solving of relatively straightforward problems in mathematics, chess and logic. The approach is useful insofar as it attempts to identify overall patterns and rules of problem solving, but it has severe limitations: not the least among them being that it likens the mind to a computer which is a pre-programmed machine with no power to generate its own thoughts. One hopes that the human mind is capable of creating something that is not pre-programmed. It would appear that the mind does not in fact work anything like the way this model assumes, as demonstrated by Gardner (1984) and Pribram (1984). This model also fails to acknowledge an 'incubation' period, taking no account of the fact that sometimes individuals are unable to solve problems by sheer logical perseverance (serial processing), but actually need a time to stand back which may result (and indeed, often does) in the gaining of intuitive insight.

Finally, it is evident that the most recent attempts to explain problem solving as a cognitive process are concerned with 'analogy' - where the problem solver develops a mental analogy between two situations. Early theories of analogy are attributable to Gentner (1980,1983) and Winston

(1980). Other contributors in the field include Holland, Holyoak, Nisbett, Thagard (1985,1986) and Keane (1986).

The basic thrust of such theories is that one problem is modelled by analogy to another (a source domain is mapped into a target domain). In other words, a model of a source problem is used as a model of a target problem (that which is to be solved).

Analogy is

> "a device for integrating diverse knowledge sources to model a novel situation .... analogy is used to generate new rules applicable to a novel target problem by transferring knowledge from a source domain that is better understood."
> (Holland, Holyoak, Nisbett, Thagard, 1986)

Whether or not an analogy is useful depends on the recognition of a significant similarity between the 'target' (problem) and the 'source' (knowledge). This raises the issue of how 'significant similarity' can actually be recognised. The value of an analogy is to make two concepts seem more similar than they did previously by drawing attention to abstract properties that they have in common. To illustrate this point Holland, Holyoak, Nisbett and Thagard (1986) cite a useful example of an

analogy between an argument and a building. From this analogy various metaphorical expressions arise, for example "the foundation of the argument was carefully laid", "the argument collapsed under its own weight" and "that argument needs to be buttressed with facts." Expressions such as these are understood because the underlying analogy

> "allows rules relevant to the source domain (if a building has a stable foundation, then it will withstand storms) to be transformed into rules relevant to the target domain (if an argument has a firm logical basis, then it will withstand efforts to discredit it.)"
> (Holland, Holyoak, Nisbett, Thagard, 1986)

Lakoff and Johnson (1980) in their exploration of systematic metaphors elaborate on this point by explaining that our conception of an argument can be moulded by other analogies besides that of a building, such as a 'path' and a 'combat' analogy. Thus multiple source domains may contribute to a single expression, such as "the tortuous argument was finally demolished by a multi-pronged assault." Various source analogs relate to different aspects of that which is being described (the argument) in a complementary fashion.

Such integration of multiple analogical sources is considered (Holland et al) to be an important device for problem solving. In this

context analogy is seen as a mechanism for constructing mental models. It seems somewhat paradoxical that in order to solve a problem by analogy, a person must attend to information other than the actual problem itself. This gives rise to two key problems outlined by Holland et al - firstly the difficulty of finding a relevant source analog when the target problem will inevitably be related to an enormous range of (often totally unhelpful) knowledge, and, secondly, once a relevant analog is identified it is hard to see what determines which aspects of the 'source' will be used to develop a mental model of the target problem.

Holland and co-writers (1986) identify four basic steps involved in analogical problem solving (analogical transfer). These are :-

i) Constructing mental representations of the source and the target,

ii) Selecting the source as a potentially relevant analog to the target,

iii) Mapping the components of the source and the target (that is, identifying components that play corresponding roles in the two situations) and

iv) Extending the mapping to generate rules that can be applied to the target in order to achieve a solution.

These steps are not seen as being strictly linear and sequential - they will interact in many ways. A fifth stage is also identified, which may be termed "schema induction" where a schema represents an "abstraction" or an abstract category, of which the specific analogs are examples.

> "The basic mechanism for schema induction is to identify those elements of each model that a)played roles in achieving the solution (that is, matched the conditions of rules that effected the transition from the initial problematic state to the final goal-satisfying state) and b)were successfully mapped across the individual analogs."
>
> (Holland et al, 1986)

According to Holland and co-workers, analogy may therefore be defined in terms of relationships between problem models.

> "In any problem model the components are directly relevant to the solution plan: the goal is the reason for it, the resources enable it; the constraints prevent alternative plans; and the outcome is the result of executing the solution plan."

In both theory and practice this relationship is a highly complex one as an implicit schema common to the two analogs is detected and developed. The work of Holyoak (in Holland et al, 1986) is seriously criticised by

Keane (1986) on the grounds that it is not at all clear how the schematic level is derived. Keane responds by outlining his 'solution-generation' theory which assumes i)that whether the base analog is a memorised story or a problem encountered in the recent past, it is encoded in some form of schematic structure in memory, and ii)this schematic structure has a portion of it which encodes the "solution part" of the memory in question (the "solution category of the schema"). Keane identifies four processing stages in the generation of an analogous solution, during which a solution to the target problem is constructed, taking into account the basic assumptions as outlined.

1.4.2. Problem Solving : The Person

To turn attention to approaches to problem solving which focus on the individual involved rather than on the procedure, again it seems logical to sub-divide these approaches into three, namely

i) Trait theory approaches,

ii) Psychodynamic (conscious/unconscious) approaches, and

iii) Hemispheric Lateralisation (left brain/right brain) theory approaches.

The work of Murray (1959) pioneers trait theory. Basically his line of investigation was into human characteristics, needs and drives, and the establishment of which (if any) particular personality factors lead to a "good" creative problem solving ability. If identified then, according to Murray et al, such traits could be developed or nurtured in less creative people. Many other workers have researched this area by analysing the self reports of people who are deemed to be highly creative and by the observation and analysis of the behaviour of such people. This field includes the studies of Patrick (1938), Hutchison (1949), Roe (1952), Barron and Taylor (1963), McKinnon (1962), and Rosner and Abt (1970). In the related field,

psychologists have examined the creative problem solving ability of "ordinary" people (Patrick 1938, Maslow 1958, Rhodes 1981), showing quite a range of personality factors demonstrated by both "highly creative" and "ordinary" people when they are in the process of creative problem solving. A partial list of frequent personality traits (cited in three or more major studies) has been prepared by Catford (1984), supplementing the material discussed in Section 1.2 of this chapter. It includes:

persistence/dedication/industriousness
field independence/self direction/
intellectual independence
tolerance of tension amongst conflicting
ideas
preference for complexity
rejection of mechanisms of suppression
aesthetic perception/sensitivity
intuition
passion/enthusiasm/intense caring
capacity to let go/surrender/be passive
self confidence in their particular area,
tendency to think in visual or auditory images.

Psychometric interpretation and factor analysis of aptitude traits that are located in creative thinking was conducted by Torrance (1965)

and Guilford (1959) who conclude that there are six aptitude traits that are crucial to the making of a person who thinks creatively. These are :-

ability to see problems

flexibility and fluency of thinking

originality

elaboration

redefinition

One of the great values of this approach to the study of creative problem solving is that it identifies aptitudes that are 'teachable' or at least available in every individual for nurture and development. Numerous studies show that this nurture is possible, including those of Torrance (1977), Gowan (1978), Buzan and Dixon (1978), to name some of the more recent investigations. Perhaps the value of the approach is also its major weakness: there is such a wide-ranging collection of traits supposedly linked to creativity that other research is contradictory (MacKinnon 1962, Hudson 1966). Nevertheless, it would seem that there is a very significant area of agreement, particularly with regard to the six aptitude traits cited above, derived from the finds of Torrance and Guilford.

The second group of approaches related to the problem solving person are in the psychoanalytical Freudian and neo-Freudian tradition. They locate the basis of creative problem solving in the primitive drives, emotions and thinking styles of the unconscious, that area of human consciousness not normally attended to (Kubie 1952, Kris 1952, Freud 1958). Closely related to this theory is the explanation of problem solving in terms of expanding one's conscious awareness to include experience of other modes of processing that are available (Williams, 1967). This theory recognises the fact that information processing goes on in our minds without our awareness (in the unconscious). In other words, an individual can be seen to have a wealth of potential for creative problem solving that is available to be used. It clearly lends support, therefore, to the notion that creative problem solving ability can be influenced or nurtured.

Finally, a considerable amount of work has been done in the field of hemispheric lateralisation. This has its roots in the findings of physiology which indicates that the human brain actually has two sides (left and right) with differing functions. The theory

argues that the left side of the brain tends to deal with analytical, verbal and sequential processing, while the right side is dealing with spatial, visual and wholistic facets. Leading researchers in this field include Gazzaniga (1970), Bogen and Bogen (1976) and Ornstein (1978). The original work in this area arose from the discovery that people with head injuries may exhibit impairment of different types of abilities, depending on which side of the brain is damaged. Patients whose corpus collosum (nerve fibres joining the hemispheres) is severed may act as if each side of the brain "has a mind of its own" that cannot communicate with the other side.

It has been established (Ornstein 1973, Eccles 1972) that the left side, the primary location of speech, writing and analytical abilities, functions in a linear and sequential convergent manner. The right side, the primary location of pattern recognition, spatial relationships and orientation, affect and musical processing, functions holistically using processes that are more metaphoric, simultaneous and divergent. Bogen (1969) proposed the terms "propositional" and "appositional" to refer to the predominant modes of knowing of the left and right hemispheres. Propositional knowledge, according

to Bogen, involves the logic and language of sequential reasoning. It consists of rational propositions and tends to isolate details for analysis. Appositional knowing is spatial and intuitive, involving images, metaphor and feelings. Right hemisphere styles of cognitive processing are considered to be

> "those skills which are indispensable for generating solutions to problems for which they are no apparent answers."
> (Rubenzer, 1979)

These skills are clearly synonymous with the "divergent thinking" skills identified by Guilford (1959) and the "creative thinking" skills of Bogen and Gazzaniga (1965), and Torrance (1979).

It must be stressed that the separation of left and right brain functions refers to distinct tendencies for dominance, and does not imply that each hemisphere has exclusive rights over one or other of these modes of thought. Incubation, in the sense of the interstice between not knowing and knowing in a problem solving situation, is often interpreted as a right hemisphere activity which occurs between two episodes of left hemisphere function. This is a mistaken interpretation and serves to illustrate common myths in the understanding of brain

lateralisation. It is not an established fact that "people only think with one hemisphere at a a time." Neither is it true that "some people think with the left hemisphere; others think only with the right hemisphere." Levy (1983), Bogen (1969), Gazzaniga (1970) and Ornstein (1977) have all demonstrated that most tasks involve the activity of both hemispheres.

> "There must be a sufficiently free interchange between propositional and appositional modes."
> (Bogen, 1969)

> "complete human consciousness involves the polarity and integration of the two modes - analytic and holistic."
> (Ornstein, 1977)

Despite the fact that this brain bifunctionality may not be exact, the model does serve a useful purpose in our quest for an understanding of creative problem solving and the modes of thought involved. It certainly reinforces the view that creativity does involve other thinking besides analytical, verbal logic.

This view was initially supported by evidence from philosophical writings at the beginning of this section, and may now be seen as having strong scientific support from researchers in the field of neuropsychology. Both viewpoints

suggest two distinct but interrelated processing rules regarding how we 'know' the world and approach its problems. Accounts of creative acts indicate a juxtaposition of such processes. Once again, the theory raises vital implications for education, as discussed in section 1.6.

The Psychodynamic approaches to problem solving analysis and the Hemispheric Lateralisation approaches both offer a bimodal view (conscious v. unconscious and left brain v. right brain). To further complicate the research analysis, it seems that a synthesis can be achieved of both bimodal approaches. If a circle is taken to represent an individual's problem space, then the top hemisphere could represent the known (conscious) component and the bottom hemisphere could represent the unknown (unconscious) component. In the words of Catford (1984)

> "I have used a circle to represent the individual because a circle is the universal symbol for wholeness."

It is then possible to superimpose the left hemisphere propositional knowing and the right hemisphere appositional knowing distinction. This effectively divides the circle into four

quadrants, with an intermingling or synthesis of conscious/unconscious/left brain/right brain modes of knowing (bearing in mind there is no absolute line between the hemisphere divisions). Though drastically simplified, this provides us with a multi-modal model, which is a synthesis of both bimodal approaches, effectively bringing together the known and unknown brain processes as well as the verbal-analytical and imagistic-holistic processes. The logic of collected research suggests it is a multi-modal approach which is actually involved in creative problem solving, and this again raises important issues for those involved in education and the designing of materials for teaching and learning. Gardner (1984) attempts to bring together what he calls "the romantic view of creative thought (unconscious, meaningful, imagistic) and the Cognitive view (analytical problem solving)." Showing that there are many forms of knowing, he suggests six "human intelligences", each having at its core its unique "computational device" or manner of processing information. These are

i) linguistic

ii) musical

iii) logico-mathematical

iv) spatial

v) kinesthetic, and

vi) personal.

Each mode of knowing enables the individual to understand information or approach problem solving in a different way. Gardner's theory is similar to that of Eisner (1982) who articulates the idea that utilisation of different modes of knowing yields different experiences of a situation.

The work of other researchers confirms a multi-modal dimension to processing but fails to correspond with Gardner's classification. Pribram (1983) confirms the findings of Wallach and Auerbach (1955) which are that thinking is carried out in sensory modes. He suggests four such modes :

i) visual

ii) kinesthetic-tactile

iii) olfactory-gustatory

iv) auditory-linguistic

Gazong (1967) identifies twenty-one sensory modalities or ways of knowing, including eleven that are conscious. McKim (1972) suggests three approaches to the study of information processing; levels of thinking (conscious or unconscious), operations of thought (analytical, inductive or deductive), and vehicles of processing (including language, mathematical thought, senses, feelings

and imagery).

It would seem therefore that human knowing can be interpreted and classified in a variety of ways. Categories are complex and diverse and cannot be complete or entirely accurate, yet multi-modal models go a long way towards helping our understanding of the complexity of human thought processes. There is physiological evidence (Tinnin 1963, Ornstein 1977) that multiple modes of processing exist simultaneously and involve the whole brain.

Pribram (1971) found that even when large parts of a person's brain were destroyed, he or she retains memories. This suggests that information is not located in one place alone, but is distributed throughout the brain.

> "The memory store is organised neither in space (in any place in the brain) nor in time (in a sequence as if it were registered on tape), although spatial and temporal markers may well accompany any specific to-be-remembered episode. The feasibility of rapid and extensive correlation stems from the distributed nature of the transformed store."
>
> (Pribram, 1971)

Evidence suggests, therefore, that the existence of multiple modes of information processing is incontrovertible. It would also appear that the key to successful creative problem

solving is accessing multiple intelligences within the human brain. Given this evidence and conclusion, it would seem logical to consider - as this thesis attempts to do - the potential of humans to harness these intelligences and thus to improve their creative problem solving abilities.

At this stage, it is appropriate to examine further the conditions that seem necessary in order for creative problem solving to occur. McKim (1972) suggests that creative problem solving necessarily involves visual thinking, illustrating this fact with reference to terms in common association with the act, such as "insight", "foresight", "get the picture ?" and "focus on." He sees visual imagery as essential and advocates a problem solving approach that involves visual representation of possible solutions. His three other conditions for creative thinking are

i) that there must be a challenge (a genuine problem that one is motivated to solve)

ii) that one must have the necessary information in order to start on the problem solving task, and

iii) that one must be flexible in approach, in openness to possible solutions and in the way one views the situation.

Edwards (1979) puts forward several specific 'tips for creative problem solving', and outlines three types of blocks to creativity. He argues that it is possible to establish a "creative attitude" that will make problem solving more likely. Such attitude is termed a "creative mindset" and suggestions for establishing it involve relaxation and being sensitive to one's own rhythms.

> "consciously opening one's awareness and perceptions, and suspending judgement as to whether possible solutions will be effective or not."
>
> (Edwards, 1979)

He is thus advocating a form of cognitive self-behaviour modification in which one allows oneself to be creative.

In line with Edwards' idea of removing perceptual blocks, Adams (1974) gives detailed descriptions of many types of conceptual blocks. He suggests ways in which they might be successfully overcome, involving practical application of the union of the two modes of thought. McKim, Edwards and Adams all give examples of experiential exercises to support their theory of utilizing a multi-modal approach to problem solving.

Rogers (1976) stresses the "openness and acceptance" of the creative process when describing how to set up a situation in which another person might be creative. He talks of the acceptance of the person doing the creating, and stresses the need for "psychological safety" in which the one who is to create is made to feel "unjudged and an intrinsically worthwhile person." The role of the observer (of the creation) is to communicate an understanding of the process going on in the mind of the creative person. He also writes of the necessity of "psychological freedom", this being complete freedom of symbolic expression (verbal or metaphorical).

The main thrust of all these writings is the accepting and receptive "mind set" that is necessary for an act of creative problem solving.

> "Willingness to work, to play, to touch the realm of the profound, to view the issue through a variety of lenses and frames, to wed the discursive and the metaphor, to dive into the depths, to fly to the heights, to dance with the unexpected, to trust that the roller coaster will take you to solution : these are some of the conditions of creative problem solving."
> (Catford, 1983)

Perhaps such conditions should be borne in mind by those interested in developing the

potential of children in our schools to tackle problems in a creative way.

1.5 CREATIVITY AND PROBLEM SOLVING: A SYNTHESIS

The analysis of research detailed in sections 1.3 and 1.4 above indicates that whilst many workers have focused on the term 'creativity' and thought styles which are peculiar to or associated with this ability, others have concentrated to a much greater degree on the sequence of thought involved which might be termed the stages of creative activity.

Koestler (1962) gives a large number of case studies of the way in which creative thought takes place. Examples include the famous "Eureka" experience of Archimedes, and Poincare's description of his experience in carrying out some original work in mathematics. Poincare was trying to prove that it was impossible for there to be any functions of the kind that are called Fuchsian functions. He worked on this for a long period of time but was unable to obtain any really conclusive results. One sleepless night he describes the following experience:-

> "Ideas rose in crowds; I felt them collide until pairs interlocked, so to speak, making a stable combination. By the next morning I had established the existence of a class of Fuchsian functions, those which come from the hypergeometric series; I had only to write the results, which took but a few hours."

Poincare believes that creativity, discovery

or sudden illumination depend upon certain conditions. These are:-

i) A protracted period of conscious work, e.g. the collection of data, the definition of a problem, attempts to reach a solution.

ii) The role of the unconscious, which Poincare considers to be of very great importance, since the emergence of an appropriate hypothesis in the unconscious gives rise to a reaction in the conscious; that is, we have a receptivity to subconscious ideas which are relevant to the creative act.

iii) The application of special techniques and methods to the ideas developed from subconscious levels. This final stage may involve the application of 'convergent' styles of thought.

Patrick (1935, 1937, 1955) conducted detailed experiments into the nature of creative thought and published results of a similar nature to Poincare's. Patrick lists stages of thought as follows :

i)<u>Preparation</u> - where the thinker makes himself/herself familiar with the problem situation and its materials.

ii)<u>Incubation</u> - at this stage the problem begins to form an outline and definition.

Suggestions as to possible solutions arise. It is possible, of course, that these may be many and varied.

iii) Illumination - a specific goal is defined and the subjects begin to work towards it.

iv) Verification - the results are fully worked out, analysed and completed.

The investigations of Poincare, Patrick and others into the nature of creativity is without doubt a parallel to the vast amount of research that has been done in the name of creative problem solving, including that of Wallas, Vargiu, Newell, Shaw and Catford, discussed in section 1.4. The position accepted within this study is that it is an impossibility to separate the notions of creativity and divergent thinking from the act of creative problem solving and the multi-modal thought processes involved in the solving of problems. This view is supported by vast amounts of research evidence, much of which has been referred to above. Parnes (1967) and Osborn (1953), for example, in their work on 'brainstorming' as problem solving, conclude that solutions are found by generating divergent ideas. Catford (1984) views creative problem solving as a continuous and divergent process, enhanced by multi-faceted modes of information processing.

Torrance (1965) and Guilford (1959) conclude that there are six aptitude traits crucial to the making of a creative problem solver, these being :

i) an ability to see problems

ii) flexibility

iii) fluency of thinking

iv) originality

v) elaboration, and

vi) redefinition.

These are totally in accord with Torrance's views of 'creativity' (as distinct from problem solving ability). Finally, in discussions of brain hemispheric lateralisation, Rubenzer (1979) states that the right hemisphere styles of cognitive processing (which are demonstrated to be essential for creative problem solving) are concerned with pattern recognition, spatial relationships and orientation, affect and musical processing. They are

> "Those skills which are indispensable for generating solutions to problems for which there are no apparent answers."
> (Rubenzer, 1979)

These skills are those which have been called skills of creativity (Bogen and Gazzaniga 1965, Torrance 1978) and skills of divergent thinking

(Guilford 1959, and Williams 1976).

In conclusion, therefore, it must be stated that there is a lack of conceptual clarity about the terms 'creativity' and 'creative problem solving', but there seems to be absolutely no doubt that the two are intertwined and in practice, the mental activities which they describe can in no way exist in isolation from each other. To be creative in one's thinking and to be a creative problem solver both depend upon multiple and complex thought processes, and to a large extent on thinking of the divergent kind. The combined research findings of psychologists, neuro-psychologists and physiologists confirm this. Such findings also accord with philosophies which describe our understanding of and dealing with the world in terms of a dichotomy or harmony of two groups of attributes.

> "It is often thought that what identifies creative thought or problem solving is the paradox or creative tension of bringing together two seemingly conflicting concepts."
> (Palmer and Catford, 1983)

1.6 CREATIVE THOUGHT: IMPLICATIONS FOR EDUCATION

One of the key ideas which has emerged from a study of the vast array of research findings concerned with creativity is that every human being possesses a measure of this ability which, in theory at least, could be harnessed, nurtured or perhaps even taught. This is indeed one of the foundation issues upon which this particular thesis has been developed, and a great deal more will be said about the identification and nurture of creative talent in forthcoming chapters. At this stage it is intended to review research and writing which has already been undertaken in this area, and to introduce a discussion of other issues related to the implications for educationists of the understanding of creative thought. One key issue, for example, which again will be elaborated upon in the current research, is the relationship of creativity to achievement in different areas of learning. Correlational data suggest that high levels of creativity are differently related to success in different traditional school subject areas. For example, Torrance (1962) reports partial correlations of .48 between creativity and reading skill, and only .28 between creativity and arithmetic skills. Hence the conclusion may be drawn that creativity

scores are particularly related to achievement in language tests, and least related to achievement in arithmetical tests. This is not surprising, bearing in mind the kinds of questions usually asked in the two sorts of tests. Arithmetic tests, in particular, often emphasize the finding of single correct solutions through the application of previously learned techniques and are, therefore, generally convergent in nature. Hudson (1966) completed large-scale studies involving several hundred boys of proven academic ability, and investigated relationships between academic achievement and intellectual style. He was interested in the extent to which biases in the boys' profiles on a number of ability measures, including IQ, accuracy, vocabulary, general knowledge and expressed interests were reflected in their preference for arts or science-type subjects. He showed that it was possible to sort the boys into those with an 'arts bias' and those with a 'science bias'. This finding indicates that success in a particular subject is closely related to an individual's intellectual style. On the basis of this evidence, Hudson then examined the divergent/convergent thinking dichotomy as one major way of conceptualising differences in intellectual style, and produced

interesting results. Divergent thinkers showed an overwhelming preference for arts subjects - literature, modern languages, history and art - while convergent thinkers strongly preferred science subjects such as mathematics and the physical sciences. Thus Hudson's research is strong support for the idea that preference for a divergent mode of thinking is reflected in a particular pattern of school achievement.

Indeed, this issue is of central importance to this study which is concerned with divergent thinking related to an integrated curriculum. involving the teaching of both arts and science subjects, and so an opposing viewpoint should be considered - that of Newell, Shaw and Simon (1966) who state that :

> "There is a high correlation between creativity (at least in the sciences) and proficiency of the more routine intellective tasks that are commonly used to measure intelligence. There is little doubt that virtually all the persons who have made major creative advances in science and technology in historic times have possessed very great general problem-solving powers."

In other words, a high level of general intelligence and a high creativity score in scientists have lead to major advancement in this area.

Certainly creativity would seem to be not necessarily linked to the arts. The scientist is as creative as the writer. H Broudy (1951) writes :

> "Thus invention, scientific thinking and aesthetic creation do have in common a facility for the rearranging of previously experienced elements into new configurations."

Sandburg says that:

> "'the fog creeps in on little cat feet', and a child calls eraser scraps 'mistake dust', and a painter shows the four sides of a barn at once, and a writer speaks of something as being 'as relentless as a taximeter', and a man converts a runner into a wheel, and a Newton sees the analogy between apples and planets, there is manifest an activity of mind that seems to be of the same weave despite the differences of coloration."

Just as a writer is transforming his human experiences into a play or a novel, so a scientist is testing and probing data he has acquired in order to produce a new theory. Both are actively concerned with rearranging knowledge or experiences into new forms or patterns.

Bronowski (1959) states that :

> "The discoveries of science, the works of art are explorations - more, are explosions of a hidden likeness. The discoverer or artist

presents in them two aspects of nature and fuses them into one. This is the act of creation, in which an original thought is born, and it is the same act in original science and original art."

Torrance (1967) also writes in accordance with this view of creativity being equally applicable to both artistic and scientific thought processes. The work of Torrance is of particular importance to this study because, in addition to a general survey of work done in the area of creativity and divergent thinking, the present author has concentrated on an in-depth study of the work of Torrance, and his tests are used for the empirical research documented in Chapter 6.

On the basis of an analysis of the diverse ways of defining creativity as discussed above, that is, in terms of a product, a process, a kind of person, or a set of conditions leading to the production of something new to the individual or to the culture, and what he considers the requirements of a definition for keeping a programme of research on factors affecting creative growth in context, Torrance defines creativity as :

"the process of becoming sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies, and so on; identifying the difficulty, searching for solutions, making guesses, or formulating hypotheses about the

deficiencies; testing and retesting these hypotheses and possibly modifying and retesting them, and finally communicating the results."

Torrance argues that this is a very good definition because strong human needs are involved at each stage. When incompleteness or disharmony is felt, tension is aroused, and is continued until solutions are found by investigating, diagnosing, making guesses or estimates, and then testing, modifying and retesting them until a discovery is made, others are told about it and the tension is relieved.

The definition is also good because it is equally applicable in scientific, literary, dramatic, and interpersonal creativity.

Inevitably, there have been various objections to the Torrance definition, not least among them being those that are concerned with the fact that he has no right to use the term 'creative' outside such fields as art, music and writing. Kreuter and Kreuter (1964) argue that the orientation of Torrance's work has clearly been toward the recognition and development of scientific creativity and that even his definition shows this concern. However, Torrance's research associates have included artists, musicians, creative writers, philosophers, theologians,

psychologists, sociologists and anthropologists, who have contributed to the professional literature in all these and other fields. In experimental work, Torrance claims that more activities are related to art, creative writing, creative dance and creative music than to science.

> "Whenever I have talked with creative artists and writers about what happens to them when they are engaged in the creative process and how they guide the creative behaviour of their students, the definition I have given seems to fit their creativity as well as it does that of the creative scientist."
>
> (Torrance, 1964)

Another objection to Torrance's definition of creativity is that it does not distinguish between creativity or creative problem solving. Some people have maintained that it equates creativity with all thinking. Torrance comments that it is one of the limitations of a brief verbal definition that there must be implicit distinctions, and that only a few distinctions can be made explicit. He argues that implicit in his definition are the distinctions usually made by other scholars between creative thinking and problem solving. Generally, creative thinking has been treated as one special kind of problem solving. Newell, Shaw and Simon (1962) state that

problem solving may be called creative

> "to the extent that one or more of the following conditions are satisfied :
>
> 1. The product of the thinking has novelty and value (either for the thinker, or for his culture)
>
> 2. The thinking is unconventional, in a sense that it requires modification or rejection of previously accepted ideas.
>
> 3. The thinking requires high motivation and persistence, taking place either over a considerable span of time (continuously or intermittently) or at high intensity.
>
> 4.The problem as initially posed was vague and undefined, so that part of the task was to formulate the problem itself."

Having considered these various objections, if one accepts the definition of creativity as put forward by Torrance, then creativity and its growth are viewed scientifically and may be objectively observed and measured. It is possible to recognise creative behaviour, creative thinking abilities, and creative potential both through test and non-test procedures. An analysis of attempts which have been made to measure the kinds of skills important in divergent thinking follows later, in section 1.7.

The implications of this work to be noted at this stage are that Torrance recognised, from the

standpoint of the teacher, that it would seem important to identify those kinds of potential that make a difference in the way pupils should be taught or guided. In other words, an understanding of the concept of creativity has considerable implications for curriculum development, since it is believed that tests of creativity can provide a useful basis for deciding on methods of instruction, and knowledge about a person's creative thinking abilities frequently provides clues about differential preferences for ways of learning.

It is also a logical consequence of this viewpoint that creativity is a concept that can be nurtured in pupils, and that certain methods of instruction will contribute towards creative growth. As Torrance himself states (1962):

> "Experiments involving deliberate methods of improving creativity have been rather convincing (Maltzman 1960, Parnes 1960, Torrance 1961). In my own classes and seminars, I have consistently found that these deliberate methods can be taught from primary grades through the graduate school with the effect that students improve their ability to develop original and useful solutions to problems. In my opinion, the evidence is strong that creativity does not have to be left to chance."

Indeed this view is shared by the present author who, as part of this study, has designed an investigation into the extent to which an integrated curriculum based on scientific enquiry and first-hand experience of the world can be an active force in the nurturing of the concept of creativity in primary school children.

Yet this view does not reflect the view of all research workers. Indeed, it has even been maintained that it would be dangerous to educate children to be creative, and to stress that emphasis must be on conformity, discipline and basic skills involving thinking of the divergent kind. As Torrance points out, however, it seems that the development of creative thinking abilities is at the very heart of the achievement of even the most fundamental educational objectives, even the acquisition of mathematics and language or the "3 Rs". This, again, is in accordance with the views of the present author who maintains that whilst actively encouraging the development of the creative process in children, there will be an increase in an understanding and application of the basic skills.

To return to the more general question of the nurture of creativity, evidence provided by Torrance's own studies indicates that this is

perfectly possible. In longitudinal studies done at the University of Minnesota, severe drops in measured creative thinking would occur, which were not accepted as being purely developmental phenomena. In particular, it was evident that many children suffered a very marked decline in creativity, especially in the fourth grade, and that many of them did not recover it as they continued through the school. Torrance went on to study the creative development of two fourth-grade classes, taught by teachers who were very highly successful in establishing creative relationships with their pupils, and who gave them many opportunities to acquire information and skills in creative ways. In these classes, there was no evidence of the usual fourth grade decline in creativity, either in measured creative thinking abilities or in participation in creative activities.

In a key lecture entitled "Creative Teaching Makes A Difference," Torrance (1964) argued forcefully and at length that creative potential can be developed.

> "The amazing record of inventions, scientific discoveries and other creative achievements amassed through deliberate methods of creative problem solving should convince even the most stubborn sceptic ... both laboratory and field

experiments involving these deliberate methods of improving the level of creative behaviour have been rather convincing."

In the course of this lecture, Torrance outlined experimental work which aimed to ascertain just what sort of difference creative teaching could make in a child's life. His students were asked to recall instances in which they had allowed or encouraged children to express themselves creatively and then observed that the experience made a difference in achievement and/or behaviour. These students included teachers, administrators and school psychologists. Eighty-two per cent of the total number of students responded in a positive way, and replies include the following claims of differences that had been brought about by creative teaching:-

From non-readers to average or superior readers

From vandalism, destructiveness and lack of school achievement to constructive behaviour and improved achievement

From bitter, hostile sarcasm to kindly, thoughtful behaviour

From emotional disturbance and unproductive behaviour to productive behaviour and even outstanding school achievement

From estrangement and lack of communication to good contact with reality and sensitive communication with others

From fighting and hostility to improved speech skills and lack of hostility

From apathy and dislike of school to enthusiasm about learning

From lack of self-confidence and self-expression to adequate self-confidence and creative expression

From mediocrity of achievement among gifted pupils to outstanding performance

From diagnoses of mental retardation to diagnoses of normal or superior mental functioning

From a troublesome student to outstanding job performance

(Torrance, 1964)

One example is now quoted which illustrates one of the different kinds of changes attributed to creative teaching - that of change from "Trouble Maker to Star Learner." David (a young learner) is described by his teacher:-

"David had been a problem in kindergarten. He knew it and acted it out in first and second

grades. He had thoroughly convinced everyone he was a problem by the time he entered my third grade.

A thatch of yellow hair, crystal clear blue eyes - as he walked along the path to school all he needed was a fishing pole over his shoulder to be the perfect Huckleberry Finn! He intrigued me and interested me beyond words - there must be a key to David, and I must try to find it.

I set the stage in every possible way so he could do a few things at least that we could praise - this was a shock to him, and he didn't know quite what to do with praise! ..... By Christmas time we had arrived at the point of mutual respect for one another.

At Christmas in our room we take a trip around the world and explore the Christmas customs of the children in our countries. This year we had decided to go by plane. We had a representative from the airlines as a guest speaker - telling about tickets, travelling by plane, and showing some slides of various countries.

The day came when each child was to make his ticket for the country he wished to visit. I was surprised as I watched David - usually he was one of the last ones to start, but this time he was well on his way immediately. As I 'toured' the room, I noticed David's ticket would be for Sweden. This surprised me as he had brought many things from Mexico in for Sharing Time, and I had rather thought his ticket would be for Mexico. The 'Captain' for the trip arranged his 'passenger' list by countries. David was the only one for Sweden. This seemed to please him, and as time passed we were all amazed at the responsibility he assumed in finding things to present about 'his country.'

We found that he had chosen this country because his favourite grandmother had come from Sweden .... He found it necessary to write five or six letters to her for various items of information. I was surprised at the neatness and the care with which he did the job - would that he had done many of his other papers in like manner!

" He wrote some wonderful factual stories about Sweden. His Swedish fairy tales were really something! He often found expression at the easel - and such vivid colors.

The day when the class were his 'guests' in Sweden he told of the customs and even taught us a game the Swedish children play. He also

taught us to make little 'goodie' baskets they hang on their Christmas trees.

Our children come to school by bus, but the two weeks before Christmas David walked nearly every morning because he wanted to go there early so he could get extra painting or writing done. As he was telling me goodbye on the last day of school before the holidays, he said, 'Gee, Miss T., this is the neatest Christmas I've ever had - I feel like I've almost been to Sweden.'

I had found my 'key' to David. He needed to find out things and tell them - sometimes do a bit of embroidery on them - sometimes do a bit of day-dreaming and make-believe on them. He liked his real world much better too.

This did change David - he no longer needed to be the 'bad boy' - he adjusted to the praise and found it 'fun' (as he said) to write stories, draw pictures etc of his 'secret world'. He was so busy doing this he didn't have time to revert to the 'old' David."

Other major changes are eloquently described and illustrated. These ideas raise a very fundamental question, which is "What makes the difference?" Torrance stresses the fact that in many instances the teacher provided a responsive environment-

> "one which involved a sensitive and alert kind of guidance and direction, the creation of an atmosphere of receptive listening, responding to children and young people as they are or might become rather than as they have been told that they are, fighting off ridicule and criticism, and making their efforts to learn worthwhile."

The students' responses to Torrance's experimental work were analysed and a list of factors most frequently mentioned was drawn up, suggesting the following "Creative Ways Of Teaching."

- Recognising some hitherto unrecognised and unused potential
- Respecting a child's need to work alone
- Inhibiting the censorship role long enough for a creative response to occur
- Allowing or encouraging a child to go ahead and achieve success in an area and in a way possible for him
- Permitting the curriculum to be different for different pupils
- Giving concrete embodiment to the creative ideas of children
- Giving a chance to make a contribution to the welfare of the group
- Encouraging or permitting self-initiated projects
- Reducing pressure, providing a relatively non-punitive environment
- Approval in one area to provide courage to try in others
- Voicing the beauty of individual differences
- Respecting the potential of low achievers
- Enthusiasm of the teacher
- Support of the teacher against peer pressures to conformity
- Placing an unproductive child in contact with a productive creative child

- Using fantasy ability to establish contacts with reality
- Capitalizing upon hobby and special interests and enthusiasms
- Tolerance of complexity and disorder, at least for a period
- Involvement
- Not being afraid of bodily contact with children
- Communicating that the teacher is "for" rather than "against" the child

(Torrance, 1964)

Whilst it is clearly recognised within this work that no teacher could or should be able to transform every pupil into a perfectly behaved creative genius and model learner, the subjective evidence collected does indicate strong support for the viewpoint that so-called creative teaching does indeed make a difference.

Parsons (1971) draws further attention to this belief, and to the increasing number of researchers who are concerned with the effects of different teaching approaches and styles on the development of creativity and self-directed enquiry. One hypothesis often discussed is that a 'traditional' classroom which is highly structured and authoritarian in atmosphere, emphasizing the

achievement of formal goals in education, is highly unlikely to encourage the development of divergent thinking in its occupants. A 'progressive' classroom, in which approaches to learning are more flexible, is far more likely to encourage and promote creative development. Under the latter circumstances, original ideas in the minds of the children and novel approaches to work and to problem solving will be encouraged and seen as valuable contributions to the learning process. The teacher will actively encourage classroom members to follow their own divergent routes to discovery, problem identification and solution.

Probably the best-known study done in England with this hypothesis in mind is that of Haddon and Lytton (1968). They administered a battery of tests of divergent thinking to two pairs of contrasted schools. This battery included tests adapted from the Torrance Minnesota Compendium (1962) - detailed in section 1.7 - and other tests that were constructed especially for the experiment. The contrasted primary schools were selected as a result of consultation with local authority inspectors and lecturers who were familiar with them. Two of the selected schools represented the 'traditional' style and formal

approach to learning with emphasis on authority, basic skills and the encouragement of thinking of the convergent kind. Two other schools were selected to represent the 'progressive' style and less formal approach to learning. Within these schools, the inspectors and researchers identified an emphasis on self-initiated learning, discovery, creative activities and the encouragement of skills of the divergent kind. Social economic background of the four schools was controlled, as was the verbal reasoning quotients of the participating children. Tests were administered to a total of 211 children aged 11 to 12 years. Results obtained showed that the children from the progressive, informal school environments obtained significantly higher scores than those from the traditional, formal schools. It would seem to be clear from these results that teacher style and approaches to learning do have a significant effect on children's creative thinking abilities.

Lunn (1970) made a study of streaming in the primary school, and also examined the prediction that schools and teachers who demonstrate a more progressive and informal approach to curriculum organisation and methods of learning would achieve higher degrees of creativity development than

schools and teachers who demonstrate formality and a more traditional approach. Tests used in this experiment were in the tradition of Guilford (1950) and Torrance (1965) and were designed to measure three aspects of divergent thinking, namely fluency in ideas, flexibility of ideas and associations and originality of response. A total of 5,500 children were involved in the experiment. Results demonstrated contrasting influences of different types of teacher and school. They indicated that 'highly creative' children show a greater degree of confidence in their abilities and a lack of inhibition in their behaviour. Also, emphasis on self-initiated learning is the most important school factor in the development of creative ability. This type of learning should take place in a relaxed atmosphere where children are free to pursue their own paths of learning and discovery. Lunn also stresses the important thought that "it is doubtful that we have reached the full knowledge of the environment which would enable us to reach optimum conditions for the encouragement of creative children."

Freeman, Butcher and Christie (1971) seek to identify the most important features in the development of creativity which arise from the work of researchers such as Haddon, Lytton and

Lunn. They conclude that

> "it is not the degree of permissiveness but rather the attitude of the teacher, the emphasis upon self-initiated learning, the freedom of access, often unsupervised, to school libraries, relatively less use of class teaching and the relaxed, friendly atmosphere,"

A study of a similar kind was undertaken by the present author (Palmer, 1981) who investigated the contribution of an integrated environmental studies curriculum to the development of creativity in primary school children. Work was concerned with the relationship between one aspect of curriculum organisation, namely that of total integration based on the philosophy of environmental education, and the development of primary school children's divergent thinking abilities.

An empirical investigation was undertaken in which a comparison was made between one class of 10-11 year old children which completed a year's work based on a subject-orientated, non-integrated curriculum, and a parallel class of 10-11 year old children in the same school which completed a year's work based on a totally integrated environmental studies curriculum. Tests of academic achievement and of divergent thinking

were administered to both classes at the beginning and the end of the year's work. At the end of this time, significantly higher scores on several tests were attained by the children who had followed the integrated curriculum. In particular, the class which had worked in an integrated way (incorporating many of the attributes of progressive education, such as emphasis on self-initiated learning and discovery) achieved significantly higher scores on the tests of divergent thinking at the end of the year.

In many ways this present study aims to follow on from this investigation. By improving experimental design, increasing sample size and introducing new ways of illuminating classroom procedures and interactions, it is hoped that this thesis may go some way towards fulfilling Lunn's defined need for progressing towards a full knowledge of the environment which would enable us to reach optimum conditions for the encouragement of creative children.

One of the greatest values of the studies of this kind (Haddon, Lytton, Lunn and Palmer) is probably that they show how the effects of different approaches to teaching, learning and curriculum organisation on divergent thinking performance can be investigated in the practical

context of existing classrooms and schools.

Further evidence concerning creative growth and development comes from studies of the development of creative thinking abilities in different cultures (Torrance, 1962). Tests of creativity have been administered in diverse cultures, with the result that the developmental curve takes on a different shape in each culture. The differing characteristics of the curve have been explained in terms of the way the particular culture treats curiosity and creative needs.

It must be noted that Torrance is primarily concerned with the social context within which creative ability may be developed. Other workers, including Ogilvie (1973, 1974) stress another context which may be described as cognitive or informational. This implies the need for information from which associations may be derived. In other words, creativity

> "cannot occur miraculously out of nothing, simply on provision of a permissive atmosphere or an unstructured curriculum."

A strength of this argument is that it breaks the implicit association that exists in some writings between creativity and 'progressive education'. Certainly it would seem to be a very false

assumption to regard the two as synonymous.

F. E. Williams (1968) comments that creativity is

> "an outcome of breadth and depth of knowledge, and the ability for its production depends on the establishment of associations between (different) items of subject-matter contents."

So the actual task of teaching is

> "how to structure knowledge so that new associations among stored information might be developed."

This idea is of central importance to this study, which is very much concerned with the ordering or structuring of knowledge and its development in primary school classrooms.

Koestler (1964) also identifies the need for a 'matrix' of information as a prerequisite of creativity :

> "creativity occurs when there is a collision, fusion or confrontation of two such matrices which would normally be regarded as incompatible."

A logical progression from Ogilvie's suggestion of the need for structure in the creative curriculum

is the notion of the need for curriculum materials designed for the development of creative thought. Space does not allow for a comprehensive survey of teaching materials, but no account of this area would be adequate without reference to the widely-known work of Edward de Bono, whose major work on 'Lateral Thinking' is sub-titled 'A Textbook Of Creativity' (1970). The author claims that lateral thinking is

> "a skill closely related to creativity; since it is a skill, it may be learned."

Bono identifies two varieties of thinking, 'lateral' and 'vertical'. The first is 'provocative rather than analytical': the second occurs 'within the context of analysis, selection and accuracy.' He outlines a series of training techniques for the development of lateral thought processes. His work, whilst being interesting and informative, is also rather oblique in the sense that it is an individual approach which is not easily integrated with other well-documented research - it is difficult to see where (if?) 'lateral thinking' and 'divergent thinking' correspond or where the concepts of fluency, flexibility, originality and elaboration fit into

his model.

There would seem, therefore, to be definite and serious implications for education with regard to the development of creative potential in our children. Creative skills are of vital importance in the modern world, for example, in terms of creative problem solving in science and industry. It would seem to be essential that teachers encourage their development to the fullest possible degree.

There would seem to be two ways of introducing creativity into formal education, namely to teach it as a new subject or skill, and to modify the present curriculum with creative potential in mind. That is, creativity may be taught in its own right, or we may draw upon the creative potential in all the subject matter that is taught by the teacher. Without doubt, the latter method would seem to be the most efficient, for two reasons. Firstly, too little is known about the precise nature of the thinking involved to teach it on its own. Indeed, the thought processes are probably so complex that they could not actually be taught in isolation: we have no definitive theory of creativity or creative problem solving, and we do not know precisely which kinds of information are book learned

authoritatively and which creatively. Secondly, and of greater importance, creativity has been demonstrated to be a component of many kinds or varieties of mental abilities, and is not an isolated process.

It is the view of the present author that if a person is to make full use of his talents, he or she should be helped to learn to think creatively in a range of situations and on a wide variety of subjects. It is vital that consideration should be given to how knowledge is structured so that creative thought may be developed to its greatest potential.

It is believed that, by operating an integrated curriculum based on first-hand experiences of the pupil, this situation can be achieved in a most effective way. In order to elucidate this fact, it will be helpful at this stage to consider at greater length ways in which creative thinking can be promoted. Perhaps it should be stressed that not every pupil in a class should be treated as though he will become a creative genius. On the other hand, a school curriculum which aims at utilising creative abilities will not necessarily be lost on all but the most creative of children. All children are capable of asking questions and wondering about

problems, of guessing and supposing, of questioning and speculating, and so a curriculum that is designed to foster creativity could possibly facilitate learning in its students. In the case of a creatively gifted pupil, a creativity-centred curriculum may help him to develop these creative talents to the full. On the other hand, approaching knowledge through creativity could help a more convergent thinking child to understand the way in which knowledge is organised, and make him a more efficient finder of adaptive solutions.

In a consideration of the promotion of creative thought, bearing in mind the theoretical implications of divergent thinking, it would seem that in the first place, we should encourage students to have original ideas, or at least, that are original to them. The teacher should not only welcome original ideas but should actively 'tease them out' of the pupils - at any time and in all subject areas. It seems a distinct possibility that the habit of creative thinking could be trained by encouraging recording of observations in a personal way - by mentioning things that no-one else has observed or thought about. Certainly the trend in education in the recent past has been to concentrate on too much correct thinking

and too little on originality. This is a natural danger in a teacher's understandable concern to transmit accepted knowledge. Thus a student should be encouraged to think or compose originally, with the teacher respecting whatever ideas are created. It is most important to stress, however, that originality is only one desirable quality among many, and that some subjects such as art and creative writing call for more originality than others, and in these the student should have greater scope to seek out unusual ideas. In subjects like mathematics, science and history, originality, although still important, must take its place with other objectives such as clarity, logic of reasoning, careful observation and factual truth. Work done for this study is intended to demonstrate that the more we know and understand of the concept of creativity and of the unity of thought and knowledge - applied to the school curriculum, then the more enlightened will be this delicate balance between logical, rational thought and fluency and freedom of mind.

Following on from encouraging originality of thought, the creative teacher should encourage children to welcome any ideas that are new, and to examine them on their own merits without

dismissing them in favour of more conservative and conventional attitudes. One way of doing this is to explain just how revolutionary all major creative achievements must have seemed when they first appeared, and to emphasize that the more we discover, the more we realise how incomplete our knowledge is.

If creativity is to be encouraged and promoted, then spontaneous expression must be encouraged, especially in young children. The more unusual their ideas are, the better, and stories of fantasy and unusual drawings should be encouraged until a child is capable of sounder creative thinking. Also, he should be encouraged to be fluent in his ideas - the more ideas he can command, then the more problems he can solve. If he is fluent in ideas, he will bring a more able mind to academic studies, and will put what he learns to a much wider use. This study aims to demonstrate that fluency of thought can be taught deliberately by practice in generating a range of ideas on given subjects. To awaken creativity, we must challenge students with provocative ideas. Before expounding a fact or theory, the teacher should turn it into a problem for the class to solve. Instead of feeding information to the pupils, he or she should place

them in situations where they must seek out the information themselves - and indeed, this will be seen to have direct relevance to the philosophy of environmental education as outlined in Chapter 4. It is most important that the pupils value and have confidence in their own ideas, and one way to gain confidence is to ask them to record their thoughts, reflections and impressions.

Another very important aspect to creative teaching is to encourage sensitivity to problems, and an ability to be puzzled by what other people take for granted. Children's curiosity should be aroused in their studies of the world about them, as they relate to natural objects and ideas. Once again, this statement can be seen to be directly relevant to the environmental studies approach.

The teacher should constantly be encouraging curiosity and enquiry by asking "What would happen if ....?" or "What would it be like if ....?" Of course, it is important that the teacher also has an inquiring mind. Indeed, the concept of creativity calls for a receptiveness to new ideas, and the student and teacher should constantly consider and seek out ideas that will challenge existing beliefs. Furthermore, it is important that, as creativity is nurtured and developed, the pupil learns to test out the implications of his

own ideas, and of ideas in general. This line of thought is described by Rubin (1963). As a child has learned to follow the implications of his own ideas, he will demonstrate even more creativity if he studies ideas that have the most implications for many fields of knowledge. This is to substantiate the case for integration of subject matter in the curriculum, as discussed in Chapter 3.

Another aspect of creative learning clearly linked to the concept of curriculum integration and the environmental approach is that of self-direction, for to learn in a creative way is to learn on one's own initiative. There is obviously a great deal of knowledge and many skills which a pupil must learn from an authoritative source; yet it is essential that such knowledge and skills are then applied to individual projects and self-initiated learning. A teacher should encourage such learning, leaving the pupil alone at times to make errors that may in themselves lead to further insights into the nature of knowledge.

A final way in which a teacher may actively cultivate creative growth is to encourage the pupils to develop a sensitivity to the world around them. Their own personal sensations should be valued, recorded and cultivated - leading to an

awareness of more demanding forms of sensitivity, for example, the feelings of others and a subsequent understanding of art forms and meanings.

Thus there are many and varied ways in which our school system, through its teachers and curriculum developers, may attempt to cultivate the growth of the concept of creativity in its pupils. Guided by this knowledge, it is possible to identify certain aspects of curriculum theory which have direct relevance to this process, and in particular the concept of curriculum integration has both theoretical and practical implications.

Furthermore, the above analysis suggests a definite inter-relationship between curriculum integration, the principles of environmental education, and the nurture of creative thinking abilities. Chapter 3 of this work pursues a discussion of this inter-relationship in the context of a more detailed examination of the integration of knowledge.

1.7 THE RECOGNITION AND TESTING OF CREATIVE ABILITY

Methods for the identification of creative children and measurements of creative thinking are obviously essential if progress is to be made with attempts to clarify the nature of this ability, and to nurture it. Once again the field of literature and research is immense and diverse. It is possible to make a very basic division between test and non-test approaches. E. P. Torrance (1962) has probably completed the most extensive writing and research in both of these areas. A first consideration will be his views on non-test ways of identifying creativity in children. Torrance promotes his views reinforced by the apparently sound arguments that :

i) Teachers should be aware of non-test methods because tests of creative thinking are not commonplace in school systems

ii) Children may not be motivated to perform creatively on a test

iii) There are a number of inherent limitations of tests designed to elicit creative behaviour (e.g. they usually have time limits and children cannot be hurried

to be creative ... they may have difficulty writing down ideas)

iv) The immediate testing conditions, personality disturbances, unfavourable reactions to time pressures and the like may prevent some highly creative individuals from revealing their true creative potential through tests.

In the course of a creative thinking seminar, Torrance pursued his work on the establishment of non-test indicators of creative talent. The seminar was attended by eighty-seven teachers, counsellors and school administrators who were requested to draw up a set of five behavioural indicators of creative talent. Their responses were analysed and summarised, the most frequent categories of behavioural indicators being as follows:

	% response
Curiosity, inquisitiveness, investigativeness, penetrating questioning etc	66%
Originality in thinking and doing, unusual solutions, unusual answers, unusual approach to problem solving etc	58%
Independent in thinking and behaviour,	38%

individualistic, self-sufficient etc	
Non Conforming, not bothered by acceptance of others etc	28%
Sees Relationships, perceptive of relationships etc	17%
Full Of Ideas verbal or conversational fluency etc	14%
Experimenter, tries new ideas, new products etc	14%
Flexibility of ideas and thoughts	12%
Persistent, perseverant, unwilling to give up, etc	12%
Constructs, builds or rebuilds	12%
Prefers the Complex, irritated and bored by routine and obvious, copes with several ideas at the same time	12%
Daydreamer, preoccupied etc	10%

In addition to this information, the following are examples of specific kinds of behaviour suggested as indicators of creative talent :-

He can occupy his time without being stimulated.

He prefers to dress differently.

He goes beyond assigned tasks.

He is able to amuse himself with simple things in imaginative ways.

He may look as though he is loafing or daydreaming when he is actually thinking.

He questions beyond the single 'why' or 'how'.

He experiments with familiar objects to see if they will become something other than what they are intended to be.

He is a window watcher during class but keeps up with what is going on in class too.

He likes to make up games on the school yard.

He enjoys telling about his discoveries and inventions.

He comes up with ways of doing things that are different from the standard directions.

He finds unusual uses of toys, other than the intended uses.

He is not afraid to try something new.

He draws designs and pictures on his notebook, while the teacher is talking or giving directions.

He draws elaborate pictures.

He goes further in his play with games than the directions accompanying them.

He doesn't mind the consequences if he appears to be different.

He uses all of his senses in observing.

(Torrance, 1962)

In summary of the behaviours listed by the seminar particulars, Torrance demonstrates that these can be conceptualised in terms of the six kinds of thinking abilities which Guilford and Merrifield (1960) consider to be components of creative thinking. These are:

1. Sensitivity to Problems: seeing defects, needs, deficiencies; seeing the odd, the unusual; seeing what must be done.
2. Flexibility: ability to shift from one approach to another, one line of thinking to

another, to free oneself from a previous set.

3. Fluency: ability to produce a large number of ideas.

4. Originality: ability to produce remote, unusual or new ideas or solutions.

5. Elaboration: ability to work out the details of a plan, idea or outline; to "embroider" or elaborate.

6. Redefinition: ability to define or perceive in a way different from the usual, established or intended way, use etc.

A systematic way of looking at behaviour in such a way as to identify creative talent would be to examine behaviour in terms of these six categories of thinking.

An interesting reflection on this work is that very frequently behaviour that would usually be labelled as socially undesirable may instead be categorised as creative, and even as a very desirable attribute. To cite Torrance once again, he analysed descriptions by parents of "highly creative children." Behaviours such as "annoying curiosity, forgetful and absent-minded, overactive physically/mentally, doesn't participate in class, mind wanders too much, uncommunicative and feels left out of things" were frequently described. It would seem that any movement in the direction of

understanding and identifying creativity and creative talent must be extremely beneficial, insofar as children displaying such 'negative' or undesirable behaviours could be encouraged to apply what actually are valuable means towards productive and socially desirable ends.

An investigation into the methods of testing and measuring divergent thinking reveals the great complexity of this procedure. Because of this complexity and the extensive work which has been done in the field, it would seem relevant to outline briefly the attempts which have been made by research workers to measure the kinds of skills which are important in divergent thinking, and, furthermore, a fairly detailed account is then included of the tests chosen for use in this particular study, which are :
Torrance Tests of Creative Thinking, Verbal Tests A and B, Figural Tests A and B (1966).

As early as 1922, Simpson defined creative ability as "the initiative that one manifests by his power to break away from the usual sequence of thought" and he pointed out that the traditional tests of intelligence neglected some aspects of human intellectual functioning. Concerned with identification of the searching, combining, synthetic type of mind, Simpson attempted to

construct some tests of creativity, arguing that these should be added to the traditional tests of intelligence, which, he maintained, do not evaluate "a vital creative energy."

Andrews (1930) designed tests of "imagination", McClay and Meier (1931) used a test of 'recreative imagination', and Welch (1946) tested the ability of university students to make original combinations of ideas. It was, however, the work of Guilford (1950, 1959) and his associates (Guilford, Merrifield and Cox 1961, and Merrifield, Guilford and Gershon, 1963) which really established the study and testing of divergent thinking and creativity. As outlined in section 1.3 above, Guilford (1959) argued that there are three main dimensions to intellect, which he labelled 'operations', 'products' and 'contents.' In other words, three basic dimensions are needed to fully describe an intellectual task. According to Guilford, within this complex model of intellect, there are certain factors which are important in creativity, for example, sensitivity to problems, word fluency, ideational fluency, semantic flexibility, associational fluency and originality. For each factor which he regarded as important in creative thinking, Guilford designed one or more

appropriate tests.

For example, The Ideational Fluency Test involves what Guilford has called the divergent-production of semantic units. (In the structure of intellect model, units are described as being composed of information such as perceived objects, syllables or verbal meanings.) In this test, a person is given a number of tasks which involve listing objects which will fulfil certain functions and which also have certain properties - for example, list objects that are both fluid by nature and will burn ..... The subject is given a limited amount of time in which to list as many such objects as possible.

Tests of originality include The Unusual Uses Test, where the subject must write a list of as many possible uses he or she can think of for an object such as a brick, no matter how unusual, weird or bizarre the answers may seem.

Systems, in Guilford's model are "organised constructs of more than minimal complexity, such as two objects or words in a simple relationship." An example of a test for divergent production of semantic systems is Expressional Fluency, where the subject is asked to construct a variety of sentences containing only four words - a sentence being a form of a system. A further example of a

test is that called Plot Titles, which has to do with flexibility of thought and 'transformation.' "A transformation may be any kind of change, revision or redefinition." In Plot Titles, the subject is given a short story and asked to suggest a variety of interesting and suitable titles. When a clever or original title is suggested, he or she must then take a look at the story in a new light, bearing the novel title in mind. Views about the story may be revised, demonstrating flexibility of thought.

A final example taken from Guilford's extensive work is a test called Possible Jobs concerned with what he terms 'implications', which are expectations or anticipations. When one item of information suggests another, there is an implication. The concept of implication comes very close to the notion of 'association' put forward by other researchers in educational psychology.

> "In the area of cognition, abilities to see implications play roles in activities like planning and they should be basic to foresight and to hypothesis formation. To test for divergent production of semantic implications, a test like Possible Jobs may be given. Each item presents a stylised, familiar object as a kind of symbol; for example, a picture of an electric light bulb, where the subject has to say what jobs or groups of people it might stand for. Here the answers might be: electrical engineer,

missionary, teacher, scientist and so on."

Guilford argues that his factors of intelligence are neither completely general nor are they very specific in scope. To quote :

> "They can be conceived as generalised and generalisable skills, each with certain limitations, but each playing roles in its own area, as witness the fact that any one test for a factor is made up of a list of specific items, all different, from a potentially very large pool, and also the fact that there can be some variation in kinds of items that also involve the factor."

Drawing upon Guilford's work for clues concerning task dimensions and scoring criteria, Torrance and his associates went on to design batteries of tests of creativity for use from kindergarten to graduate students. The Torrance Tests of Creative Thinking (1962) devised at the University of Minnesota have the advantage of including both verbal and non-verbal test items.

The Figural and Verbal Tests are arranged in separate booklets and consist of two parallel series, A and B. Naturally, these were constructed in accordance with Torrance's definition of creativity, and represent a sharp departure from the factor type tests developed by

Guilford, even though they draw on Guilford's ideas. Torrance has made

> "deliberate attempts to construct test activities that are models of the creative process, each involving different kinds of thinking and each contributing something unique to the batteries under development. Test tasks or activities are thus fairly complex and have features that make use of what we know about the nature of the creative thinking processes, the qualities of the creative products and creative personalities. An attempt is made, however, to assess the products that result from the administration of these test activities in terms of Guilford's divergent thinking factors (fluency, flexibility, originality and elaboration)."

When constructing the Figural and Verbal tests A and B, Torrance was most concerned with making test items and activities both interesting and challenging for the testees, bearing in mind that they may be at any stage of education from kindergarten children to graduates. It is often desirable to study creative development over a wide educational span of time, making general activities such as those included in the Minnesota batteries highly desirable.

Torrance acknowledges the fact that creative thinking may manifest itself in other than verbal and figural forms, yet some of the most important products resulting from the creative thinking process are found in these forms. On the basis of

his analysis of the thinking manifested by scientists, artists, writers and others in making outstanding creative achievement, the test author has attempted to put together "batteries of figural and verbal activities that require kinds of thinking analogous to the thinking involved in recognised creative achievements."

To turn to the rationale of the activities included in the Verbal tests A and B, one of the clearest and most straightforward models of the creative thinking process is found in the Ask and Guess test, which was included in the battery to give subjects an opportunity to express their curiosity and give a picture of their ability to develop hypotheses and think in terms of what might be possible. Subjects are shown a picture and given the following series of instructions:

> "The next three tasks will give you a chance to see how good you are at asking questions to find out things that you do not know and in making guesses about possible causes and consequences of events. Look at the picture. What is happening? What can you tell for sure? What do you need to know to understand what is happening, what caused it to happen, and what will be the result?"

Young children are asked to dictate their response to an adult, and older children and adults are asked to write theirs down. The first

task, of asking questions to find out about what is happening in the picture, is designed to reveal the subject's ability to sense what he cannot find out from looking at the picture, and to ask questions that will enable him to fill these gaps in his knowledge. The second and third tasks (guessing causes of what is happening in the picture and guessing consequences - that is, what might happen as a result) are designed to reveal the subject's ability to formulate hypotheses concerning cause and effect. The number of relevant responses produced by a subject gives a measure of ideational fluency. The number of different categories of questions, causes or consequences, or the extent to which the ideas show a shift in thought away from the obvious, gives a measure of originality. Finally, a measure of elaboration is provided by the detail that is incorporated into the hypotheses and questions.

In another task, subjects are asked to produce unusual or provocative questions about common objects such as tin cans, or cardboard boxes. They are encouraged to ask questions that lead to a variety of different answers, and that might arouse interest and curiosity in other people concerning the object. This unusual

questions activity was adapted by Torrance from a technique devised by R. C. Burkhart (1961) who developed the Unusual Questions Test as a measure of what he terms "Divergent Power", which he maintains is essential for creative achievement, and is to be considered to be of critical importance for creativity in the classroom.

The Unusual Uses Task calls for interesting and unusual uses of common objects such as cardboard boxes, and such activities used by Torrance are direct modifications of Guilford's test called Brick Uses. Torrance substitutes cardboard boxes and tin cans for bricks, believing that children will respond in a more creative way to these objects, since bricks are not readily available for use by children in their play. It is very easy to think of a tin can or box as a container and then to think of all the things that can be put in it, and so the task is designed in part to be a test of ability to free one's mind of these common ideas. This activity gives scores of fluency, flexibility, originality and elaboration, determined in a similar manner to that described above for the Ask and Guess Activity.

The Product Improvement Activity is regarded by Torrance as being a very dependable measure, calling for the production of clever, interesting

and unusual ways of changing a stuffed toy animal (a monkey or an elephant) so that it will be made more interesting for children to play with. The fluency score for this activity is the number of different approaches used in producing ideas for improvement. The flexibility score is the number of different approaches used in producing ideas for improvement. The originality score is based on the statistical infrequency and appropriateness of the ideas produced. The elaboration score is the number of different ideas or details given in elaborating or spelling out the ideas produced.

The final activity on the Verbal A and B Test booklets is entitled "Just Suppose", and this task presents the subject with an improbable situation and asks him to think of all the things that might occur if that situation really was to happen. That is, the subject has to imagine that the improbable situation really has happened in order to think of all the possible consequences. Each "Just Suppose" activity is accompanied by a drawing depicting the improbable situation used in the test, e.g. "Just suppose all the clouds had strings on them hanging down to the earth." This task is really a variation of the Guess Consequences Activity of the Ask and Guess series, and was designed in an attempt to gain a higher

degree of spontaneity and to be more effective with children. Scoring is similar to that described for the Ask and Guess Activities. Examples of specific verbal test items are given in Appendix 1.

Although a variety of figural test tasks have been designed by Torrance, the standardized batteries consist of three tasks, each designed to demonstrate a different aspect of creative thinking. Again, these are published in parallel A and B booklets.

In the Picture Construction Activity, an original task devised by Torrance, the subjects are required to think of a picture in which they use a given shape as an integral part. In test A this shape is a teardrop shape made of coloured paper with an adhesive backing so that the subjects can stick it down wherever they wish. They then add to the shape with pencil lines to complete a picture. An effort is made to ensure originality by asking the subjects to try and think of a picture that no one else will have thought of. The finished product is evaluated for originality and for elaboration.

The Incomplete Figures Activity consists of ten complete figures, which the subjects have to complete with lines or sketches, trying to make

each completed figure tell as complete and interesting a story as possible. This task is an adaptation of the Drawing Completion Test, developed by K. Franck and used in studies of creativity by Barron (1958). As is well known from Gestalt psychology, an individual will readily complete a figure in the simplest and easiest way possible. Thus to produce an original response, the subject is required to control tension and delay gratification of natural impulses. Each figure completed is scored for flexibility, originality and elaboration. Titles made up for completed drawings may also be scored for originality and cleverness. A fluency score is provided by the number of figures completed out of the ten possibilities.

The final test is very similar to the previous one, and is known as Repeated Figures Activity. The stimulus is two or three pages of repeated figures, for example, thirty pairs of parallel lines or forty circles. The common element being tested is the ability to make multiple associations to a single stimulus. Theoretically the parallel lines task elicits the creative tendency to bring structure and completeness to whatever is incomplete, whilst the circles require the ability to disrupt or destroy

an already complete form. Subjects are instructed, within the usual time limit, to see how many objects or pictures can be made from the figures, bearing in mind that the figures should be the main part of whatever is drawn. Again, encouragement is given to try and think of ideas that no one else will have thought of, and to put as many ideas as possible into each drawing. In this activity, a deliberate attempt is made to stimulate all four types of divergent thinking, namely fluency, flexibility, originality and elaboration. However, the time allowed is not adequate to permit emphasis on all four kinds of thinking. Thus individual response tendencies come into play.

These three figural tests represent three different aspects of creativity or three different creative tendencies. The Incomplete Figures task requires structuring and integrating. The figures create tension in the subject, who must control this long enough to make the mental leap necessary to get away from commonplace ideas.

The repetition of a single stimulus, for example the parallel lines or circle, requires an ability to return to the same stimulus again and again and perceive it in a different way.

The picture construction test sets in motion the tendency towards finding a purpose for something that has no definite purpose and then to go on and elaborate it in such a way that this purpose is achieved. Examples of specific figural test items are given in Appendix 1.

Thus it can be clearly seen that Torrance and his co-workers have tried deliberately to base the test stimuli, test tasks, instructions and scoring procedures on a basis of what is known from research about creativity. In most instances, they have administered the same test tasks at all educational levels, and so it has been possible to determine whether or not 'creative' children behave in the same ways that famous creative adults behaved when they were children.

Concerning the reliability of the Torrance tests, most of the customary concepts of test reliability are relevant, yet the very nature of creative thinking abilities creates a number of problems. For example, theories of divergent thinking emphasize the importance of emotional factors, for example, bodily states and group atmosphere. Also, in considering problems of reliability over time, it must be remembered that creative thinking abilities, and in particular

those measured by the Torrance Tests of Creative Thinking, are susceptible to development through educational experiences. Another important factor relevant to an assessment of reliability is motivation. Torrance (1965) in Rewarding Creative Behaviour has demonstrated that a variety of motivational procedures affect creative functioning.

Having stressed that the emotional, physical, motivational and mental health factors affecting creativity may possibly contribute to a decreased level of test-retest reliability than is commonly estimated, it certainly must not be assumed that the Torrance Tests of Creativity are unreliable or have little use. Torrance states :

> "The very fact that measurement instruments are sensitive to such factors may make them especially useful in certain kinds of situations."

Test scores can certainly be extremely useful for educators who are concerned with planning courses, and for teachers insofar as they may be made aware of creative potential that might otherwise go unnoticed. In the context of this study, the scores are most useful as a guideline for assessing the potential of differing curriculum

approaches on the development of creative thought processes. The tests of Torrance - The Minnesota Tests of Creative Thinking - remain the most comprehensive battery of published creativity measures available to educationists and researchers.

The combined work of Guilford and Torrance without doubt represents the origins and background of tests of divergent thinking/ creativity. A large number of variations upon, selections and adaptations of these tests have since been used in empirical studies. This original work provides us with a quantitative operational scoring and record which is based on a conceptual model.

1.8 AN OPERATIONAL DEFINITION

In the context of this thesis, it is essential to formulate a working definition of creativity that may be understood within the framework of the empirical investigation involved, and by teachers involved in the study and its outcomes.

This account so far has demonstrated the lack of precision of terms which seems impossible to overcome in totality. Nevertheless, it is to be assumed that within this thesis further references to creativity refer to :

> An intellectual process which is characterised by divergent thinking. This is clearly related to creative problem solving which is also a process which involves stages of creativity, thinking of the divergent kind and accesses multiple modes of knowing.

A more formal taxonomy of divergent thinking activities follows, providing a useful summary of the thought processes involved.

Classification of Creative Activities and Experiences (Based on Williams, 1964)

Divergent Thinking : scanning stored information, searching for many possible solutions, thinking in different directions, ability to go off in new and untested directions, deferred judgement.

A) Fluency : quantitative - emphasize rate within classes.

i. Ideational fluency - generation of a number of ideas, words, titles, responses, phrases, sentences, uses, consequences, productions (drawings, pictures, designs or other sense stimuli.)

ii. Associational fluency - completion of relationships - production of relations, generation of synonyms, analogies, similarities, problems of likeness.

iii. Expressional Fluency - new ideas to fit a system or structure organisation into systems or logical theories; sentences, verbal ideas, question responses.

B) Flexibilities: quantitative - variety.

i. Spontaneous flexibility - variance of kinds of responses into classes, number of considerations of properties, attributes or

inherent characteristics of problem or product; number of shifts of category responses, versatility.

ii. Adaptive flexibility - number of detours, freedom to make changes, number of approaches or strategies used in seeking solutions; number of changes of interpretations, changes in direction of thinking.

C) Originality : qualitative - unusual, clever, uncommon, infrequent, remote associations. Verbal, figural, symbolic transformations as uncommon, objective unusualness - statistically infrequent - subjective choice as clever, far-fetched, novel, different from standard or norm.

D) Elaboration: production of detailed steps, variety of implications and consequences; quantitative measure.

1.9 SUMMARY OF KEY IDEAS EXPRESSED IN CHAPTER 1

1. Creativity is a multi-dimensional concept. Research has demonstrated a changing emphasis from viewing creativity as 'product' to viewing it as a 'process'.

2. An operational definition of the term is vital, within whatever context it is being used. It is fairly generally agreed that creativity is an intellectual process, involving thinking of the divergent, rather than convergent kind.

3. There is a lack of conceptual clarity about the terms 'creativity' and 'creative problem solving', but there seems to be no doubt that the two are intertwined and in practice the mental activities they describe can in no way exist in isolation from each other.

4. Both creativity and creative problem solving depend on multiple and complex thought processes, and access multiple ways of knowing.

5. Creativity is not a rare type of ability. Everyone possesses a measure of it. Because individual differences are a matter of degree and

not of kind, it is an ability which is capable of nurture and development.

6. The concept therefore has serious implications for educators and those responsible for designing, implementing and evaluating programmes of work.

7. In classroom development of creativity, it is important to consider not only a social context but also a cognitive or informational context.

8. We do not yet have a full knowledge of the classroom environment that would enable us to reach optimum conditions for the development of creativity in children.

CHAPTER 2

EVALUATION OF THE CURRICULUM:

THE CONNOISSEURSHIP MODEL

CHAPTER 2

2.1 The Complexity of The Evaluation Task

2.2 Qualitative Approaches to Evaluation

2.3 The Connoisseurship And Criticism Model

2.3.1 Philosophical Justification

2.3.2 Methodology

2.3.3 Critique

2.4 The Model In Context

2.1 THE COMPLEXITY OF THE EVALUATION TASK

At the outset of this discussion it must be made clear that there is a perceived difference between the terms 'evaluation' and 'assessment'. A useful distinction is to think in terms of evaluation as relating to the curriculum of a classroom or a school and assessment relating to its pupils. In practice the two are closely related. Without doubt, evaluation is seen as an essential task, leading to the improvement of pupil learning, or more generally, the improvement of the quality of education that is being provided by the formal education service.

It must also be stated at the outset that it is inevitably beyond the scope of this thesis to provide a detailed overview of the myriad definitions and techniques of approaches to and political implications of the evaluation process. Rather, it is intended to analyse the philosophy and the methodology of the one particular model of evaluation which has been selected for use in this investigation and to set this within the wider context of approaches to curriculum evaluation generally and qualitative techniques in particular.

The first section of this Chapter outlines and promotes the viewpoint that the curriculum of

a school is too complex to be measured in scientific or psychometric terms. A survey of the literature concerning curriculum studies, and its evaluational aspects in particular, reveals that traditionally there has been an almost overwhelming tendency to attempt to measure the effects of programmes on student behaviour, with little or no attention paid to the assessment and description of the environment which creates such effects, or indeed the great complexity of the curriculum in operation. The vast majority of traditional evaluation studies involve a comparison between 'expected' and 'observed' outcomes of student performance, employing standardised psychometric measurements.

These practices are derived from the commonly accepted notion of 'education as a science', rooted in the ideas and assumptions of those theorists who were actively working in this field during the late nineteenth and early twentieth centuries. It was at this time that psychology developed as an independent scientific discipline set apart from philosophy, and the influential ideas of Edward L. Thorndike concerning the science of educational practice had great effect; both in advancing the establishment of educational psychology as a key theoretical

field of education, and also in their influence upon school administrators and teachers of the era. Eisner (1979) states :

> "The general aspiration that Thorndike held for schooling was the creation of a science of educational practice. Through experimentation it would be possible, he believed, to discover the laws of learning so that teachers could rely not on intuition, chance, artistry or talent but rather on tested principles and procedures for managing the student's learning."

John Dewey was also influential in the early twentieth century in promoting the belief that scientific methodology was a very efficient and worthwhile means of guiding and evaluating educational practice. Whilst it can be claimed that Thorndike and Dewey were most influential in the establishment of the scientific model for educational measurement, many have followed in the tradition of their basic theories and assumptions. For example, the influential work Basic Principles of Curriculum and Instruction by Ralph W. Tyler (1949) applies scientific principles to the design of the curriculum, claiming that one needs to identify and measure observable behaviour if attempting to demonstrate that learning has taken place. Tyler identifies four central questions around which curriculum planning revolves in a

cyclical fashion. These are :

i) What educational purposes should the school seek to attain?

ii) What educational experiences can be provided that are likely to attain these purposes?

iii) How can these educational experiences be effectively organised?

iv) How can the effectiveness of learning experiences be evaluated?

It is important to note that formulated statements of intent or objectives, are to be specified before the remaining components of the model are considered. In the light of such objectives, the learning experiences offered are selected in the second stage. At the third stage these experiences are organised to produce a worthwhile cumulative effect. The final stage is that of evaluation which measures the extent to which the original objectives have been realised, thereby indicating the educational effectiveness of the curriculum.

This model is a highly rational, systematic, means-ends approach to curriculum development, which takes little or no account of the great complexities of a curriculum which exist in reality and the context in which that curriculum

is being implemented. Its assumptions are basically scientific.

Furthermore the Tyler rationale provides a basis which was elaborated by a whole generation of workers in the curriculum field. Much work by educationists such as Popham and Mager has concentrated on making the first stage of this rationale as precise as possible in order to facilitate the measurement and evaluation of the final results of the curriculum programme. In their consideration of the scientific curriculum evaluation, Taylor and Richards (1979) comment:

> "First define your educational objectives and secondly, give them an operational (and preferably, behavioural) definition - have been crucial tenets of 'scientific' curriculum evaluation."

Central to the notion of the science of education was the ability to measure the effects of education through the use of tests of achievement, attitude scales and interest inventories. Originally designed as tools of educational psychology, they became widely employed as means for measuring educational success. Instruments developed in this area have been used to select students, to stream them, and to place them in different or selective

educational situations. Thus the area of psychometric measurement has provided instruments and techniques to be used in the assessment of students' input and output characteristics. Merwin writes of such techniques:

> "They have provided instruments for measurement of the essential components in the evaluation equation."
>
> (J.C.Merwin, 1969)

Traditionally, therefore, in this scientific approach to education and to the process of curriculum evaluation, a basic premise is that the practice of education is intentional. Furthermore, its effectiveness can only be measured by reference to observable behaviour. Coombs reflects this scientific flavour when he writes that education and the curriculum within it ....

> "has a set of inputs, which are subject to a process and certain outputs, which are intended to satisfy the systems objectives. These form a dynamic, organic whole."
>
> (P. Coombs, 1968)

This view is reinforced time and again by writers on the subject. For example, Gronlund states

"The final step in the instructional process is to determine the extent to which the pupils achieved the instructional objectives. This is accomplished by using tests and other evaluation instruments designed to measure the intended learning outcomes. Ideally, the instructional objectives will state the desired changes and the evaluation instruments will measure or describe the extent to which those changes have taken place."

(Gronlund, 1985)

Throughout the last twenty years researchers and curriculum theorists have continued to promote this scientific approach, as evaluation has received a great upsurge of attention, with the promotion of the belief that it is an integral and key element of professional development and accountability. Pressures for accountability increased dramatically throughout this time, and by 1980 the concept of educational evaluation was often regarded as being synonymous with accountability. Nuttall (1982) suggests that the two terms are so intertwined that the distinction may be untenable. Certainly accountability would seem to presuppose evaluation. This upsurge in the need for accountability in recent years stems from a number of complex social, economic and political pressures, contributing to a gradual change in the perception of education and also from an apparent decline in public confidence in educational programmes.

"The 1970s witnessed a widespread rotting of public confidence in public institutions."
(Halsey, 1979)

Whilst it is beyond the scope of this thesis to explore these pressures for increasing accountability in education, it must be noticed that this increase has manifested itself in the widespread acceptance of evaluation procedures in schools and classrooms. On both sides of the Atlantic, such procedures developed a very high profile, reflected in the establishment of national testing programmes through innovations such as the government's Assessment of Performance Unit and the USA's National Assessment of Education Progress programme. Throughout this development, evaluation was seen to be synonymous with testing and measurement in perpetuation of the scientific tradition. In addition to national evaluations which aim to monitor the education system as a whole, recent years have also witnessed a tremendous increase in the number of local testing schemes. These can give information on individual schools if they employ "blanketing" techniques where all children in a Local Education Authority are tested.

The most common reason given by Local Authorities for blanket testing (of, say,

reading schemes) is screening, to ascertain which pupils need remedial help. As pointed out by McCormick and James (1988) some Authorities saw an important opportunity in the formation of an item bank, linked to Assessment of Performance Unit tests, upon which they could draw to generate their own tests. The Local Education Authorities' and Schools' Item Banking Project (LEASIB) operated by the National Foundation For Educational Research, offered such an opportunity. In the USA, the Educational Testing Service (1973) described state testing programmes and reported that there were plans for many states to test a wide range of curriculum areas.

The development of such testing programmes is linked to expectations and central directives. In the USA a state defined curriculum, often enshrined in legislation, requires school district authorities to improve and develop the curriculum through a framework. An example of one framework suggested by the California State Education Department (1977)

> "is expected to contain the goals of instruction, an outline of the concepts and processes to be taught, the content objectives, the appropriate teaching strategies and learning activities, and the tests, student self-assessment and teacher evaluation required."
> (McCormick and James, 1988)

This example illustrates a (representative) case where the school itself has little space for innovation or even involvement in curriculum development and evaluation.

In this country there has been an increasing trend towards testing and measurement as the accepted means of evaluation and public accountability. The Education Act of 1980 made it a legal requirement for all schools in England and Wales to provide public information on the curriculum. The government White Paper Better Schools (1985) suggested that the curriculum was best organised in terms of subjects, signalled the government's intention to provide a further statement on the organisation of the curriculum, and drew attention to concern for the definition of levels of attainment. Such major developments clearly encouraged educators to review and evaluate the curriculum of schools. The implementation of the National Curriculum in England and Wales and its associated "benchmark" testing is the culmination of this increasing trend towards centralist testing and measurement as the accepted means of evaluation and accountability.

This trend reinforces the basic premise which considers the process of education to be

intentional, its effectiveness measurable and its related behaviour observable.

In reality, however, it can be argued that this basic premise is founded on false assumptions. The four basic elements of a complex curriculum, namely objectives, content, method and evaluation, do not constitute neat and easily separable facets. There is a very close interrelation between them and each element is influenced by, and has influence upon the others. Any schemes for curriculum evaluation should take this complex system into account, leaving no doubt that the process of curriculum evaluation is itself an extremely complex and multi-faceted activity.

Furthermore, bearing in mind that the instruments of measurement so readily used in scientific approaches to evaluation were originally developed as research instruments, it is important to point out the practical limitations of this resemblance between curriculum evaluation and research.

Eisner (1972) identifies five important limitations which are very relevant to this discussion. Firstly, when an evaluation is made of a new teaching method or programme, often not enough attention is given to making a distinction

between findings that are statistically significant and those that are educationally significant. Indeed the differences may have no educational significance at all.

Secondly, Eisner maintains that there has been a tendency to reduce educational problems into forms that fit research paradigms, rather than finding research methods that really fit the problems. Very frequently research questions are conceived within the methodology of, for example, correlation and analysis of variance instead of confronting vital questions and finding new and more relevant ways to answer them.

Thirdly, almost no emphasis has been placed on an assessment and description of the environment in which student behaviour is developed. The effects of programmes on behaviour are analysed in isolation from these important environmental influences.

Fourthly, an identification is made of the failure of evaluation attempts to recognise the difference between what students will do and what they can actually do. For example, tests of achievement are given to students in contexts in which they know that they must perform well. The circumstances are artificial and the results may be very different from a student's performance in

his everyday environment. Surely we wish to be concerned with something far more profound than test performance on a particular day. Long-term effects are essential.

Finally, Eisner identifies the limitation of severe brevity which is often a characteristic of both experimental research and evaluation practices. He recommends the necessity for longer experimental treatment periods, as well as more sensitive instruments with which to evaluate programmes that are provided in schools.

For these various reasons it would appear that the measurement instruments which are used in educational research have severe limitations when applied to the practical tests of curriculum evaluation. Furthermore, it is the thesis of this chapter that their fundamental limitation, as implied within the above reasons, is rooted in the fact that the curriculum is a far more complex entity than it appears in the rational, scientific, means-ends model. Indeed, it is impossible to encompass the complexity in such a linear dimension. Evaluation should take account of this fact. Standardised test scores do not necessarily represent what students are actually learning in a school classroom. The totality of their learning experiences contains a complexity

beyond the scope of psychometric measurement. Such measurement may be extremely useful in ascertaining whether a desired level of achievement has been attained in specific predetermined skills and competencies which the educator intended to develop. Yet within a classroom situation there is a myriad of equally important yet unintended outcomes which will have a profound effect on the totality of a child's learning experiences.

It is perhaps useful at this stage to cite an example of this situation, drawn from personal experience of teaching children aged ten and eleven years. This example is highly relevant to the present thesis insofar as it provided the stimulus for and the basic thinking leading to this current investigation and research design. Over a period of several years an approach to teaching and learning was developed based on the students' interaction with their immediate environment, and their first-hand experiences of the natural world.

The school concerned is situated in a major conurbation in England, on a bleak housing estate characterised by a very high density of dwelling units, lack of open space and amenities, and severe socio-economic problems. Generally the

children in this area have little or no experience of contrasting environments and even less motivation for academic work. Within this setting, an educational programme was developed committed to educating children about the environment, from the environment (using the environment as resource material) and for the environment (with ethical goals). A completely integrated and multi-disciplinary approach was developed (Palmer, 1982) in which the children are encouraged to use contact with natural materials and environmental exploration as a foundation for the development of basic, scientific and creative skills. The programme provides opportunities and direction according to the interests, age and ability of the students concerned; skills are introduced and developed in an ordered and sequential progression. It is firmly believed that such an approach to the curriculum will encourage a positive attitude towards learning, a very high level of motivation, and a resultant high level of attainment in basic skills. The intended outcome was a satisfactory level of achievement by all students in tests of specific skills of literacy, numeracy and general reasoning as compared to results obtained by other students taught in a more traditional manner.

At the end of each of four consecutive years of programme development, psychometric testing revealed that the intended outcomes were certainly being achieved. Specific behavioural and content oriented objectives were being realised, as indeed they were in an alternative and parallel educational programme with totally different methodology and rationale. Superficially, therefore, according to traditional scientific testing, it could be concluded that the two programmes were of equal value. Yet it was extremely obvious to a participating observer that the children involved in the integrated approach demonstrated a very superior level of originality of thought in all aspects of their work. They consistently revealed their ability to think fluently and with flexibility. These facets of divergent thinking were reflected in all subject areas and across subject boundaries. Very frequently data would be presented by the children in an original, artistic or creative way and then analysed in a more rigorous mathematical or scientific tradition.

An empirical investigation (Palmer, 1981) revealed a very significant statistical difference in the level of creativity demonstrated by the children learning in the integrated

environmentally oriented way, compared to that demonstrated by children following a more formal and traditional approach to teaching and learning. In short, this example demonstrates that many qualities and outcomes of a learning environment were identified by a teacher-evaluator operating within the system. The development of a high level of divergent thinking is but one of a myriad of consequences that would not have been revealed by traditional scientific testing. It was demonstrated that it is one of many unintended consequences of this particular method of classroom organisation and teaching style. Yet it is indeed of fundamental importance, and has profound implications for education.

In The Educational Imagination (1979) Eisner identifies the implicit or unintended curriculum as being a vital and essential aspect of the totality of what is taught and learned in a school. He claims that all schools teach three curricula regardless of what particular orientation to curriculum is being followed within the establishment. These are the explicit, the implicit and the null curricula.

The first of these curricula is that with which the traditional, scientific measurements discussed above would primarily be concerned. It

can be defined as the publicly explicit goals and aims of a school - relating to the curriculum in general and to the specific courses and subject areas that are taught.

> "In short, the school offers to the community an educational menu of sorts; it advertises what it is prepared to provide."
> (Eisner, 1979)

Yet as Eisner goes on to explain, this is certainly not the sum total of all that is taught within the environment of the school. There is an implicit curriculum as discussed in relation to the example cited above, often consisting of 'hidden' aspects that educators may not even realise that they are 'teaching.' Dimensions of this curriculum may be sociological or psychological. Examples discussed by Eisner include the unintended teaching of compliant behaviour, competitiveness, and the impact of time allocation on an individual's perception of what constitutes important subject matter. Indeed, it is argued that even a school timetable teaches .....

> "It may teach students to be cognitively flexible, to be able to shift problems and adapt to new demands on schedule. It may teach students not to get too involved in what they do

because to become too involved is to court frustration when time runs out....."
(Eisner, 1979)

Furthermore, aspects of the implicit curriculum are rooted in the cultural background of a school. The traditions of its cultural setting are so often reflected in the atmosphere and surroundings that are created, having an inevitable effect on the educational programme that is offered.

Finally the null curriculum is concerned with that which is <u>not</u> taught .... that which does not exist in the classroom context for teaching and learning.

"It is my thesis that what schools do not teach may be as important as what they do teach."
(Eisner, 1979)

This statement is argued on the grounds that what one is ignorant about has very important effects on the perspectives from which one can analyse and view a situation in the world, and on arguments and ideas that one can produce. Eisner identifies two dimensions of the null curriculum, these being intellectual processes and subject areas. Deficiencies in one or both of these aspects will have profound effects on the overall development of a student, leading to a situation

where there will be perspectives in the world that he or she may never know about. The absence of vital concepts and skills and/or knowledge of certain subjects have important consequences for his/her future life.

Numerous other writers have articulated the view that the curriculum has 'hidden', 'unintentional', 'implicit' or 'null' elements, (Jackson 1968, Assar and Gordon, 1987).

Without doubt, the curriculum of a school is an exceedingly complex and multi-faceted entity. Many aspects of the curriculum are not obvious or readily identified. Quoting once again from The Educational Imagination:

> "Schools teach far more than they advertise. What schools teach is not simply a matter of covert intentions, it is largely unintentional." (Eisner, 1979)

Certainly the curriculum does not in practice demonstrate that neat linear dimension suggested by the means-end model of thinking. Many outcomes cannot be pre-determined. The unintentional may be just as important, if not more so, than the originally planned and intended outcomes and effects. For this reason it seems patently obvious that psychometric measures and testing

alone are certainly not a fully adequate answer to the problems of curriculum evaluation. That is not to say that scientific methodology should be rendered redundant in the curriculum process. Indeed psychometric techniques have a vital role to play in the consideration of certain aspects of an educational programme and in indicating the performance of individuals. Yet used as the primary legitimate means of evaluation, they are far from adequate as a comprehensive measure of the totality of curriculum outcomes. Eisner goes so far as to comment that:

> "The reduction of educational evaluation to a set of limited quantitative methods .... is to reduce educational evaluators to a technical process. Educational evaluation is far more than that however."

and

> "The outcomes of educational programmes are not completely predictable, and hence to evaluate only for those goals one has intended can lead one to neglect equally important, and at times even more important, outcomes that were unintended. Using objectives to serve as criteria for evaluating educational programmes has an important function to perform, but a conception of evaluation that limits itself to what has been preplanned in terms of goals or objectives is likely to be educationally thin."
> (Eisner, 1979)

In conclusion, therefore, it can be stated that without doubt the curriculum of a school is an exceedingly complex, multi-faceted entity. Certainly it is far too complex to be accurately and comprehensively measured or evaluated solely by the traditional instruments of psychometric testing derived from the practice of educational research. Such instruments of evaluation, whilst being very useful and accurate for measuring certain precise curricular aspects, have severe limitations rooted in this complexity.

A worthwhile and comprehensive curriculum evaluation employs alternative methodology to complement the traditional. This thesis would not be complete without reference to the issue of what alternatives to psychosometric/scientific techniques are available to educators and researchers who aim to accomplish a worthwhile and comprehensive classroom evaluation. Clearly, however, space does not allow for an exhaustive and detailed account of alternative methodologies. It is therefore intended to outline briefly various approaches and then to focus on the one particular model of qualitative evaluation, that of 'Connoisseurship and Criticism' which is employed in the empirical research of this thesis.

2.2 QUALITATIVE APPROACHES TO EVALUATION

During the past twenty years there has been an increasing amount of interesting and exciting work done in the field of 'new' evaluative methods. Eisner writes (in Willis, 1978) of

> "a new climate that appears to be developing in the field of educational evaluation, one that could have significant consequences for the ways in which enquiry into educational problems is conceived."

Many educators and researchers have found the "rational", scientific approach irrelevant to their concerns and have proceeded with an articulation of alternative viewpoints, based more on the qualitative aspects of classroom life and its complexities, rather than on quantitative statements on the issue of how far objectives have been achieved. The work of Willis (1978) was the first research of its kind devoted entirely to the use of qualitative methods in educational evaluation and aims to link together practical and theoretical examples of such methods. Willis identifies and describes three major sources of motivation for the development of qualitative methodology. The first of these is political motivation from those who view schools as

"an institutionalised conspiracy to keep children dependent, ill-informed, and tolerant of mindless tasks so that when they become adults they will fit into the existing social order. To such individuals the feckless character of schools is not indicative of failure but of success. Schools, they believe, were and are intended to be a mindless experience."

(Willis, 1978)

"For many of those politically motivated to use qualitative methods, a socialist society or Marxist-socialist philosophy is more compatible with the kind of schooling they prefer. Qualitative methods of evaluation, they believe, might make a significant contribution to the realization of such ends."

(Willis, 1978)

Thus it is considered that because the research establishment and the testing industry are participants in this scenario, then they are important targets to 'attack'. Qualitative methods of evaluation have the capacity to illuminate the sorts of experiences that teachers and children are actually engaged upon in classrooms and schools, and thus may reveal to the public what really does go on in educational establishments. This may precipitate a perceived need for significant changes in the structure and goals of schooling.

The second source of motivation for change is considered to be methodological rather than

political. Laboratory-style research/evaluation methods more associated with educational psychology are considered by many to be inappropriate for illuminating the life of classrooms. Methods that are more flexible and 'naturalistic' are considered to be far more suitable for illuminating the whole context of teaching and learning and for observing naturally what is going on in an educational situation. It is argued that without intervention by 'experimenters' more valid data can be obtained from which a true understanding of classrooms and teaching can be derived. This is not based on political motivation insofar as those who promote these views genuinely find that traditional methods are superficial, and wish to widen the variety of legitimate procedures for evaluation.

The final source of motivation is described by Willis as epistemological in nature, and is promoted by those who consider scientific epistemology as being totally inadequate by itself for illuminating and describing all that we need to know about teaching, learning and classroom life.

> "Scientific and quantitative methods are important utilities for describing some aspect of educational life and its consequences, but they are far too limited to be the exclusive or even dominant set of methods. To complement these methods of evaluation, evaluators must look to the qualities that pervade classrooms, the experience that students have in schools, and the character of the work that children produce. To see these qualities requires a perceptive eye ....."
>
> (Willis, 1978)

Both the methodological and epistemological arguments advanced above will be examined at greater depth in the context of the discussion of the 'Connoisseurship and Criticism' model of evaluation in section 2.3 below. Between them, the three sources of motivation for change form a powerful position from which to argue and debate. Many have accepted the challenge of a very difficult task - any attempt to alter or expand evaluation methods that have dominated educational research and advancement for almost a century must be a frustrating endeavour. Not only can a large investment of both time and money in traditional methods be identified, but also the difficulty of posing a threat to the status quo must not be underestimated. The ideas and writings of Eisner have been of fundamental importance to the growth of the process of qualitative evaluation. He clearly articulates

the viewpoint that there is plenty of room in education for both quantitative and qualitative methods, and methods that are artistic as well as scientific.

> "What the field does not need is narrow-minded parochialism that assumes that only one set of criteria or one kind of method of enquiry is valid."
>
> (Eisner in Willis, 1978)

To compound the problem of expanding the range of techniques available to evaluators, it must be stressed that the actual doing of qualitative evaluation is a very difficult task. It does not rely on a relatively straightforward administration and marking of tests and observation schedules. There is no 'procedural prescription' and a very high degree of sensibility, perception and intelligence is required by the evaluator who is the actual 'instrument' of the job.

> "The inquirer needs to know when to shift purpose or focus, how to recognise what is real and what is feigned, how to interpret the meaning of events observed, and what to make of them from an educational point of view."
>
> (Willis, 1978)

The task is also very difficult because of the

personal nature of the evaluator's involvement. If something is perceived, written and shared then it is causing the author/evaluator to have a personal stake in the situation. This can be uncomfortable or even threatening for all parties concerned : it is an area fraught with difficulties and frustrations. As Eisner himself comments "It is far easier to talk and write about qualitative evaluation than to do it!" Once again, these problems and complexities will be addressed at greater length in the context of the description of this current attempt to conduct some evaluation of this type.

It is perhaps a combination of the relatively 'new' status of qualitative methodology and its fascinating complexity which contribute to a justification for using this technique in the present investigation. The time is ripe for the extended use and refinement of qualitative methods and indeed for the consideration of 'metaevaluation' - that is, evaluation of an evaluation, in order to justify and promote successful methodology of this kind. Furthermore, this thesis totally supports the view of Eisner, reinforced throughout his writings (1978, 1982, 1984) that students and teachers should be widely trained in the use of qualitative techniques.

More courses of this nature for students of education and in-service training courses for teachers would usefully serve a two-fold purpose. Firstly, the very existence of such training courses for teachers would add to an understanding within the education profession that qualitative methodology is legitimate, and useful. They would help to redress the balance of the still prevailing bias towards teaching quantitative methodology. Secondly, if the techniques are to be used successfully, then undoubtedly, training is necessary. Such training would promote their good and effective use and provide a substantial contribution to the methodology available to educators for understanding the complexity of classroom life.

Such methodology, hitherto referred to as qualitative, has also been termed 'naturalistic' (Smith and Glass, 1987). These terms may refer to both research and evaluation in which evidence is gained from observation, interviews, document collection and/or photographic sources. These data are then analysed and reported to others in a qualitative form. Various evaluation models have emerged and developed from the assumptions of such naturalistic research, including 'Responsive Evaluation' (Stake, 1975), 'Illuminative

Evaluation' (Parlett and Hamilton, 1976), 'Criticism' (Mann 1968, Willis 1975) and 'Connoisseurship Evaluation' (Eisner, 1979). Other researchers supportive of the view that qualitative methodology and results are highly valid and responsive to the goal of evaluation (judging the true worth of a programme or product) include Bogdan and Biklen (1982), Patton (1980), Guba and Lincoln (1981) and Fetterman (1984).

A detailed discussion of the justification for and criticisms levelled at the model of 'Connoisseurship' follows, but at this stage it is relevant to draw attention to one of the general areas of criticism and caution that have been articulated by opponents to the whole notion of naturalistic methodology. Wolcott (1982) expresses the view that the aims of evaluation are antithetical to the roles, methods and purposes of ethnographic research. The naturalistic researcher studies subjects for an extended period of time in order to get close enough to them to understand them from their own point of view. Judgement is deferred on their worth. The naturalistic evaluator, however, is required to make judgements in a relatively short period of time. Evidence is gathered quickly, perhaps in time to support a decision. Fetterman (1984)

reinforces this extremely important point : that qualitative methods, attractive as they may be for providing description, interpretation and multi-method data, should never be applied to evaluation in a thoughtless or irresponsible manner.

Smith and Glass (1987) provide a very useful set of standards or issues which may be raised in the critique of a naturalistic study. These are :

1. Time Spent Collecting Data

One of the primary controls in naturalistic research is the length of time the researcher spent in collecting data, and the amount of data collected. Length of time should be assessed in the light of the size and complexity of the case and the phenomenon studied. When circumstances restrict the time available, the researcher should compensate by collecting more data from alternative sources and informants.

2. Access To Data

The quality of relationships the researcher forms with informants and subjects provides access to information on the insider's perspectives. If the relationships are not adequate, the researcher will be denied access to parts of the case and the data will suffer. The report should detail the role the researcher played, which doors were

open and closed as a result of the role chosen, and the impact on the data.

3. 'Naturalness' Of The Data

The ideal study is one that portrays the case in its natural state, that is, without the reactivity and artificiality that can be introduced by a researcher. Possible observer effects should be noted.

4. Researcher Self Criticism

The researcher's pre-conceptions and biases can influence and perhaps distort the data. There should be evidence that these were acknowledged and controlled. If prior hypotheses or biases were evident, were they compensated for by the introduction of alternative hypotheses, multiple sources of evidence and observers, and a disciplined search for disconfirming evidence ?

5. Logical Validity

If conclusions are stated, they should have a convincing and carefully reasoned connection with the descriptive data.

6. Confirmation

Systematic efforts to check hypotheses and

alternative hypotheses with alternative methods, perspectives and observers should be evident.

7. Descriptive Adequacy

The researcher should have provided precise specific details about the case and its context in a way that creates verisimilitude and a vicarious experience for the reader. The perspective and meanings of the subjects should be extensively illustrated. Methods of the study should be described. Reliability, validity and generalisability are enhanced by specification of methods, notes, selection and sampling of units, and analytic techniques (Goetz and Le Compte, 1984).

8. Significance

The study should have addressed theoretically important questions and have been designed in such a way that questions could be answered.

These standards are of critical importance, and have been borne in mind throughout the implementation of the model used in the current investigation. It is to this particular model that detailed attention is now turned.

2.3 THE CONNOISSEURSHIP AND CRITICISM MODEL

2.3.1 PHILOSOPHICAL JUSTIFICATION

As mentioned above, the growth of the process and methodology of qualitative evaluation has been heavily influenced by the ideas and writings of Elliot W. Eisner. In turn, it is very evident that Eisner's thoughts and beliefs are an extension of the philosophy and work of John Dewey. Dewey's work Experience and Education (1938) is of such fundamental importance to an understanding of the philosophy underpinning Eisner's model that it is relevant to review this work in some detail. As the title suggests, the key concept underpinning Dewey's whole account is experience. The ideal interpretation of the term 'education' is

> "The intelligently directed development of the possibilities inherent in ordinary experience."
> (Dewey, 1938)

Dewey is concerned with understanding the nature of the concept of experience and with an application of this understanding to the development of worthwhile programmes of education. A great deal of discussion in the account is concerned with analyses of both the 'traditional' and 'progressive' approaches to education.

Fundamental problems are recognised and explained with regard to both of these approaches, on the grounds that neither is successful in applying the principles of a carefully developed philosophy of experience. Dewey argues that it is essential that educators recognise the importance of such a philosophy and its application to the development of educational programmes. His purpose is not to outline a compromise between traditional and new methods. Rather it is to define a concept; a philosophy of experience, to relate the formulation of this new order of conceptions to new modes of practice and to insist on its importance.

In an opening discussion of the contrast between traditional and progressive approaches to education it is claimed that in the latter:

> "To imposition from above is opposed expression and cultivation of individuality; to external discipline is opposed free activity; to learning from texts and teachers, learning through experience; to acquisition of isolated skills and techniques by drill is opposed acquisition of them as a means of attaining ends which make direct vital appeal; to preparation for a more or less remote future is opposed making the most of the opportunities of present life; to static aims and materials is opposed acquaintance with a changing world."
>
> (Dewey, 1938)

From the above description it may well appear to the reader that the progressive education movement

is characterised by principles and a practice which are merely the opposite of that which is traditional. Indeed a fundamental issue introduced at this stage concerns the fact that a great danger of the progressive movement is that it rejects the aims and methods of the traditional, so it may develop its own principles negatively rather than positively and constructively. Any 'new' mode of education should be concerned with the constructive development of a philosophy of its own, rather than with evolving a practice based on what is rejected. Dewey states quite plainly that the fundamental unity of the new philosophy is

> "... found in the idea that there is an intimate and necessary relation between the process of actual experience and education."
> (Dewey, 1938)

All planning and organisation should proceed on the basis of experience - the general principles of the new education create problems which have to be worked out on the basis of a new philosophy of experience. Certainly these problems will not be resolved by rejecting the ideas and practices of traditional education, and then proceeding with the complete opposites. There must indeed be a

"... positive and constructive development of purposes and subject matter on the foundation of a theory of experience and its educational potentialities."

(Dewey, 1938)

The need for a theory of experience is further illuminated by a consideration of what exactly the term means. Experience and education cannot directly be equated to each other; many experiences can be mis-educative, arresting or distorting the growth of further experiences. Traditional education contains many examples of mis-educative experiences, for example when students lose their motivation to learn a particular subject because of the way in which learning that subject is experienced by them. In many such instances the process of learning is associated with boredom. In other words, Dewey acknowledges that the problem with traditional education is not a lack of experiences, rather it is concerned with the character of those experiences, since they may be defective or not in any way connected to experiences of the future. Relating this to progressive education, it is essential that every educator must consider the quality of experiences, and not just the fact that they are necessary. Their influences upon and relation to future experiences are particularly

important.

Thus the reader is persuaded that a 'new' education must not merely replace that which is old by introducing opposing principles and practices. Rather, it must demonstrate an additional component, attention to the nature and quality of experiences to which the learners are exposed. The whole system must be well founded on a philosophy of its own.

The attention of the reader is subsequently focused on the author's interpretation of certain criteria of experience, of which he identifies two, namely continuity and interaction.

The criterion of continuity is interpreted from a biological standpoint, as indeed are many of the ideas discussed in the account. It is likened to habit, whose basic characteristic is that every experience undergone modifies the individual, and this in turn has an effect upon subsequent experiences. In other words, the individual has changed as a result of undergoing the experience. In this same way

> "The principle of continuity of experience means that every experience both takes up something from those which have gone before and modifies in some way the quality of those which come after."
>
> (Dewey, 1938)

Thus an experience always lives on in subsequent experiences, which provides for continuity. Furthermore, continuity is seen as a criterion by which to discriminate between experiences which are educative and those which are mis-educative or even non-educative. It would seem that the principle of continuity applies in every case, yet it is the quality of an experience that influences the way in which it will be applied to future situations. Relating this to practical terms, it would seem that one of the major problems of an educator is to evaluate an experience, to see the direction in which it is heading in terms of the attitudes and habits being created in the individual, and to promote those experiences which are educative and worthwhile. Education is effected through the continued exposure to worthwhile experiences - each building on those which have come before - and modifying the quality of those of the future. This in Dewey's terms is the 'experiential continuum', which leads to the education, or to the growth of the individual.

Interaction, the second criterion of experience, is of equal importance. Dewey distinguishes between the external, or objective conditions influencing the experience of an

individual learner, and his own personal internal conditions. The term interaction:

> "assigns equal rights to both of these factors in experience - objective and internal conditions. Any normal experience is an interplay of these two sets of conditions."
> (Dewey, 1938

As these two factors interact together, they create what Dewey terms a 'situation'. Quite obviously an educator should be concerned with the situations in which interaction takes place, yet by definition each individual's situation will be unique. Within a classroom, there will be as many learning situations as there are pupils in the room. One of the major problems with traditional education was that it emphasized the external conditions that are part of an experience and paid very little attention to the internal aspects, which are of equal importance in any situation. A new education must acknowledge not only responsibility for selecting and modifying objective conditions, but also for understanding the needs, attitudes and abilities of the individual learners who are being educated. It must also recognise the process of interaction between the two. Particular methods and materials

that have been so effective with pupils in past situations may not be so successful when interacting with new and differing internal conditions.

Certainly the two criteria of experience, continuity and interaction, are not separate from each other:

> "They intercept and unite. They are, so to speak, the longitudinal and lateral aspects of experience."
>
> (Dewey, 1938)

Taking the two together, they provide an adequate measure of the value of an experience and the extent to which it is educative. Relating this once again to practice preparation is obviously of fundamental importance. Great care must be taken to prepare and provide the conditions which should give each and every unique experience a worthwhile educational meaning.

One of the great strengths of this classic work is that the author's intelligent theory, or philosophy of experience is explained with reference to actual approaches to education, to concrete plans, methods and problems. Indeed, the whole philosophical content is very readily transferrable to the practical classroom

situation, and much of Dewey's work is very much concerned with discussing educational problems and issues in the light of the philosophy which has been expounded. Issues discussed include individual freedom and social control, and the progressive organisation of subject matter. The basis of a philosophy of experience is always fundamental. For example:

> "When education is based upon experience and educative experience is seen to be a social process .... the teacher loses the position of external boss or dictator but takes on that of teacher of group activities."
> (Dewey, 1938)

Dewey's interesting interpretation of freedom has little to do with movement or outward physical activity.

> "The only freedom that is of enduring importance is freedom of intelligence."
> (Dewey, 1938)

In other words, one has freedom of thought, desire and purpose. Whilst Dewey does acknowledge and explain the importance of outward freedom, this inner freedom is absolutely fundamental to education and growth. Freedom is identified with the power to frame purposes and then to carry these into effect, which is

"The work of intelligence."

Once again, the reader can see the great relevance of biological or organic ideas in Dewey's explanation of the meaning and educational significance of purpose. Every purpose has its origins in an impulse which is personal to the individual. If this impulse is not immediately acted upon, it becomes a desire. This is then translated into purpose: a plan and method of action,

> "based upon foresight of the consequences of acting under given conditions in a certain way."
> (Dewey, 1938)

Certainly this judgement or foresight of consequences involves intelligence, and has important consequences for teaching ....

> "The crucial educational problem is that of procuring the postponement of immediate action upon desire until observation and judgement have intervened."
> (Dewey, 1938)

Secondly, there should be

> "an orderly development toward expansion and organisation of subject matter through growth

and experience."

(Dewey, 1938)

This indeed seems to create an extremely difficult task for the educator, who must constantly be aware of the connectedness which exists between a range of existing experiences and new problems of intelligently directed activity. It would seem that the prime task of the educator is to produce a sequential series of situations which are problematic for the learner - where the term 'problem' refers to an intellectual construction. The process of enquiry is used to deal with such problematic situations, which is dependent upon intelligence. Every stage in this process expands the learner's perspective on the world, and is building up his 'experiential continuum'. The curriculum becomes a spiral entity, forever moving onwards and outwards.

Without doubt, the work as a whole seems heavily influenced by the theories and ideas of Darwin. Man is interpreted as a biological concept and the theory put forward has a growing organism as its root metaphor. Growth, for Dewey, means an increase in an individual's ability to secure meaning from experience. In turn, this represents the extension of human intelligence.

Thus the source of growth is located in experience.

The justification for a sound philosophy of experience is extremely well argued, with constant use of examples from educational practice. The central curriculum question for Dewey is concerned with what quality of experiences will a particular mode of curriculum organisation provide for the learners for whom it has been planned. Their education is entirely dependent upon the intelligently directed development of the experiences it will provide. This central question is, of course, highly relevant to this current thesis and investigation.

The whole account of "Experience and Education" represents a most exciting and well argued philosophy of education, demonstrating very profound and practical consequences for teaching and curriculum planning. The central theme is concerned with the quality of education as a basic and practical problem of mankind: philosophy is recognised and used as an efficient tool for approaching this problem.

Elliot W. Eisner extends and elaborates the philosophy and work of Dewey by applying its underlying ideas to curriculum and evaluation. Eisner's own philosophy and understanding of what

is basic in education perpetuates the Darwinian and biological tradition that is clearly articulated by Dewey. One of the basic premises underpinning Eisner's work is that concept formation is biologically rooted in the senses.

> "Our ability to experience different qualities constituting the environment through the information pickup systems represented by our senses provides the material out of which concepts are made. Thus, our concepts are formed not only in visual, but in gustatory, alfactory, tactile and auditory form. We have a conception of roundness not only because we know what a circle or sphere looks like but because we know how it feels."
>
> (Eisner, 1982)

A human being has a range of sensory apparatus available for interpretation of his or her interaction or contact with the environment. The ability to differentiate among the various qualities of the environment, to memorise and recall them and to manipulate them in the imagination is biologically rooted. The environment will of course be made up of a whole range of qualities that can be experienced by using a variety of sensory systems. The way in which an environment is known will be greatly influenced by the particular sensory system or systems that are employed to interpret it.

> "A rose is not just its aroma, but also its colour and texture and the relationship of these qualities to each other. A person is not simply his visual appearance, but his voice, this distinctive character of his personal traits, the sound of his walk."
>
> (Eisner, 1982)

A very important extension of this point is that if the environment has multiple qualities that can be perceived, experienced, or 'known' in multiple ways, then

> "the ability to experience the multiplicity of environmental qualities is one of the aims I believe educational programmes should attempt to achieve. Insofar as the qualities of the world are multiple and insofar as concept formation with respect to those qualities is multiple, it is unlikely that one's conception of complex qualitative wholes is likely to be singular. What, for example, does it mean to have a conception of autumn? For some, it is something that begins during the ninth month of the Julian calendar; for others, it is that period during the year when daylight diminishes and darkness expands. For teachers, I suppose, autumn means the appearance of thirty new faces. Autumn can also be the time in which the sharp chill of the early evening blends magically with the aroma of burning leaves. For those not tied to the restrictions of a dictionary, autumn is a multiplicity of meanings, each the offspring of how the season is experienced."
>
> (Eisner, 1982)

Eisner argues that the development of cognitive ability is of fundamental importance and that the chief aim of educational institutions and programmes should be to encourage and foster the

pupils' ability to understand their world, to deal effectively with problems and to acquire wide varieties of meaning through the development of cognition. He also considers the basic question of what is cognition and what is not. Often, cognition is far too narrowly conceived, for example by Anderson (1975), who views it essentially as thought mediated by language. Eisner is very critical of the view that cognition may be contrasted with the affective domain, where cognition supposedly deals with knowing and not feeling and affect, on the other hand, deals with feeling and not with knowing. This perceived dichotomy has implications for education and curriculum; for example, cognitive studies such as the mathematical and discursive are often regarded as demanding, and are taught in the morning when pupils are allegedly alert and more inclined to think. Affective studies on the other hand (the arts, for example) are very often located in the afternoon or end of week slots on a timetable. This is a very limited view of cognition which has significant effects on the practice of education. Eisner opposes this viewpoint and articulates a wider view of cognition in which there is no clearcut distinction between what is cognitive and what is affective. He states quite clearly that

there can be no affective activity without cognition.

> "If to cognise is to know, then to have a feeling and not to know is not to have it. At the very least, in order to have a feeling one must be able to distinguish between one state of being and another. The making of this distinction is the product of thinking, a product that itself represents a state of knowing."
>
> (Eisner, 1982)

Similarly, there can be no cognitive activity that is not also affective. Affect and cognition are not independent processes; nor are they separable. "They are part of the same reality in human experience." This view is reflected in the writings of Piaget (1973) who states that

> "the affective and cognitive mechanism always remain indissociable although distinct ...."

Eisner's view of the nature of intelligence reflects the opinion of Dewey. Furthermore (and of great significance to this thesis) it reflects the view of intelligence as a multi-faceted activity commanding a variety of convergent and divergent thought processes as outlined and discussed in Chapter 1. Dewey forcefully argues (1934) his viewpoint on the relationship

of intelligence to the affective area of art:

> "Any idea that ignores the necessary role of intelligence in production of works of art is based upon identification of thinking with use of one special kind of material, verbal signs and words. To think effectively in terms of relations of qualities is as severe a demand upon thought as to think in terms of symbols, verbal and mathematically. Indeed, since words are easily manipulated in mechanical ways, the production of a work of genuine art probably demands more intelligence than does most of the so-called thinking that goes on among those who pride themselves as being "intellectuals." "
> (Dewey, 1934)

This certainly portrays a view of cognition that is wider than 'knowing' in the mathematical and discursive sense. Despite the reservations of some classical philosophers (Plato, 1951) that knowledge which is dependent on the senses is untrustworthy, Eisner has no doubts that cognition is definitely not independent of feeling and data derived from the senses. One significant implication of this view is related to creative problem solving. Being able to visualise, to feel, or to hear through imagination, aspects of a situation or problem may contribute to its solution. Visualisation may be a vital element in productive mathematical thinking and problem solving. This argument is totally in line with the 'multiple forms of knowing' approach to

problem solving as outlined and discussed in Chapter 1.

Further to this argument that concept formation is dependent upon sensory material, it is logical to assume that the kind of meaning that an individual can convey is significantly influenced by the sensory data and qualities that are emphasized by what Eisner terms 'forms of representation.' These are the methods or devices that are used to convey an individual's private conceptions to the public world. In other words, human experience has a social or external dimension whereby private conceptions that may be visual, auditory, kinesthetic, olfactory, gustatory or tactile are rendered public. Vehicles through which this occurs may be termed forms of representation. The status of such public concepts may take the form of music, words, film, drawings, mathematics, paintings, dance and the like. Eisner illustrates this idea with an example of a painter who has personal experience of a town ....

> "For him, the experience of the town is altogether special: the scale of the main street, the character of the storefronts, the pace and comportment of the people, the menus pasted on the door of the diner, the slow-paced movement of the traffic in the streets, the expanse of sky that hangs cloudless overhead.

> There is for him, a special kind of magic to the place; in certain respects it is a sort of throwback to a life that he occasionally glimpsed as a boy growing up in New York...."
> (Eisner, 1982)

This experience has qualities that are based on sensory data, they are multiple in both form and meaning. In particular, the qualities are visual, and are a mixture of images, sounds, words, textures and colours. In order to convey this meaning to others, a variety of forms of representation could be used. The qualities of the town could be expressed in drama, in music, in words, in dance or in poetry. For the person concerned, the obvious choice of medium is a painting, a visual image which attempts to capture in a two dimensional form the complex visual qualities of the experience. Unfortunately this single form of representation is not all-encompassing and will inevitably fail to convey many qualities of the town in question.

> "Whenever a form of representation is used there is a concomitant neglect of those qualities of the world which the form cannot 'name'.
> No single form of representation can reveal all that can be experienced; hence, expression, like perception, is selective."
> (Eisner, 1982)

It is clear, therefore, that the particular form of representation selected by an individual, inevitably, places constraints on the concepts and qualities that are conveyed. Also, some forms of human experience are much more ably expressed through certain forms of representation than others. A wide variety of forms of representation is essential (if it were possible to convey the totality of experience through one form, then others would be unnecessary and therefore redundant). The choice of form is obviously vital - as this dictates both the way in which an experience is conceived and also the way in which it will be rendered for interpretation by others. The meanings that are secured in an individual expressive medium will appeal to one or more of the sensory systems, hence a form of representation may be visual, tactile, auditory. kinesthetic, olfactory, gustatory or any combination of these. Dance, for example, is an expressive medium that will be interpreted in visual, auditory and kinesthetic forms. A piece of music will be limited to auditory interpretation. Such interpretation or gathering of meanings from forms of representation is not literally transferable or translatable to other forms. For this reason, it would seem vital that

education is concerned with helping an individual to develop an ability to use a wide variety of forms of representation and to understand and interpret the meaning that is encapsulated in a wide variety of expressive media. Eisner regards this ability as an essential form of literacy.

> "The concept of literacy is not limited to things said ; it extends to things represented. I choose the term generically as the power to encode or decode meaning through any of the forms that humans use to represent what they have come to know."
>
> (Eisner, 1982)

Eisner's views on the transformation or rendering of concepts and the skills necessary for this task are heavily influenced by the work of Langer, who discusses the functions of discursive and non-discursive forms of representation and their ability to express human feeling. Langer writes :

> "Such knowledge is not expressible in ordinary discourse. The reason for this ineffability is not that the ideas to be expressed are too high, too spiritual, or too anything else, but that the forms of feeling and the forms of discursive expression are logically incommensurate, so that any exact concepts of feeling and emotion cannot be projected into the logical form of literal language. Verbal statement, which is our normal and most reliable means of communication, is almost useless for conveying knowledge about the precise character of the affective life."
>
> (Langer, 1957)

This view has very significant implications for curriculum development and evaluation. Traditional emphasis in the school curriculum is placed on forms of representation that emphasise and are common to 'rule-governed' learning such as propositional discourse and mathematics. The majority of traditional classroom problems are concerned with learning how to follow and interpret rules and how to demonstrate to others that this has been achieved. The thesis articulated by Eisner which underpins the theory and research developed within this manuscript, is that educators should adopt a much wider view of cognition and curriculum development

> "If meaning is specific to the forms of representation used and if schools are or should be concerned with expanding the students' ability to construe meaning from experience, then determining which forms should receive attention with the school curriculum constitutes one of the most fundamental of educational decisions."
>
> (Eisner, 1982)

In practical terms, a curriculum that embodies this wider view of cognition and representation would have certain fundamental characteristics. First of all, it would be founded on the belief that a major role of education is to help individuals to pursue the nature of meaning in

their experiences in the world. Secondly, it would be rooted in the belief that meaning can be construed rather than discovered. Thirdly, it would take account of the fact that meanings can be represented through a wide-ranging variety of forms, each of which may provide meaning in a unique way, and finally it would reflect the idea that educational programmes or teaching and learning experiences can be designed in such a way that the achievement of literacy within multiple forms of representation is encouraged and promoted. This would involve both a widening of the variety of forms of representation encountered by children and also the extended use of different forms of representation in the teaching and learning of all areas of the curriculum. In short this means a widening of the scope of the curriculum to include a greater emphasis on the importance of the arts and art forms, these being some of the crucial ways in which humans construct and convey meaning to others.

Furthermore this view of cognition and curriculum and the pursuit of meaning has fundamental implications for classroom evaluation, both at conceptual and practical levels. Evaluators should be concerned with conveying the complete range and diversity of meanings that are

embodied within the study of an educational situation. If this is to be done effectively, then a wide variety of forms of representation should be used by evaluators themselves. No single form can adequately portray the true significance or range of qualities demonstrated by a situation. Indeed a restrictive use of forms of representation by evaluators will impose severe limitations on what is conveyed to anyone interpreting their findings. A restrictive form of understanding will be the result. At a practical level, this suggests the importance of the use of a wide range of expressive media by classroom evaluators. It also suggests the employment of non-conventional means of evaluation, in the sense of departure from the use of criterion-referenced tests and other quantitative procedures. Certainly this would seem essential if evaluation is viewed as a means of coming to know and understand the complexities of the processes through which cognitive development and learning have taken place. Visual or discursive forms of representation may be far more effective in achieving this end than the employment of standardised tests. As stated at the outset of this chapter, the curriculum is far too complex to

be measured in psychometric terms alone. Hence

> "Evaluation procedures, if they are to be instrumental in the achievement of complex educational goals, need to be useful for determining more than whether simple goals were achieved. Knowing that certain gains in reading were achieved, for example, tells us little about the quality of education if we know nothing about the processes that led to those gains."
>
> (Eisner, 1982)

Such is the philosophy and theory underpinning the model of evaluation articulated and developed by Eisner to which further detailed attention is now turned. It rests on the belief that a combination of forms of representation can convey meanings that are not possible by the use of a single restricted form. The combination must be sensitive, imaginative and thoughtfully chosen. It also rests on the firm belief that processes and forms of representation derived from the arts are essential for complementing evaluation forms that are derived from a scientific model. These ideas clearly reinforce the philosophy and thesis of Dewey whose key work Art and Experience (1934) portrays the deep significance of the relationship of art to intelligence, which in Eisner's terms, is "a wider view of cognition."

2.3.2 METHODOLOGY

The methodology and procedures of the evaluation model termed 'Connoisseurship and Criticism' depend upon and arise out of this philosophy and belief that the assumptions and procedures of conventional 'scientific' evaluation have generally been too narrow and parochial. Eisner's understanding of a wider conception of cognition, curriculum and evaluation led to the development of this model which is firmly rooted in the arts yet is intended to supplement rather than replace those models rooted in the sciences.

It must be pointed out that the use of the term "criticism" used in association with educational evaluation is not attributable to Eisner alone. It may be linked with the names of other researchers, including John Mann and George Willis. As early as 1968 an influential essay by Mann gave definition to the term "curriculum criticism" and stressed the vital importance of the aesthetic dimensions of the curriculum. Mann describes the use of critical methods in educational research which are similar to those of the field of literary criticism. He suggests that the use of criticism combines elements of aesthetics and science and is vital insofar as it

attends to qualities and meaning ....

> "why are educators so willing to judge educational institutions by the characteristics of their pupil-products, and so unwilling to judge or even note the qualities of the situation itself? The philosophical problem of rendering an ethical judgement of a future entity is at least as complex as the problem posed by a present entity. Is it possible that the educator's preoccupation with products involves an escape, by removal in time, from the responsibility to see and value education in ethical terms altogether? The world we create through the curriculum is a real present world, a lived-in world, and a meaning world. Ought not the educator to know and respond to its meanings? .....the curriculum is to be thought of not only as producing but also as meaning ..."
>
> (Mann, 1968)

In the type of criticism Mann describes, a curriculum is considered as a piece of literature and the function of the curriculum critic is the disclosure of meaning as it is embodied in the design of the curriculum.

Willis (1968) suggests that the curriculum field itself incorporates aspects of both art and science and that for the field to develop fully it must be "self-consciously self critical". He gives an overview of issues involved in the development and uses of qualitative methodology in evaluation and of specific techniques which might be termed "curriculum criticism". Willis argues that the aesthetic perspective is not simply an

alternative in educational evaluation, one which may or may not be chosen.

> "Rather, it must be chosen to assure a full view of the complexities of educational environments. In adopting it a curriculum worker reorients practical perspectives on objectives, methods of curriculum development, curricular effects, and sources of values."
>
> (Willis, 1975)

Eisner clearly shares the views of Mann and Willis, and his own writings and research have extensively developed the rationale for and methodology of criticism and have linked the term with the process of 'connoisseurship'.

It is made very plain throughout the writings and teaching of Eisner that his intention is to provide tools and concepts that are a supplement to rather than an alternative to the use of scientific procedures for describing, interpreting and evaluating educational settings. This new, non-scientific approach to educational evaluation requires 'educational connoisseurship and educational criticism'. Eisner makes it very apparent (1985) that these terms have unfortunate connotations which he is anxious to dispel. One such connotation concerning the word 'connoisseurship' is that it may be interpreted as having to do with that which is 'elite' or

'snobbish' - something which belongs solely to the upper classes of society. As Eisner uses the term, it is intended to relate to any form of expertise in human endeavour whether this be desirable or highly undesirable. The word 'criticism' may also carry unfortunate connotations as it is frequently used to convey 'harping, hacking, negativistic' attitudes. This is not the way Eisner uses the term. Rather it is conceived of as a generic process aimed at revealing qualities and characteristics that are embodied in any human achievement, product or events.

These terms coined by Eisner are clearly derived from an artistic paradigm.

> "Connoisseurship in education, as in other areas, is that art of perception that makes the appreciation of that complexity (of educational practice) possible. Connoisseurship is an appreciative art. Appreciation in this context means not necessarily a liking or preference for what one has encountered, but rather an awareness of its characteristics and qualities."
> (Eisner, 1985)

A natural comparison may be made with the more traditional use of the term related to wine tasting. The connoisseur of wine, through much experience and training, is able to discern the most subtle qualities of the product. The

techniques used will aim to reveal the subtle combination of qualities within the wine and judgements will be made about these qualities. The connoisseur will focus attention on a number of attributes (colour, flavour, aftertaste etc) and will also relate the present experience to memory of other wines tasted. This backlog of previous experience is very important insofar as it differentiates between the skilled connoisseur and an 'ordinary' drinker of wine who is unable to attain the same level of discernment between the subtle qualities of products that are tasted. The conclusions made by the wine connoisseur will be true judgements based on skill and experience, rather than mere preferences. These judgements will be grounded on true reasons that genuinely refer back to the wines' qualities and to other wines of a similar variety.

Connoisseurship in other fields, for example music, poetry and art shares these principles. Eisner's theory extends this view to the field of educational evaluation wherein "connoisseurship is the art of appreciation." As a result of having developed a highly differentiated array of 'anticipatory schemata', the classroom connoisseur is able to discern qualities and relationships that others may not be able to see or interpret.

"I suspect, the subject matters of connoisseurship are found in the process of schooling; in the character and quality of teaching, in the interactions of children, in the organisation of the school as a whole, and in the use and character of the materials of instruction. The reason connoisseurship is so important is that it provides the content for knowing. It makes possible the stuff we use for reflection."

(Eisner, 1985)

The 'anticipatory schemata' referred to in this model are the devices for organising phenomena or focusing attention so that qualities are defined and discerned. Some of the schemata may take the form of prefigured concepts that are discursive insofar as they have discursive labels. Eisner uses the example of looking for manifestations of 'competition' in the classroom and trying to determine its sources. Competition may have a discursive label but what we decide counts as competition is essentially nondiscursive. We recognise it by a variety of images we hold. It may manifest itself in the tone of voice used by a child ... in the way he or she moves and behaves in relation to others. All of this occurs in a 'living context' that is entirely significant in terms of establishing the true meaning of the situation. In order to know what really counts as a manifestation of competition, the observer or evaluator must have

not only models or schemata of competition to apply but also an appreciation of the context to which the schemata are applied. The possibilities of misinterpretation are considerable without an appreciation of context. The connoisseur should be able to establish true meaning in an educational situation through contextual interpretation. The limitation of connoisseurship is that it is essentially a 'private' process. It can only be useful in an educational or evaluatory sense if the connoisseur can convey the information received as a result of the process to other people. The art of appreciation and its results must be made public.

This is the function of 'criticism' which may be termed the 'art of disclosure.' The critic aims not only to discern the character and qualities constituting an object or event, but also to provide a rendering of what he or she has encountered so that others (not possessing the same level of connoisseurship) can also share the subtle and pervasive qualities of whatever is being observed. Once again the term clearly derives from the arts - a literary critic performs the tasks of appreciation and then making public the character and qualities constituting a work of literature. Critics portray to the public

the qualities or 'essence' of music, poetry, paintings and the like. Eisner's interpretation of criticism again reflects the thoughts of Dewey who writes

> "The end of criticism is the re-education of the perception of the work of art."
> (Dewey, 1934)

Eisner shares this view that the function of criticism is educational.

> "Its aim is to lift the veils that keep the eyes from seeing by providing the bridge needed by others to experience the qualities and relationships within some arena of activity. In this sense criticism requires connoisseurship but connoisseurship does not require the skills of criticism."
> (Eisner, 1985)

Criticism, therefore, is a public enterprise whereby encounters and qualities are portrayed through writing, talking or some other medium (or indeed a combination of media). The language of criticism is crucial. It must be imaginative, vivid and rich enough to enable the reader to feel that he or she has shared in the original experience of that which is being criticised. A linguistically vivid picture is required. Certainly a critic must use language artistically.

It must not be restricted to a flat, didactic, exposity mode that would severely limit the essence of what is being portrayed.

> " "The straight facts", unencumbered by context, are paradoxically non-factual."
> (Eisner, 1985)

Often the language of criticism is full of metaphor and unlikely analogies. Eisner constantly stresses the importance of the use of metaphor:

> "The use of metaphorical language is at base poetic. Metaphor is the recognition of underlying commonality in what is usually discrete and independent. The sudden recognition of such commonalities through the use of metaphor provides a bridge between the critic's language and the work and provides the conditions through which insight is generated."
> (Eisner, 1985)

As with connoisseurship, the process of criticism can readily be applied to educational settings. Together the two form a single approach to understanding classroom life. Through the careful use of artistic language, a critic may disclose to a wider audience the qualitative nature of aspects of classrooms, learning materials and processes. The first stage of educational criticism is thus one of description, albeit in an artistic sense.

True criticism however has two other essential stages, interpretation and appraisal.

Interpretation is the process of applying theoretical ideas to explain what the critic has described. Fundamental questions may be addressed and answered in this stage, such as: Why does this programme have these effects ? Why is it that this classroom is organised in this particular way? What side effects are resulting from this method of teaching and why are these effects occurring? How is time used in this classroom? What is the nature of the interaction between teacher and children? Many questions lend themselves to analysis in this way. The application of theories to perceived and described qualities accounts for the interpretation phase of criticism.

A vital final phase is that of appraisal or evaluation. This phase addresses such questions as: What is the educational significance of what children have learned? What is the importance of the side effects resulting from particular methods of teaching? Could alternative methods be equally effective? Appraisal or evaluation of this nature aims to provide constructive feedback to those responsible for classrooms and educational programmes. Evaluation here is seen to be at its

best, insofar as it illuminates the conditions or circumstances that may actually lead to the improvement of educational practice.

Eisner does not envisage a sharp dividing line between these three phases of the process, although there is a difference in focus and emphasis.

> "The descriptive aspect aims at the vivid rendering of the qualities perceived in the situation. The interpretive attempts to provide an understanding of what has been rendered by using, among other things, ideas, concepts, models, and theories from the social sciences and from history. The evaluative aspect of educational criticism attempts to assess the educational import or significance of the events or objects described or interpreted."
> (Eisner, 1979)

In the evaluation phase, the critic's prime function is to apply educational criteria so that judgements about reactions and events are grounded in theory. It would seem that a knowledge of the philosophy and practice of education is essential in anyone trying to perform this task.

The end product of an educational criticism is likely to be a written document that is descriptive, interpretive and evaluative, and which can be presented to an audience. The way in which the document is written will depend on the nature of the audience for which it is intended,

whether this be the teacher involved in the evaluation or some outside persons who may or may not have a vested interest in the findings. It must also be stressed that the products of connoisseurship and criticism need not be restricted to a written document alone. Feedback might well be in verbal form, or in a combination of different forms of representation such as documentation together with videotape, tape recorded interviews, visual displays or film. Indeed, the effective use of videotape recordings and other illustrative material may be fundamental to the reliability of this methodology, as discussed in section 2.3.3.

The task of connoisseurship and criticism is clearly not an easy one. In doing this task, an individual would typically formulate a hypothesis for investigation or identify aspects of an educational situation which warrant appraisal or evaluation. Contact would then be made with a school, classrooms or whatever aspect of educational practice or materials is under scrutiny. Assuming for the sake of this illustration that a particular classroom is being appraised, then the critic would make arrangements to visit that classroom for an extended period of time: this may be on a daily basis for a period of

two to three weeks, or on a regular basis throughout a much longer period of time such as a school term or year. During visits, the critic will observe the classroom as discretely as possible. It is possible for a specific focus of attention to be decided in advance, relating to the specific hypothesis being investigated or the specific aspects of classroom life which are of interest. Examples of a pre-determined focus might be to concentrate on how competition or co-operation is being fostered, or on issues of time management or teacher-child interaction. On the other hand, an educational critic might have no pre-determined focus and would simply observe and then allow the emerging qualities of the classroom to suggest what might be significant or important in this particular classroom. From such observation and emergence, a theme or focus for critical description would become apparent.

> "Each classroom has a pervasive quality - even ones that appear chaotic - and each room (or school) provides an arena for significant events to emerge, events that one might not notice if one's focus is pre-figured. What we try to achieve is a readiness to give structure to what is almost always a rich and literally dynamic environment. The educational critic's problem is never not having enough "data", it's just the opposite. The creative task is to confer a telling structure on a field of vision so that sense can be made of it."
>
> (Eisner, 1985)

Either of these approaches, the pre-figured or the emergent, is equally valid. Eisner does not hesitate to suggest (1975) that a very effective use of emergent criticism is to yield phenomena that might be subsequently pursued through conventional educational research.

> "Creative scientific work in any field depends upon new realisations, new models or new methods to guide enquiry. Insofar as effective criticism reveals aspects of educational phenomena that were previously unnoticed or underestimated, a fresh focus for conventional scientific study could be provided."
> (Eisner, 1975)

This is a very important statement in the context of the present research. Eisner in no way suggests that Connoisseurship and Criticism should be totally divorced from traditional research designs. As stated above, the critic may well identify phenomena that warrant investigation in a more traditional (scientific) way. Conversely, the connoisseurship model may well be used alongside traditional methods to aid illumination and understanding of processes and phenomena in classrooms. The current research attempts to apply the model to this good use. Used alone or in conjunction with more traditional methodology, the Connoisseurship and Criticism model would

appear to have tremendous potential for deepening our understanding of classroom processes and for improving the quality of education. No account of this model would be complete, however, with a statement of rationale and methodology alone. Further consideration of its use, reliability and limitations is essential.

2.3.3 CRITIQUE

This overview of the methodology of the evaluation technique known as connoisseurship and criticism has so far failed to take into consideration its potential for trustworthiness and reliability. To the confirmed opponent of qualitative techniques or indeed to the sceptically minded, the model in question may well appear to lack academic rigour and objectivity, and be entirely dependent on the subjective value judgements of the individual who is conducting the evaluation. In trying to establish whether what the critic is describing, what it means and what its true value is, is justified, there are inevitable possible sources of disagreement between the critic and others who are observing the same phenomena. Furthermore, two critics observing the same situation might have strong disagreements: for example, they might agree on what is observed and described, agree on the interpretation, yet disagree on what the educational value is. On the other hand, they might agree on what is described, disagree on an interpretation yet agree on its educational value. They might even disagree on what they are seeing yet find a common interpretation. The permutations are numerous and the problems of

validating educational criticism are complex.

Eisner defends the validity of his model with two inter-related criteria, these being structural corroboration and referential adequacy. The first of these is a process which demonstrates that 'the pieces of the story fit together,' or in other words, that the 'facts add up to the whole.'

> "Structural corroboration is a process that seeks to validate or support one's conclusions about a set of phenomena by demonstrating how a variety of facts or conditions within the phenomena support the conclusions drawn."
> (Eisner, 1985)

> "... it is a process of gathering data or information and using it to establish links that eventually create a whole that is supported by the bits of evidence that constitute it."
> (Eisner, 1979)

Application of the structural corroboration criterion enables a reader to judge whether the written account is in fact a coherent story insofar as the evidence contained within it is not contradictory and the whole makes good sense. If separate parts of the account support rather than contradict each other then it can be said that the evidence reported by the critic is structurally corroborative. Eisner illustrates this process by using an analogy from jurisprudence. In a trial,

the prosecution attempts to create a 'structurally corroborative' set of facts that will persuade a jury that the defendant is guilty. The defence attempts to create a set of facts that will convince the jury of innocence. In these circumstances, Eisner identifies both 'structural corroboration' (the evidence that the respective attorneys try to gather) and also 'multiplicative corroboration' - the use of a jury of peers to pass judgement on what has or has not been structurally corroborated. The jury provides "the consensual validation for the cases that the attorneys have presented." (Eisner, 1979)

Similarly in educational criticism the reader can speculate as to the extent to which the facts represented and their interpretation are corroborated by the way in which they support one another. As Eisner rightly points out, this is not some rare process exclusive to the worlds of jurisprudence and educational criticism - it is actually a function of our everyday lives and our interaction with people and the environment. For example, we use the process to make judgements about people when examining relationships and determining whether they are genuine or 'fake'.

Despite the great importance placed on the process of structural corroboration for validity

of criticism, it cannot stand alone as the sole criteria for judging trustworthiness. Indeed its conclusions can even be false. Geertz (1973) reminds his readers that "nothing is so persuasive as a swindler's story." This is one of the liabilities of structural corroboration, leading to the necessity for identification of a second criterion for judging validity, which Eisner terms (1979) 'referential adequacy'. The process of educational criticism is intended to 're-educate the perception' or help its audience to see more than he or she would have done without its aid. The referential adequacy of the criticism is determined by checking the relationship between what is said or portrayed by the critic and the original subject matter of the criticism. The critic's job is to describe and interpret an object, event or situation: if the criticism is useful then its audience should be able to experience the object, event or situation in a new and more adequate way.

> "We use the critic's work as a set of cues that enable us to perceive what has been neglected. When the critic's work is referentially adequate we will be able to find in the object, event or situation what the cues point to. It is in this sense that criticism is a highly empirical undertaking. We look to the phenomena to test the adequacy of critical discourse."
> (Eisner, 1979)

Thus a test of criticism is deemed to be empirical in the sense that one analyses the critical product and asks whether or not the referents it claims to describe, interpret and evaluate can be found in the original subject. If the criticism is referentially adequate then the audience will find in the subject what the critic has described. The use of visual material such as photographs, video tape or film in the construction of a criticism is clearly of fundamental importance when considering this criterion. Whilst not essential, it is a highly desirable addition to a finished description insofar as the audience can refer back to a genuine 'replaying' of the subject matter and locate referents within it. Ideally the best educational criticisms are backed up with illustrative material of this kind which is a very worthwhile aid to validity.

Objectors will still argue that criticism may lead us to neglect aspects of a situation that the critic may not see or describe, that the critic might lead us to see certain aspects of a situation because a criticism biases perception and that critics can disagree on the characteristics and values of situations and objects that are their subjects. Eisner (1979) strongly defends validity by insisting that the

need for unanimity among critics is not characteristic of criticism

> "because it is recognised that complex phenomena - works of literature, painting, film and the like - have several layers of meaning and that the greatest works seem inexhaustible in the meanings one can secure from them. What is sought is not the creation of one final definitive criticism of a work; rather, the goal is to have our perception and understanding expanded by the criticism we read. Classrooms and schools are at least as multilayered as works of art, and we should seek, therefore, not a single definitive criticism but rather criticism that is useful."
>
> (Eisner, 1979)

Indeed it can be further argued that it is actually wise to cultivate diversity of response to classrooms since critics with differing orientations and foci of attention will illuminate a variety of facets of the complexity of classroom life.

Together, the two processes of structural corroboration and referential adequacy form the major procedure with which to establish the validity of an educational criticism. Application of these processes is far from straightforward and further questions of doubt can be raised, for example: How can one be sure that what the critic has created actually fits the phenomenon a few weeks later? How can a piece of criticism be

tested against something like a classroom that has dynamic, constantly changing qualities? Defence of these doubts lies in an assumption that the most significant characteristics of an event or situation are not entirely transitory and do not radically change over short periods of time. Without doubt, classrooms and approaches to teaching and learning do have individual characteristics and qualities that are not only relatively constant but which distinguish them from other classrooms and approaches. This issue of change through time is not a problem to connoisseurship and criticism alone. It is a characteristic of many naturalistic and ethnographic approaches to evaluation and is accepted as an element to be accounted for when developing such methodology and interpretation. It also draws attention to the very important factor of time in evaluation and the need for anyone attempting criticism (or ethnography) to have as much contact time as possible with the subject being investigated. It is essential that time spent is sufficient to tease out those qualities which are characteristic and significant and those which are not. This reinforces the fact that unlike the application of standardised tests, qualitative evaluation is not a quick and

straightforward procedure. It requires a considerable period of time being spent on the task, both in the contact stage and the writing up of the findings. Eisner uses this argument to reinforce his views that quantitative evaluation is far too simple -

> "We have underestimated the amount of time useful educational evaluation requires. Easy test administration and test scoring have been seductively simple tools for evaluating what children learn and experience and what teachers and schools teach. We might very well have to face up to the fact that the kind of evaluation that will be useful to teachers will need to pay attention not only to the outcomes of teaching and learning but also to the processes.
> .... The sooner educators help the public to understand the need for forms of evaluation that attend to the processes of teaching and learning, the better."
> (Eisner, 1979)

Educational criticism may also be taken to task for the fact that it cannot yield generalisations in the same way that scientific enquiry does. That is, it does not lend itself to the identification of generalisations that may help anticipate future events and qualities. In reply to this critical view, Eisner defends the methodology by expressing the belief that criticism can indeed yield two types of generalisations, namely the generalisation of more refined processes of perception and the creation

of new forms of anticipation. The first of these refers to the generalisation of the process of connoisseurship - the consequence of using educational criticism to perceive educational objects and events in the development of the ability to be a connoisseur. In other words, the critic develops skills that may be generalised. The other type of generalisation is the acquisition of new forms of anticipation. Concepts and generalisations may be derived from one particular situation that can then help to anticipate factors in another situation.

> "what educational criticism does is to help us appreciate the uniqueness of a set of circumstances; but this uniqueness can be appreciated only if we consider it against a backdrop of other instances and circumstances."
> (Eisner, 1979)

No method of evaluation is totally without problems and it is very apparent that the methodology of connoisseurship and criticism, like all other techniques, contains strengths and weaknesses. A summary and reinforcement of the key problems associated with the model must begin by emphasising that it relies on judgement and, as Eisner himself admits (1985) "A high level of precision is possible when one counts but it is

diminished when one has to judge."

A second serious problem concerns the language of the methodology. There is an inevitable tension between using artistic language to describe something and the fact that the use of this artistic language can lead an audience to conclude that the description is biased (because it does not appear to be factual). This tension is impossible to resolve. If there is no emotional or artistic rendering, then the description may well fail to communicate the most significant qualities.

A third problem concerns the inevitable reduction of a highly complex qualitative subject to a small number of conclusions that are portrayed in discursive terms. This would seem to have the effect of eliminating most of what the criticism has to render - hardly doing justice to the original subject. The resolution of this problem lies with the skill of the critic and the media used. A combination of media and the use of illustrative/artistic material is undoubtedly helpful in the task of rendering "the work as a whole, not an artistically eviscerated symbol of it." (Eisner, 1985)

Finally, the model is constrained by the severe problem of cost, both in terms of time and

skills. As argued above, in order to do it effectively both are required. A great deal of time must be invested in the classroom under scrutiny and the critic must be highly skilled in the methodology being used. The training for and the gaining of the necessary skills and experience is in itself a time-consuming exercise. Eisner himself admits that he is unsure whether, in the practical world of schooling, such an investment can reasonably be expected. He writes :

> "I do not know what proportion of teachers and administrators can develop the level of connoisseurship and the critical writing skills necessary for making educational criticism useful."
>
> (Eisner, 1985)

Nevertheless he argues forcefully for the need to train students and teachers in the art of educational criticism and firmly believes that higher education institutions concerned with the training of educational researchers and teachers should incorporate and develop courses of this nature as an essential element of their work.

Despite these problems, educational connoisseurship and criticism makes a very significant contribution towards widening the array of techniques available for the purposes of

evaluation. Furthermore, it makes an extremely significant contribution towards deepening our understanding of educational processes set within the particular context of a school or a classroom. Eisner believes that

> "Perhaps the major virtue of educational criticism is that it expands our understanding of how we come to know, and as a consequence it makes new avenues for educational evaluation and research possible."
>
> (Eisner, 1985)

Certainly it recognises the all-important fact that good and meaningful evaluation is concerned with professional judgement about processes and the character of teaching and learning set within the context of a particular institution. It would seem to the present author that one of the greatest virtues of Connoisseurship and Criticism is that it acknowledges the many inevitable weaknesses of traditional, measurement-based procedural, output led evaluation methodology and makes a significant contribution towards promoting techniques which enhance our understanding of classrooms and which encourage both people in schools and research workers to share in this understanding. In other words, it encourages the development of true professionalism.

2.4 THE MODEL IN CONTEXT

So far this chapter has provided a general overview of qualitative evaluation techniques, with a specific outline and critical analysis of the methodology known as connoisseurship and criticism. Set against this outline, this section aims to continue a discussion of the intellectual arguments for and against such techniques, and then to consider how useful this model has so far been, the ideal conditions for its use, and how it might be developed.

As stated in section 2.1, there is undoubtedly an ever rising tide of intellectual arguments for the use of qualitative methodology in evaluations. A number of converging lines of argument suggest that models such as connoisseurship and criticism should be developed to enhance (not necessarily replace) quantitative work. Campbell (1974) in a paper on "Qualitative Knowing In Action Research" makes the point that all traditional research and scientific knowing actually depends on a deeply significant form of qualitative knowing. The evaluator has to identify behaviours and analyse them. The observer is making use of a qualitative level of background knowledge about culture and social norms and this is assumed whenever figures or

quantitative data are generated. This is very interesting as Campbell was traditionally an exponent of the 'hard line' quantitative approach. Cronbach, writing in 1975, argues from a similar position, perhaps even more radically, by suggesting that it is not possible to do 'science' in the social realm. He argues that we may never be able to have precise laws and theories in social science as situations are constantly changing and a large number of dynamic interacting factors will affect any particular treatment procedure. This suggests a major rethinking of work in the social sciences and a recognition that there is certainly a place for historians, philosophers and connoisseurs in the evaluation field.

To these writings can be added the growing realisation which has already been addressed - that human behaviour is affected by the settings in which it occurs. A researcher needs to study behaviour within a particular context or setting because such background is impossible to predict or to account for.

Quantitative tests that are a good gauge of performance in one particular setting may well not be appropriate for another. This assertion relates to the views of Cronbach, suggesting that

aptitude and treatment are affected by context which is constantly changing. This view is also related to the basic philosophical distinction between behaviour and action, that is, between the bodily movements of a person and what they mean or convey. Meaning is the action rather than the basic behaviour. Furthermore, if bodily movement is behaviour, this could mean a great variety of actions. Meaning cannot be derived by noting behaviour alone. When quantitative evaluation is undertaken, numbers are generated, and this actually measures bodily movement alone. It does not help us to understand actions, meaning and purpose. In order to achieve this depth of understanding, an observer must come to know the setting and context of behaviour.

A final thread of intellectual argument for the use of qualitative techniques is that there are many dimensions of experience which cannot be captured in ordinary language. Much is ineffable, having aesthetic qualities which cannot be expressed in words alone and certainly cannot be measured. This of course forms the basis of Eisner's argument as outlined and discussed above.

Together, these converging lines of argument form a very convincing statement justifying the desirability of employing methodology such as

connoisseurship and criticism. The most fundamental question to be addressed at this stage is - what is the ideal use of this methodology? Once again, a philosophical approach is perhaps a sound basis for providing an answer. Epistemology raises the questions of 'What is knowledge?' and 'Under what circumstances do we wish to know?' The justificationist answer may tell us that we have knowledge with some authority, such as the authority of sense experience (empiricist view, after Locke, Bacon, Russell) or the authority of reason (rationalist view, after Descartes). On the other hand a rival non-justificationist tradition (Popper) leads us to believe that there is no authority which can claim the basis for our knowledge. Nothing is absolutely beyond doubt and we must build up 'the best possible case' as justification. According to this tradition, no one set of evidence for knowing is better than another. Testing would seem to be important for those pertaining to this viewpoint.

Applying this to evaluation methodology, it would seem that an experiment can certainly offer a sound case for justification. The good thing about an experiment is that it really is a true test. Qualitative workers may arrive at good interpretations, yet may need to go back and

collect data that may actually disprove these. It can be argued that a sound and reasonable 'best possible case' is one that has been tested, in the true scientific sense of the word.

It can therefore be argued that the real function of a qualitative observer is to open up possibilities, or to raise suggestions and formulate hypotheses. Perhaps, however, these need to be tested if the hypotheses are to be established as being true and thereby adding to our fund of knowledge. It would seem, therefore, that qualitative evaluation may need to go further than some methodology allows, and actually include some testing of possibilities and hypotheses that have been raised.

In conclusion, it would seem that the ideal educational evaluation would consist of a qualitative approach perhaps incorporated within a more traditional research design or allowing for the testing of data or hypotheses which it generates. A qualitative evaluator is highly likely to formulate hypotheses that an experimenter may not. In an experiment, a treatment will produce an effect, but from the data derived, it may not be possible to ascertain why these results were achieved: that is, there are no grounds for interpreting the results or

formulating further worthwhile hypotheses.

Eisner himself is totally supportive of this view that an ideal use of qualitative evaluation is in conjunction with more traditional methods.

> "...effective connoisseurship and criticism might yield warranted generalisations ..... as cues useful for locating phenomena that might subsequently be pursued through conventional educational research. Creative scientific work in any field depends upon new realisations, new models or new methods to guide enquiry. Insofar as effective criticism reveals aspects of educational phenomena that were previously unnoticed or underestimated, a fresh focus for conventional scientific study could be provided."
>
> (Eisner, 1975)

This particular research study aims to achieve this "creative scientific work" and to use the model of connoisseurship and criticism alongside a conventional research design and in conjunction with traditional testing methods. This is an academically exciting and original approach which sets out to put the Eisner model to an ideal use.

To date, a substantial amount of evaluation has been undertaken using the methodology of connoisseurship and criticism. On the whole, this work has been undertaken in the United States of America by Eisner, his co-workers and doctoral students at Stanford University, California, and by former Stanford students now working elsewhere

in America. Published examples include those of Donmayer, Barone and McCutcheon (in Eisner, 1977) who attempt to provide a vivid rendering of classrooms and children. Much of this work is in the form of Stanford University doctoral dissertations, for example, Alexander (1977), Berk (1977), Davidman (1976), Greer (1973), McCutcheon (1976), Sternberg (1977), Valance (1975), Flinders (1985) and Hawthorn (1986). It is evident, therefore, that a variety of authors have successfully implemented the tools and techniques of educational criticism, providing useful and vivid accounts. Many of these, however, are predominantly descriptive in nature. In its quest to inform and improve educational practice, this present study attempts to go some way beyond the production of criticism.

Conclusions drawn from an analysis of the use of the connoisseurship and criticism model in the context of classroom suggest that perhaps the methodology can be used to optimum advantage when in conjunction with other, more traditional approaches to research and testing. This study attempts to do so by setting the methodology within the context of a more traditional research design and by using it alongside a battery of standardised tests. Furthermore, it is logical to

suggest that the ideal use of the methodology is when it is able to have some real impact on the quality of work being done in classrooms - that is, on the development of professionalism and quality of education in our schools. Again, the present study aims to meet this challenge by taking the methodology a stage further than the production of criticism: the results of critical evaluations produced will actually be used to promote the professional development of teachers in schools and students in initial training.

In order to pursue the theoretical overview of concepts which are fundamental to the empirical investigation of this thesis, attention is now turned to the subject of integration of the curriculum and in particular, to the notion that the aesthetic experience may be regarded as a basis for integrated learning. This following chapter serves to extend and reinforce arguments already raised relating to a justification of an artistic basis for understanding classroom life. It also provides a theoretical underpinning for the integrated approach to basic classroom organisation employed by the Experimental group schools of the empirical investigation outlined in Chapter 6.

SUMMARY OF KEY IDEAS EXPRESSED IN CHAPTER 2

1. The curriculum of a school is too complex to be measured in psychosometric terms derived from the practice of educational research.

2. Many educators and researchers have found the rational, scientific approach irrelevant to their concerns and have proceeded with an articulation of alternative viewpoints, based more on the qualitative aspects of classroom life and its complexities, rather than on quantitative statements on the issue of to what extent objectives have been achieved.

3. The ideas and writing of Elliot W. Eisner have been of fundamental importance to the growth of qualitative evaluation, suggesting that educational evaluation based on a scientific model can usefully be complemented by that which is based on an artistic/aesthetic model.

4. Two processes are identified in Eisner's proposed methodology of evaluation, deriving from an aesthetic foundation. These are the processes of educational connoisseurship and educational criticism.

5. It is not necessary for these processes to be divorced from more traditional research designs and methods of evaluation. Used alone or in

conjunction with more traditional methodology, the connoisseurship and criticism model would appear to have tremendous potential for deepening our understanding of classroom processes and for improving the quality of education.

6. The ideal use of this methodology is when it is able to have some real impact on the quality of work being done in classrooms, that is, on collaboration amongst people in schools and research workers and on the development of true professionalism.

CHAPTER 3

CURRICULUM INTEGRATION: THE AESTHETIC EXPERIENCE AS A BASIS FOR INTEGRATED LEARNING

CHAPTER 3

3.1 Integration Of The Curriculum

3.2 The Aesthetic Experience As A Basis For Integrated Learning

3.3 Summary Of Key Ideas

3.1 INTEGRATION OF THE CURRICULUM

It is evident from reviewing the literature in this area, that curriculum integration is a much more complex notion than is often realised. With regard to the past two decades, there can be no doubt that 'integration' has been something of an "in" word in primary education. Many schools have an 'integrated day' and 'integrated' or 'inter-disciplinary' enquiry features in the curriculum planning of many establishments.

> "The Schools Council publishes examples of good 'integrated approaches' and there is talk of the 'seamless cloak of knowledge', the 'unity of learning', or 'a single view of the world and of life', all of which, so we are told, can be reflected adequately only in an integrated curriculum."
>
> (Pring, 1970)

To integrate means to make up a whole from the parts, or to combine separate elements, and so on its own may be regarded as a very empty word. There must be integration of something and it is impossible to understand or appreciate what is meant by curriculum integration until it is ascertained exactly what it is that is being integrated. Furthermore, as the integrated curriculum both means, and is in organisation, many different things, it is important to ask not

only what is being integrated, but also how it is being integrated, and why one is wanting to integrate.

If by integrated we mean an attempt at making up a whole from separate parts, then there has never been a time when this has not been an important intention of those responsible for developing and planning a curriculum.

Certainly there have been constant attempts to integrate the subject curriculum in various ways, and as early as 1941, the Norwood Report had strong words to say regarding some instances of integration:

> "We think it difficult to find any principle of what is called integrating the curriculum if it is to take place round a subject or group of subjects, still less round a single idea, for instance, leisure or self-expression or citizenship. If anything is to be integrated it is not the curriculum but the personality of the child ..... only the teacher can make a unity of the child's education by promoting the unity of his personality in terms of purpose ..."

Whilst the Norwood Report was concerned with education at the secondary stage, it seems that the Primary curriculum has, to a large extent, always been dependent on what is done in the later stages of education. This is evident in the results of a world-wide survey on the Primary

curriculum by Dottrens (1962) who claims that subject specialists clearly dominate the curriculum. The Plowden Report (1967) also states quite clearly that:

> "Children's learning does not fit into subject categories. The younger the children the more undifferentiated their curriculum will be. Even for older children subjects merge and overlap."

Despite these authoritative references to an integrating element in primary schools, this concept of integration of the curriculum is meaningless unless it is ascertained what exactly is being integrated, and the theoretical principles upon which it should be done.

It is said (Pring, 1976) that what are frequently referred to as integrated curricula seem to have little in common other than their opposition to the 'disintegration' of the curriculum into distinct subjects, and behind this opposition lies a very wide range of practical difficulties and theoretical ideas. Pring, who has written extensively in this area has attempted to discover some of the various principles underlying certain recommendations for integration. He has established many of the common reasons which are put forward as criticisms

of a subject based curriculum. For instance, insufficient account is often taken of the pupil's previous experience, levels of understanding and individual perception of things. Also, inadequate notice is often taken of the interests of the pupils, which could be used as the focal point of an educational programme. There is failure to link the pastoral care of the school with curricular activities, that is, too clear a demarcation between caring for the pupil as a person and developing the pupil's mind. Sometimes, there is unnecessary inhibition of close personal relationships between a teacher and a pupil, thought necessary by some if the teacher is to help the individual pupil, and the pupil to trust the teacher. Worthwhile enquiries are very often terminated because they cannot be confined within the boundaries of subject areas. Learning difficulties may arise from the constant switch of attention from one subject matter to another. There is inability to accommodate practical and inter-disciplinary concerns such as career advice, sex education and current affairs. Links between subject matters are not taught, and support of one subject by another is not provided. There is inflexibility of organisation - both of time and space, so that certain desirable educational

activities, for example, outside visits, cannot be pursued, and the pupil's initiative in his own studies is discouraged, (Pring, 1976).

This list, whilst being inevitably incomplete, was written with the secondary curriculum in mind, but all of these criticisms may be applied in some measure to organisation in a primary school. From an analysis of these criticisms, it is evident that some are relating solely to the organisation of a subject based curriculum and are not directed against the subjects themselves. Thus an integrated curriculum could be seen as an organisational device for dealing with the teaching of traditional subjects in a more flexible, and hopefully, a more effective way. But this is not always so, because underlying the concept of integration we find different principles of educational rationale as well as principles of organisation, and these reflect certain differences which exist in theory about the nature of knowledge.

One such principle is concerned with a logical interconnection between different kinds of knowledge. In this situation, an integrated curriculum is a matter of creating connections between subjects. As mentioned above, a subject

based curriculum is said to limit enquiry, set up barriers and confine study within certain limits. It is believed that often these barriers are entirely arbitrary, and that if there is to be a more genuine and comprehensive approach to reality, then an integration of subjects is an absolute necessity. Behind this notion of integration is, of course, the belief that there are logically distinct subject areas. Also, it is understood that one subject area frequently uses the material contained within another area, or that it makes basic assumptions about understandings within another area. In the light of the present author's experiences of teaching about the realities of the world from first-hand inter-action with the environment, this argument seems undoubtedly accurate: for example, a child could not be expected to understand the geographical distribution of trees, or to make a historical study based on the pattern of annual rings in a trunk, without a knowledge of basic biological principles and relationships.

A second educational principle concerned with integration theory is based on the structuring of knowledge around themes, and this is particularly relevant to the primary school curriculum. The work of primary school children

is very frequently concerned with themes, topics or ideas, yet as Pring argues, this idea related to the concept of integration is more often than not, completely misconceived. The general principle involved is that themes, topics and ideas are said to provide the integrating element within the curriculum. These topics are explored in an inter-disciplinary way and, because of this, subject barriers are eroded and distinctions between subjects become unrecognisable. Quite often, themes are ways of demonstrating how different disciplines are really inter-connected, and so the type of integration which results is very similar to that previously mentioned.

The major failure of this approach lies in the nature of the themes chosen, many of these being of a relatively trivial nature, such as dinosaurs and eskimos - both very common as primary school topics. This suggests that the need to study complex human issues is not a matter of concern, yet this is usually the reason given for integration. A purpose of seeking greater integration has been given as to make possible the exploration of large and complex human issues, which are not usually confined to distinct subject areas. In this way, a theme would have an integrating idea, and the subject matter would be

subordinate to this idea. As Bernstein (1967) states:

> "When the basis of the curriculum is an idea which is supra-subject, and which governs the relationship between subjects, a number of consequences may follow. The subject is no longer dominant, but subordinate to the idea which governs a particular form of integration."

This situation raises the inevitable problem of how does one select certain themes as being more important than others, in terms of their 'over-arching' ideas. So the justification for integrating the curriculum around themes is apparently very confused. To add to this confusion, the word theme is sometimes used as a way of describing pupil-initiated learning, where it is the pupil's own enquiry that becomes the integrating element. This, however, is another of the basic principles to be examined below. Also, themes are sometimes designed to pick out a set of questions, usually of a particular nature, or a range of loosely connected interests and activities which are seen to integrate different disciplines. But it is not these practical questions or the theme itself that provide the structure necessary for a true justification of integration. Rather, the pupil needs to be

introduced to a new, distinctive way of structuring his thinking, through a theme, which, in order to fulfil this requirement, is obviously going to have to be fairly complex. An example quoted in various writings associated with this principle is that of "power". The integrating idea, that is, the concept of power is supra-subject. There are over-arching ideas which need to be explored, which are certainly not confined within the limits of any one subject area. By studying such a theme, the child's mind would be in some way developed and made more effective. In other words, a curriculum would give structure to thought - provided by the integration of subjects around a theme. Thus integration leads to the development of a distinctive way of thinking or enquiring. It is not, therefore, the theme title that is the all important aspect in integration of this nature. It is the questions asked about it, the ideas involved, and the way that these develop the thought process.

Again it is possible to make a practical identification with this principle. So often in a primary school, it is decided to make a study of, for example, canals or Red Indians, yet very infrequently is due consideration given to the underlying concepts, or the over-arching ideas,

which make integration acceptable. This present research study, investigating the impact of integrated curricula based on the practice and philosophy of environmental education can readily identify with these ideas. If children are educated from the natural environment, based on first-hand experiences, and all of their work is derived from the experiences they have had outside the confines of the school building, or from objects and ideas brought in from field studies, then this situation is concerned with very complex areas of study, involving the inter-relatedness that exists among man, his culture and his bio-physical surroundings. Of particular concern is the relationship between man and the landscape, and so clearly this approach has due regard for the theory of over-arching ideas being all important in the interpretation of a theme. It is very evident that this work is also concerned with aims which do not fit into neat and distinct subject divisions.

Sir Alex Smith (1978) lecturing at Birmingham University, stated that one of the major aims of education, in his opinion, should be to encourage children to "stand in awe" of the world, giving due perspective to man and his achievements.

"Every educated person ought to be able to stand in awe of the mysteries of life."
(Smith, 1978)

Certainly this aim would seem vital to an integrated programme of environmental education. Furthermore, when children are encouraged to stand in awe, to look carefully at the world, and to consider man in his true perspective, then in no way can this be seen to fit into neat and distinct subject areas. Rather, they are concerned with fundamental ideas, which are certainly supra-subject.

A third principle underlying the concept of integration is concerned with the integration of knowledge in practical thinking. In this it is recognised that in an integrated curriculum, there need not necessarily be an integration of the whole curriculum. Certain areas of practical thinking can be distinguished that do not fit into distinct subject areas. Pring (1976) quotes examples such as sex education and living in a multi-racial society which demand understanding and judgement from the pupil. In order for this to be accomplished, he will need to draw on evidence and argument from many different subject areas. So this approach is multi-disciplinary, and is based on enquiry into important and

controversial issues in areas of practical living. The integrating element is provided by a pupil resolving such issues in this inter-disciplinary fashion. Certainly, key practical issues are broader in scope than any single area of knowledge.

A fourth and final underlying principle is that of integration in the learner's own interested enquiry. This stresses the pupil's own enquiry, as such, into any areas of interest, as the integrating factor in the curriculum. According to this view, all enquiry is basically of the same kind, and we should be encouraging the pupil to acquire the powers of mind, habits of thinking and skills of enquiry that are common to all intellectual pursuits. Because they are common to all areas of intellect, it is these which give unity to thinking. Thus this view casts aside the conventional distinctions caused by boundaries between subjects. So pupil-initiated learning is the focal point of curriculum organisation. Learning is entirely child-centred and there are no preconceived, teacher-planned categories or subjects.

Experience reflects a sympathy for this rationale. An approach based on environmental experiences should reflect a balance in practice

between flexibility and rigid organisation. Such a scheme is never without structure, and the programme provides opportunities and direction according to the background, age and ability of the pupils concerned, and skills are introduced in an ordered progression. On the other hand, the approach is very flexible insofar as all the children are highly motivated and interested in their work, and their own spontaneous ideas and discoveries are frequent starting points for investigations. In this practical situation, therefore, it is very apparent that the learner's own interested enquiry can often be the integrating factor in the curriculum.

The above is but a very brief examination of the different educational rationales underlying integrated curricula, and without doubt they are by no means mutually exclusive in application to any teaching situation. Rather, they combine to provide a solid theoretical foundation to integration in practice.

It is apparent from the above discussion that the concept of integration may be regarded either as a purely organisational device, or it may be regarded as a deeply theoretical concept reflecting differences in theory about the nature of knowledge. In other words, it may be placed in

any one of a variety of locations on a conceptual diagram, relating to aims, methods, teaching or organisation. Bearing this in mind, the question can now be asked, where is the integrated day to be found on such a conceptual diagram? Since a day is necessarily a unit of time, then it would seem that the integrated day must essentially be an organisational concept, and is not a concept which is concerned with aims, curriculum or methods. A study of the literature concerned with the operation of an integrated day certainly discusses it as an untimetabled day, where there is a wide variety of activities going on simultaneously in a classroom.

> "The integrated day could be described as a school day which is combined into a whole and has the minimum of timetabling."
> (Brown and Precious, 1968)

Essentially then, the integrated day form of organisation is one providing a controlled environment which will be regarded by the child as a whole, and in it he can choose what to do, and how long he will spend doing it. There is a framework giving the child security, but his activities are essentially self-directed. The role of the teacher in this situation will be to

maintain the degree of control necessary if the situation is not to develop out of hand, to deal with individual children by encouraging them and to suggest useful and purposeful activities that the children would not think of, if left to their own devices. The teacher's problem is clearly to ensure that every child makes daily progress in learning, and in order to fulfil this task, she will normally have a basic daily programme of work, to include experiences of mathematical concepts, reading and writing derived from self-initiated interests, and some activities of a creative or practical nature. At one moment in time, some children may be reading, others writing, weighing or measuring, some painting, modelling or acting, while others may be devising an experiment or be in consultation with the teacher.

Dearden (1971) regards this organisational situation as a "minimum concept" of the integrated day.

> "The minimum concept of the integrated day, then, is that of a school day, so organised that there are no, or at least, very few uniform and formalised breaks in the activities of learning and teaching, but rather a variety of such activities going on simultaneously and changing very much at the choice of the individual child, or perhaps of the group."
>
> (Dearden, 1971)

Thus in every way, the integrated day may be regarded as a basic organisational concept in a primary school; yet it may also be seen to be closely inter-related with concepts of aim, curriculum and method. As mentioned above, the integrated day as an organisational device may be regarded as a minimum concept, and there are various ways in which this minimum concept may be enriched - notably by the addition of 'optional extras', namely the integrated curriculum and team teaching (Dearden, 1971). It is apparent, therefore, that an integrated day does not necessarily produce total integration.

To provide children with a variety of occupations from which they can choose, and to abolish timetabling and teacher-directed tasks, will most certainly not automatically give young children a sense of the wholeness of knowledge. However, it is highly desirable that there is some awareness of this when operating an integrated day, both at child and teacher levels. It is not really sufficient that the child should choose a certain activity to follow another according to his own free will. Rather it is more important that he should choose because one thing naturally leads to another. The ultimate aim of this should be that individual children begin to form a

coherent pattern of thought embracing all their varied experiences.

> "His reading, his measuring, his shopping, his painting and all other practical activities must somehow make his experience more coherent, more integrated in truth as well as in teacher's theory."
>
> (Sadler, 1974)

Without doubt, this is not easy to attain, and children may need a great deal of training before they can exercise the freedom implied by integrated day organisation.

In practice, this ideal situation of working an integrated curriculum is certainly an optional extra as far as the integrated day is concerned. This is demonstrated by Dearden who makes a classification of observed practice into four broad types of integrated day. The first type of school regards the curriculum as definitely divided into more or less traditional subject areas, but methods of teaching are to set individual and group assignments. The children freely choose when and in what order they will complete their assignments, and what they will do when their assignments are complete for one day. Here, then, is an integrated day with a predominantly subject based curriculum. The

second type of school sets no assignments and there is freedom of choice according to interest, but the classroom and resources are arranged in areas devoted to subjects. Thus the children's activities are still channelled, though indirectly, in the direction of a differentiated curriculum.

The third group of schools reflects freedom of choice according to interest, and a changing variety of resources in each room is arranged and rearranged to suit current interests. Such a regime may be labelled a 'free day', and is found more commonly in infant rather than in junior schools.

Finally, the fourth type of school has an integrated half day, when in the morning, the children take part in differentiated activities related to the acquisition and development of basic skills (Dearden, 1971).

In practice, therefore, it is very evident that many establishments operate the minimum concept of the integrated day, and it would seem relevant to point out the various advantages it may have. Certainly, an increase in individualised learning will lead to sustained motivation, interest and involvement on the part of the pupil. Secondly, much of this learning

will necessarily be unsupervised, while the teacher is involved with another group or individual. The children must, therefore, acquire skills associated with learning for themselves, which is certainly advantageous. Finally, this individualised learning and the developing of self-learning skills are closely connected with the important development of autonomy and self-direction, which is obviously to be encouraged.

In conclusion, therefore, it seems possible to define a minimum concept of an integrated day, which is a purely organisational device and which has related educational advantages. This concept, however, may be enriched into being an integral part of another important concept, that of an integrated curriculum. Certainly in practice, the two may exist entirely independently of each other. Thus, it is perfectly possible to operate a totally integrated curriculum in the theoretical sense, without any school day being integrated in terms of organisation. Conversely, it is also possible to operate a fully integrated day, this being a useful organisational device, but which has no regard for any of the educational rationales underlying the theoretical concept of integration.

The term integration is here used to refer to a totally integrated curriculum in the theoretical sense. The operation of an integrated day is an organisational device used fairly frequently in the teaching methods employed in certain schools as documented in Chapter 6, though it is not regarded as a permanent and essential element of their programmes. What is essential to them is the theoretical integration through themes and complex issues derived from the natural environment. Therefore it is intended in Chapter 4 to analyse and describe the current philosophy and practice relating to environmental education in primary schools, which is necessary for an understanding of the nature of the work being organised within the schools selected for this research.

3.2. THE AESTHETIC EXPERIENCE AS A BASIS FOR INTEGRATED LEARNING

The second section of this chapter aims to explore at greater depth the philosophical justification for curriculum integration and puts forward one of the key arguments of this thesis, which is that the basis for integrated learning is aesthetic experience. This premise is totally in accord with the philosophy and methodology of Eisner and underpins the justification for using the connoisseurship and criticism model alongside more traditional evaluation procedures.

For any person engaged in the process of curriculum planning, the importance of the role of aesthetic experience in education cannot be overstated. Whilst the views expressed here are intended to relate primarily to the primary school curriculum, many of the fundamental ideas are equally applicable to all stages of the education of an individual. Irrespective of the age of the learner, it is the personal development of that individual, his or her total growth and development in every sense, both intellectual and otherwise, that should be the basic concern of any curriculum planner or educator. The role of

aesthetic education is of fundamental importance as a basis for personal development and intellectual growth, and as such has profound implications for selecting curriculum content and organising subject matter.

At the heart of the above statement is the idea and belief that there is a relationship between the imagination and other aspects and functions of the human mind. As was pointed out by H.S.Broudy (1979), imagination has commonly been regarded as the antithesis of reason, and as a thing apart from wisdom and intellectual reasoning.

> "Art, which shares the suspicions engendered by imagination, accordingly has always had ambiguous status in the academy. It is not surprising, therefore, that the intimate connection between imagination and the intellect has been forgotten, overlooked and neglected - especially in our schools."
>
> (Broudy, 1979)

Yes, without doubt, it is possible to identify a relationship between the process of imagination and language, thought and feeling. The perception of images is essential for the formation of concepts and their subsequent translation into the written and spoken word. Perception is related to images, which will guide

the thought and actions of an individual.

In accordance with the philosophy of John Dewey, aesthetic experience is undoubtedly an intellectual activity dependent upon the interaction between an individual and his or her environment. Furthermore, the aesthetic belongs to every normal and complete experience in the life of an individual, and is not a thing apart from one's ordinary, everyday activity. The origin of aesthetic experience is therefore biological, dependent upon a live creature forming and reforming states of equilibrium within his surroundings.

> "Only when an organism shares in the ordered relations of its environment does it secure the stability essential to living. And when the participation comes after a phase of disruption and conflict, it bears within itself the germs of a consummation akin to the aesthetic."
> (Dewey, 1934)

In accordance with these ideas, Dewey identifies the difference between the aesthetic and the intellectual as merely one of place where emphasis falls in this constant rhythm that is the interaction between a living organism and its surrounding environment. Ultimately they come to the same, set in the experience of an individual.

"The odd notion that an artist does not think and a scientific inquirer does nothing else is the result of converting a difference of tempo and emphasis into a difference in kind."
(Dewey, 1934)

The scientific thinker engages in aesthetic experience when his or her ideas cease to be ideas alone and are related to the meanings of the objects or symbols which are being dealt with. The artist accompanies thinking in terms of the qualities of the media with which he/she works. Furthermore, that which is aesthetic cannot be sharply divided from an intellectual experience, since the latter must have aesthetic qualities in order for it to be complete. For Dewey, an experience, which inevitably has aesthetic qualities when complete, consists of the process of doing and the process of undergoing which are in relationship to each other. Perception of this relationship between that which is done and that which is undergone is dependent upon the operation of intelligence. The artist in his work is controlled by an understanding of the connection between what has already been done and that which ought to be done next, and for this reason Dewey considers that

"The notion that the artist does not think as intently and penetratingly as a scientific

inquirer is absurd."

(Dewey, 1934)

In short, therefore, in accordance with the philosophy of Dewey, art and aesthetic education can be regarded as an intellectual activity.

> "Any idea that ignores the necessary role of intelligence in production of works of art is based upon identification of thinking with use of one special kind of material, verbal signs and words. To think effectively in terms of relations of qualities is as severe a demand upon thought as to think in terms of symbols, verbal and mathematical."
>
> (Dewey, 1934)

It would seem that in the worlds and the operations of both so-called artists and scientists, there exists thinking which is dependent upon emotion and feeling. The substance of this feeling consists of appreciated meanings or ideas, and the only distinction of any great significance between the status of artists and scientists has to do with the nature of the material to which the feeling and imagination is directed.

> "Those who are called artists have for their subject-matter the qualities of things of direct experience; 'intellectual' inquirers deal with these qualities at one remove, through the medium of symbols that stand for qualities but are not significant in their immediate presence."
>
> (Dewey, 1934)

Whilst the act of thinking is technically a different operation in both of these cases, both require a basis of qualities and emotional ideas. Indeed, for Dewey all thinking depends on the awareness of qualities.

David Ecker, heavily influenced by Dewey's ideas that the artistic process is an intellectual activity involving thought and the ordering of qualities, has explained this process as a series of problems and their controlled resolution. The problems which the artist has to solve are related to one another in a qualitative way and, through an ordering of such qualities, the artist is exercising intelligence and thought.

> "Artists at their work think in terms of relations of qualities, think with qualities; their thought, in a word, is qualitative."
> (Ecker, 1963)

To both Dewey and Ecker, therefore, cognition plays an indispensable part in aesthetic process. The traditional distinction between arts and sciences, where the former has to do with feeling and imagination and the latter with reason and intelligence, is quite rightly rejected. As was documented by Villeman and Champlin (1959), qualitative (aesthetic) and theoretical

(scientific) intelligence operate in all areas of human experience. Whilst Ecker reinterprets Dewey's ideas to identify artistic problem solving as the control of qualitative relationships as means to the achievement of a qualitative end, both identify what Dewey (1934) terms:-

"a complete act of reflective thinking"

If aesthetic education and intelligence are so inextricably linked, and are related to the emotions, feelings and everyday experiences of the learner, then the fundamental question need be raised as to the role that aesthetic education should play in the school curriculum. H.S.Broudy (1977) considers this question and discusses the issue of whether in fact, arts education should be regarded as a fourth "r" alongside reading, writing and arithmetic.

> "If reading and arithmetic are codes or languages in which ideas are stored, so to speak, then one might also think of the artistic skills as learning the codes by which one penetrates the realm of ideas and feelings in the form of images in various media. It is in this sense that one refers to the 'languages of the arts' .... "
>
> (Broudy, 1977)

In this way, aesthetic education can clearly be regarded as a basic subject, parallel to the more traditional three "rs", since the skills of artistic expression may correspond to the skills of writing and the skills of artistic impression may correspond to the skills of reading. Yet, as Broudy identifies, there is a vital difference between the skills of reading, writing and arithmetic, and those of artistic impression and expression. In reading and writing, the child is inevitably dealing with levels of abstraction, since the written word in no way resembles the sensual experience provided by the object which it represents. The written word does not share the appearance, the sound, the smell or the feel of the real thing. It is an abstract code, requiring an understanding of the connection between itself and the real object which is being considered. In mathematical language, the child is dealing with even greater levels of abstraction, requiring someone to explain the connection between the code and the concept of quantity which is being represented within it. In art and aesthetic experience, however, we can identify no such code requiring translation. Images of thought and feeling are the very objects and ideas being symbolised. For this reason, whilst aesthetic

skills may quite rightly be regarded as basic, they are apart from those skills more traditionally regarded as basic, those of reading, writing and computation. An analysis of the relationship which exists between the traditional three "rs" and aesthetic skills is of fundamental importance to educators and curriculum planners alike, and is one of the key issues underpinning this present thesis and research.

This relationship extends far beyond a correlation of test scores on basic skills. For indeed, the entire meaning of what is read in the printed word and written on a page is dependent upon the images which the reader or writer forms. Basic skills of reading, writing and computation require a context of meaning in order for them to make any sense in the mind of the learner. Such context, as discussed in Chapter 2 above, is comprised of images, rooted biologically in the sensory system of the individual. As such, images may be visual, auditory, tactile, gustatory or olfactory. Without the necessary image, the term must remain a mere code or formula. It has no context of meaning in the mind of an individual. Without doubt, the acts of reading and writing are performed with the use of the imagination. For this reason, Broudy (1977) suggests that when it

is reported that high school students graduate without being able to read, the answer to this problem is rooted in the probabilities that either such non-readers lack access to the meanings encased in written language or their imagic store is so impoverished that so too are their resources for interpretation and comprehension. It would seem, therefore, that without access to imagination and meaning, adequate progress will not be made in the skills of reading, interpreting and comprehending.

For these reasons it can be argued that the skills of aesthetic education are not only a basic part of a school curriculum, but also that they are a central necessity. Broudy (1977) goes so far as to suggest that

> "Aesthetic experience is basic because it is a primary form of experience on which all cognition, judgement and action depend. It is the fundamental and distinctive power of image making by the imagination. It furnishes the raw material for concepts, and ideals, for creating a world of possibility."
>
> (Broudy, 1977)

In no way should the development of imagination be left to chance processes, as is often the case in the schools of the world today. Not only is this fundamental experience on which

other basic skills depend, but it can also be related to the development of intelligence following the ideas of Dewey and Ecker as discussed above. Without positive attempts at encouraging image making and image perceiving, intelligence itself may remain under-developed.

It is a well-founded argument, therefore, that aesthetic education should be a central necessity to a primary school curriculum.

> "The aesthetic response is indispensable to all experience, and instruction in the aesthetic response is both possible and necessary."
> (Broudy, 1977)

This argument is quite apart from the important fact that aesthetic experiences within themselves contain such value as to render them an essential part of the lives of those we seek to educate.

Yet it would seem both possible and necessary to extend the above argument, to consider at greater depth the relationship between art and other subject areas, leading to positive recommendations concerning the organisation of subject matter in a school curriculum. The following comments are based therefore on the premises discussed above, and assume that art is an intellectual activity and that aesthetic

experience is a fundamental form of experience on which all cognition and judgement depend.

The skills of aesthetic perception, of image making, are common to all subject areas. Already the relationship between imagery and other basic curriculum skills of literacy and numeracy has been discussed. Imagery has been shown to be fundamental. Although we can define a distinct coming together of the arts and sciences through imagery, Dewey himself (1934) recognised the basic similarities between artistic and scientific activities, claiming that

> "the only significant distinction concerns the kind of material to which emotionalised imagination adheres ..."
> (Dewey, 1934)

as previously documented. Thus as Sandburg (also previously cited in Chapter 1) says

> "when 'the fog creeps in on little cat feet', and a child calls eraser scraps 'mistake dust', and a painter shows the four sides of a barn at once, and a man converts a runner into a wheel, and a Newton sees the analogy between apples and planets, there is manifest an activity of mind that seems to be of the same weave, despite the differences of coloration."
> (Sandburg, 1965)

Just as a writer is transforming his human experiences into a play or a novel, so a scientist is testing and probing data he or she has acquired in order to produce a new theory. Both are actively concerned with rearranging knowledge or experiences into new forms or new patterns.

Bronowski states:-

> "The discoveries of science, the works of art are explorations - more, are explosions of a hidden likeness. The discoverer or artist presents in them two aspects of nature and fuses them into one. This is the act of creation, in which an original thought is born, and it is the same act in original science and original art."
> (Bronowski, 1956)

Herbert Read also establishes the relevance of aesthetics to the processes of perception and imagination and relates this to all subject areas.

> "In the end I do not distinguish art and science, except as methods, and I believe that the opposition created between them in the past has been due to a limited view of both activities. Art is the representation, science the explanation - of the same reality."
> (Read, 1943)

In other words, the realm of science is concerned with restructuring ordinary experience by introducing theoretical form. Science may inform us about why certain phenomena happen and

enable predictions to be made, yet it cannot provide adequate personal meaning of an object, situation or feeling. Only the images created by aesthetic experience are capable of doing that. Thus there is a distinct positive relation between images and language, thought and feeling, which exists across all subject areas. Art gives personal meaning to and enriches experiences in a way that other subject areas cannot.

In the light of the above comments, it would seem wrong and against the best interests of educational purposes to organise a primary school curriculum around neat and distinct subject areas, establishing territories and boundaries that to a large extent are false.

As discussed in section 3.1. above, the concept of an integrated curriculum where subject boundaries are not recognised may be regarded either as a purely organisational device, or as a deeply theoretical concept reflecting differences in theory about the nature of knowledge. In other words, it may be placed in any one of a variety of locations on a conceptual diagram, relating to aims, methods, teaching or organisation. Various principles which might underlie recommendations for integration have also been discussed, and are again relevant at this stage in the current

argument: they include the fact that in a subject based curriculum, insufficient account is often taken of an individual's unique perception of objects and events. This fact has already been shown to underlie skill acquisition across the curriculum. A second principle is concerned with a logical interconnection between different kinds of knowledge. A subject based curriculum can only limit enquiry, set up barriers and confine study within certain limits. If there is to be a more genuine and comprehensive approach to reality then an integration of ideas from different subjects is an absolute necessity. The skills of aesthetic education provide the foundation for this comprehensive approach, the interconnection between areas of knowledge. Again referring to and extending an example cited above, a child could not be expected to understand the geographical distribution of trees, calculate their differential growth rates, or make a historical study based on the pattern of annual rings in the trunk, without a knowledge of basic biological principles and relationships. Yet first and foremost, that child requires the necessary imagery and perception to comprehend the objects relating in the manner being discussed. Aesthetic education can provide, therefore, the

integrating element in a curriculum which is designed not to create artificial boundaries in knowledge and learning, but to develop a structure to thought and imagery in a way which is unique to each individual learner.

Translating this theory into classroom practice, a curriculum utilising these ideas would aim primarily at increasing each learner's sensitivity to the aesthetic qualities of everyday objects and experiences. Certainly those things more commonly recognised as 'works of art' should have an important role in early education. Drawing attention to the qualities of good music, painting, poetry and so on is fundamental, and is greatly underemphasised in the majority of schools and classrooms. Yet returning to the basic ideas of John Dewey, aesthetic education does not relate entirely to the works of fine art or to the teaching of a particular art form. Rather, it is grounded in the ordinary and everyday experiences of the learner. Aesthetic education begins with images, with the perception and qualities of objects and ideas, the sensory material out of which art works are made. Such objects may be the very ordinary, useful things of life - the tree, the vase of flowers, the kitten or the postman. Aesthetic education aims at encouraging the

learner to perceive their qualities.

> "It is a way of perceiving that allows us to fuse sense impressions into images, images made of sound, or color, or movement, images evoked by words. We become aware of shapes, masses, shadings, tonalities, and they take on a sense of import for us, as we uncouple them from the ordinary, the practical world."
> (Green, 1981)

Indeed, Green argues that any object can function aesthetically if it is disconnected from its ordinary context, from its practical and everyday use. Thus a good basis for education would be involvement of the learner with as many objects and experiences of his familiar world as possible, encouraging sensitisation to the qualitative aspects of these experiences - their colour, their texture, their sounds, movement and so on. A vital function of the teacher is to provide for contact with as many objects and experiences as possible in both familiar and then contrasting environments. In this way it is possible to develop aesthetic education beyond this focus on single qualities, to consider the ordering and relation of the qualities perceived.

> "Aesthetic perception is not only perception of qualities in aesthetic space; it is perception of qualities in compresence, in relation to one another." (Green, 1981)

The teacher is thereby actively cultivating creative growth and encouraging the learners to develop greater levels of sensitivity to the world around them. Their own personal sensations should be valued, recorded and cultivated, ultimately leading to an awareness of more demanding forms of sensitivity, for example, other people's feelings and a subsequent understanding of art forms and meanings. Following on from this, the fundamental importance of expressiveness and conveying meaning to a public audience cannot be overemphasized. Whilst this present discussion is primarily concerned with imagery and functions of the mind and does not allow for a detailed discussion on expressive activities, the vital role of educating people who are competent in a wide variety of modes of expression must be stated. It is both the construction and conveyance of meaning, and the creation of art forms based on experience, perception and judgement that are activities requiring the operation of intelligence. It is through such intelligent operation that investigations into our complex world may be approached. Aesthetic education may be regarded as a vehicle for penetrating the ideas concerning the relationships that exist among human life, our culture and our bio-physical surroundings: complex

ideas that are essentially supra-subject, leading to learning that certainly does not fit into distinct subject categories. No child is too young to begin to stand in awe of his or her world, giving due perspective to mankind on its achievements. The younger the child, the more undifferentiated his or her approach will be. Even for the older child, subjects merge and overlap. Yet no matter what the child's age, the process of imagination is of central necessity to all thinking and learning across all subject boundaries. From such aesthetic beginnings, learning may proceed according to the learner's own interested enquiry, encouraging him or her to acquire the powers of mind, habits of thinking and skills of enquiry that are common to all intellectual pursuits. Because they are common to all areas of intellect, it is these which give unity to thinking. Conventional distinctions caused by boundaries between subjects are cast aside, and learning initiated by the child's own imagination and perception becomes the focal point of curriculum organisation. Learning is entirely child-centred and there are no pre-conceived, teacher-planned categories or subjects. Much is said about the need for individualised instruction in our schools, yet as pointed out by Eisner

(1982), in practice this generally refers to a situation where the major variable that is altered for students is time:

> "Fast and slow-learning students are given variable amounts of time to proceed through the same sequence of curriculum activities toward the same performance objectives."
> (Eisner, 1982)

Yet in a truly integrated curriculum such as is described above, all children are encouraged to realise their own unique learning potential and intellectual abilities. They will be highly motivated and interested in their work, with their own spontaneous ideas, perceptions and discoveries used as the starting points for investigations.

Clearly, therefore, it can be seen that there is a positive and important relationship between traditional school subjects and aesthetic skills which is of fundamental importance to curriculum planners and educators alike. The importance of the aesthetic experience should be recognised as fundamental to all education which is directed towards the realisation by each individual child of his or her unique learning potential and powers of intellect. The centrality of the aesthetic experience calls for it to be recognised as the essential basis of a curriculum

which establishes no separate territories or false boundaries, but which seeks to integrate the knowledge and thinking of each child derived from his or her own unique experiences of reality.

Without doubt, aesthetic education or rather, an awareness of the centrality of the aesthetic experience, underpins and relates to the area of learning which we know as environmental education. It has already been pointed out that aesthetic education may be regarded as a vehicle for penetrating the ideas concerning the relationships that exist among human life, our culture and our bio-physical surroundings, which is the very essence of environmental education.

Attention is now turned to this subject area, to its definition, philosophy and practice and to an overview of developments leading to its position in the National Curriculum. Part of the justification for paying particular and detailed attention to an overview of environmental education lies in the fact that it is the starting point for and unifying element in the work of all six schools involved in the empirical investigation. More importantly, however, justification may be linked to this critical argument that education from first hand experiences of the world and the perception of

qualities in everyday objects and ideas is of central importance to the school curriculum. This argument clearly has relevance to the National Curriculum debate, the way in which teachers view an overall curriculum framework and the location of cross-curricular themes.

This thesis aims not only to demonstrate that an understanding of the optimum ways of developing environmental/aesthetic experiences is of vital importance to children's learning, but also to provide both qualitative and quantitative data which illuminate the value of integrated learning based on such experiences for developing children's creative thought processes. Thus attention is now focused on the area of learning which is the basis for empirical investigation.

3.3 SUMMARY OF KEY IDEAS EXPRESSED IN CHAPTER 3

1. The aesthetic foundations of education and intelligence are inextricably linked together:

> "The difference between the aesthetic and the intellectual is thus one of the place where emphasis falls in the constant rhythm that marks the interaction of the live creature with his surroundings."
>
> (Dewey, 1958)

2. Ideally, a curriculum should aim at increasing each learner's sensitivity to the aesthetic qualities of everyday objects and experiences.

3. The importance of the aesthetic experience should be recognised as fundamental to all education which is directed towards the realisation by each individual child of his or her unique learning potential and powers of intellect.

4. The centrality of the aesthetic experience calls for it to be recognised as the essential basis of a curriculum which seeks to integrate the knowledge and thinking of each child derived from his or her own unique experiences of reality.

5. An understanding of the optimum ways of developing aesthetic experiences is not only vital to children's learning but is clearly relevant to the implementation of the National Curriculum for schools.

CHAPTER 4

ENVIRONMENTAL EDUCATION IN PRIMARY SCHOOLS

CHAPTER 4

4.1 Towards A Definition and Aims

4.2 Approaches, Philosophy and Practice - Developments Leading To Its Present Position In The National Curriculum

4.3 Environmental Education and The National Curriculum : The Way Forward

4.1. TOWARDS A DEFINITION

During the past thirty years, there have been many changes in approaches to education in primary schools, and the development of environmental study over this time may be regarded not so much as the development of a new subject area but as the development of a philosophy and an approach. This approach is consistent with significant trends of this period of time, which include a move from formal towards informal methods; an increasing stress on child-centred as opposed to teacher-directed learning, and on helping children to find things out for themselves; the integration of work within a day and within the curriculum as a whole; the organisation of work on an individual basis and through assignments for small groups whereby children are encouraged to learn from each other; widening the learning and teaching environment to include the whole space of the school so that children are not confined to one classroom for a day's activities; and the provision and use of a rich range of resources and experiences, both within the school and outside it. As pointed out in papers prepared as part of the United Kingdom delegation's contribution to the UNESCO inter-governmental conference in Tbilisi, USSR, October

1977, the merits of traditional approaches have not been lost sight of, and they persist in varying degree in most schools; but the emergence of environmental studies as an important element of the primary school curriculum must be seen in the setting of these trends and developments.

> "To an extent much of the 'content' has always been there, but now the environment is often looked at in a new way and not least as a stimulus to the curiosity and imagination of teacher and pupil alike.
>
> Children need to learn that value judgments and sensible decision-making are worthless unless they are established on an understanding of fundamental relationships and principles."
> (UK papers for Tbilisi Conference, 1977)

Shirley Williams, the then Secretary of State for Education, wrote

> "The environment is a key factor in determining the quality of life. A well founded understanding of the world about us is essential if we are to appreciate our heritage, recognise the international dimension of many environmental problems and plan soundly and imaginatively for the future."
> (Foreword to the UK's submission, Tbilisi 1977)

At this stage it would seem necessary to give brief consideration to the question "What is environmental education?" and to a justification for the development of the approach and its

widespread inclusion in the primary school curriculum, for indeed it seems widely accepted that environmental education should permeate the whole curriculum both inside and outside the school and that every school should have adequate arrangements for planning and implementing a programme of environmental education.

Many and varied attempts have been made to define the term environmental education during the past century in which the subject has evolved, and in particular during the past twenty or so years when the implementation of environmental education has taken on a new urgency in response to critical problems that are becoming apparent in the world. As pointed out by Carson (1978), in the United States of America, many people were independently facing up to problems, particularly since the publication of Rachael Carson's Silent Spring in 1962. Worldwide concern of a similar nature arose and in 1970 the International Union for the Conservation of Nature and Natural Resources called a Conference on environmental education in Nevada. The findings of that conference still represent a major influence on the development of environmental education, and the definition drawn up at the Conference is that accepted in Britain by the National Association for Environmental

Education, which is widely accepted in this country and elsewhere:-

> "Environmental education is the process of recognising values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the inter-relatedness among man, his culture and his biophysical surroundings.
> Environmental education also entails practice in decision making and self-formulation of a code of behaviour about issues concerning environmental quality."

Since that time, there has been a tremendous interest in the development of environmental education in the United Kingdom and throughout the world. In 1967 the Plowden Report, Children and Their Primary Schools, confirmed the value of using the environment and from then onwards 'environment' has become one of the most widely discussed words in education, and the subject has rapidly evolved through the efforts of individuals, the campaigning of voluntary organisations and the development of government environmental policy.

In 1968 a group of teachers founded the first British teachers' organisation to propagate ideas about the use of the environment in education and education for the environment. This was named the Society for Environmental Education (S.E.E.) The National Rural Studies Association, which already existed, showed increasing concern

for the new and complex requirements of environmental education. In 1970 it changed its name to the National Association for Environmental Education, and has since superseded the SEE as Britain's main teachers' organisation. The NAEE promotes environmental education in discussion and activities. National Conferences are held regularly, working committees carry out research and outline possible courses and useful activities, and the results of the Association's work and ideas are published regularly in newsletters, Journals and booklets.

The national Council for Environmental Education (C.E.E.) was also established as an educational charity in 1968 to provide a focus for organisations involved in or interested in environmental education. Today its membership consists of some sixty national organisations from the professional, statutory and voluntary sectors. The CEE has three broad goals:

"Development: CEE aims to facilitate the development of the theory and practice of environmental education."

"Promotion: CEE aims to promote the concept of environmental education and facilitate its

application in all spheres of education."

"Review: CEE aims to monitor the progress of environmental education and assess its effectiveness."

The CEE maintains a computerised database on environmental education and produces a wide range of publications and resource sheets for educators.

At an international level there are frequent gatherings and conferences of people working in the field of environmental education leading to a great deal of common understanding of the aims, objectives and approaches to the subject. Principle 19 enunciated at the United Nations Conference on the Human Environment held in Stockholm 1972 stated

> "Education in environmental matters for the younger generation as well as adults, giving due consideration to the underprivileged, is essential ..."

(UN Conference on Human Environment, Stockholm 1972)

A year earlier the Ministers' Deputies at a Council of Europe meeting in Strasbourg had adopted a resolution advocating the introduction of the principles of nature conservation into education.

"the principles of ecology and the various forms of practical application embraced by the term 'nature conservation' must be taught in schools continuously at every level ..."

(Resolution (71)14 Council of Europe 1971)

A further resolution was adopted

"...to encourage the training of teachers and officers capable of carrying out action both in and out of school, to organise introductory courses on environmental problems for youth leaders ....."

(Resolution (71)22 Council of Europe 1971)

1975 saw the establishment of The Belgrade Charter, prepared at the meeting set up by the new United Nations Environment Programme. This was the first inter-governmental statement on environmental education. It listed the aims, objectives, key concepts and guiding principles of environmental education, as discussed below. This was followed in 1977 by the first inter-governmental Conference on Environmental Education, held as stated, in Tbilisi, USSR, and organised by UNESCO. This conference prepared recommendations for the wider application of environmental education in formal and non-formal education. This major event and subsequent publications based on it, continue to provide the framework for the development of environmental education in the world today.

In 1980 the World Conservation Strategy was produced, one of the most significant documents concerning conservation and environmental education at a global level ever to be published. Indeed, the WCS is very significant indeed for those involved in environmental education as it greatly emphasises the need to build support for world conservation through programmes of environmental education. From 1986 onwards, work at an international level has continued on preparing supplements to the World Conservation Strategy, including environmental education and ethics and culture.

The year 1987 marked the tenth anniversary of the first Tbilisi conference and a 'Tbilisi Plus Ten' Conference, jointly organised by UNESCO and UNEP, was held in Moscow. A number of major themes emerged from the deliberations of this event, including the vital importance of environmental education, summed up as follows in an introductory address:

> "In the long run nothing significant will happen to reduce local and international threats to the environment unless widespread public awareness is aroused concerning the essential links between environmental quality and the continued satisfaction of human needs. Human action depends upon motivation which depends upon widespread understanding. This is why we feel it is so important that everyone becomes

environmentally conscious through proper environmental education."

(Booth, 1987)

In 1988 the Council of European Community gave their backing when they agreed on the need to promote environmental education throughout the community. Bearing in mind the accepted definition of environmental education as stated at Nevada, it follows that its contents should be directed towards certain ends. It is helpful at this stage to consider initially the brief but comprehensive set of objectives for environmental education set out by UNESCO (1975) at the Belgrade Workshop. These are summarised as follows:

i) To foster clear awareness of and concern about economic, social, political and ecological inter-dependence in urban and rural areas;

ii) To provide every person with opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment;

iii) To create new patterns of behaviour of individuals, groups and society as a whole towards the environment.

The National Association for Environmental Education in its Statement of Aims (1976 and 1982) recognised that "throughout primary and secondary education, the human environment, both rural and urban, should be regarded as a continuum from the wilderness, through the productive countryside, small settlements and suburbs, to the heart of the inner city." As pointed out by the Council For Environmental Education's overview of Environmental Education, since the environment is all-embracing then it must at some stage be considered in its totality to include aspects which are urban and rural, technological and social, aesthetic and ethical. This overview should be reflected in environmental education. This raises certain problems in itself since either environmental education becomes equated with the whole of education, thus losing its identity; or else, in order to become comprehensible, selected features only are considered. Either way, essential aspects of environmental education may be lost. One way to help overcome this problem is to recognise that an

environmental dimension can be found in most aspects of education. Environmental education thus becomes an approach to education which incorporates considerations of the environment rather than being a separate part of education.

It is widely accepted that education related to the environment may take three forms. This was first formalised in the School Council's 'Project Environment'

> "There are three threads which have contributed to our present ideas and it has become almost commonplace nowadays to characterise these as education either ABOUT, FROM OR FOR the environment." (1974)

'Project Environment' states that

> "Education ABOUT the environment seeks to discover the nature of the area under study, often through investigatory and discovery approaches; the objectives are chiefly cognitive ones in that the aim is to amass information."

> "In educating FROM the environment, teachers have sought to forward the general education of the child by using the environment as a resource in two main ways; firstly as a medium for enquiry and discovery which may lead to the advancement of the learning process, the most important aspect being learning how to learn; secondly, as a source of material for realistic activities in language, mathematics, science and craft."

> "To educate FOR the environment ... is education which is environmental in style with emphasis on developing an informed concern for the environment. The objectives go beyond the acquisition of skills and knowledge and require the development of involvement to the extent that values are formed which affect behaviour.

.....Thus the aim is to develop attitudes and levels of understanding which lead to a personal environmental ethic; that is, to educate pupils so that their actions and influence on collective action will be positively for the benefit of the earthly environment."

In 1974 the report by H.M.Inspectors of Schools (Scotland) recognised that

"A programme of environmental education must disseminate knowledge, encourage understanding and foster attitudes"

which reflected the views of Project Environment. They went on to say

"It contains empirical, synoptic aesthetic and ethical elements, none of which can be studied in isolation:
a)The Empirical element. This is concerned with those aspects of the environment which lend themselves to objective observation, measurement and analysis ... The main priority is to ensure that all pupils have as many opportunities as possible of making direct contact with the environment through observation and by measuring, recording, interpreting and discussing what has been observed.
b)The Synoptic element .... pupils need to be made aware of the complex nature of the environment. The aim of synoptic studies is to help pupils to realise the complexity of such issues and to introduce them to the inseparable nature of the various components of an environment and to the inter-relations of these. Method is as important as content in achieving this.
c)The Aesthetic element. Many aspects of the environment, perhaps the most important, are qualitative rather than quantitative ....The aesthetic elements .....can help a pupil to realise that there is no right or wrong answer in absolute terms to aesthetic questions and that the answer to environmental issues is frequently a compromise.
d)The Ethical element. A programme of environmental education aims at introducing pupils to the idea of personal responsibility for the environment and to the concept of

> stewardship. It trains pupils to ask if the criteria of proposed actions are based on morally justifiable values."

Whatever its form, environmental education cannot be without key educational aims concerned with knowledge and skills as well as attitudes and behaviour. The CEE (1987) summarises these aims as follows:-

Knowledge and Skills

i) To develop a coherent body of knowledge about the environment, both built and rural, sufficient to recognise actual and potential problems,

ii) To be able to gather information from or about the environment independently or as part of cooperative activity,

iii) To be able to consider different opinions related to environmental issues and to arrive at a balanced judgement,

iv) To appreciate the ways in which environmental issues are interrelated so that one factor affects others,

v) To be able to evaluate information about the environment from different sources and to try to resolve environmental problems,

vi) To understand and to know how to use the

mechanisms available in society for bringing about environmental change.

Attitudes and Behaviour

i) To develop an appreciation of the environment and critical awareness of the natural and built environment,

ii) To develop an attitude of concern for environmental matters and a wish to improve environmental understanding,

iii) To be critical of one's own environmental attitudes and to take steps to change one's own behaviour and actions,

iv) To have a desire to participate in initiatives to care for or improve the environment,

v) To wish to participate in environmental decision making and to make opinions known publicly.

> "Using these aims as a guide it should be appreciated that environmental education may take many forms and that a wide variety of activities or programmes may be appropriate."
> (CEE, 1987)

The possibilities for the acquisition of knowledge, concepts, skills and attitudes (DES, 1985) promoted by the teaching of environmental education in the primary school have been outlined

in many sources. Key contributions to this debate have been made by Her Majesty's Inspectorate (DES, 1984, 1985, 1989) in their comments on the aims of environmental studies.

> "Aims of environmental studies are to contribute to the general purposes of primary education, including the attainment of acceptable standards of literacy and numeracy by providing suitable learning contexts and offering relevant opportunities for the application of skills and the formation of positive life-long attitudes to learning."
>
> (DES, 1984)

Two years later, Her Majesty's Inspectorate extended its statement of aims as follows:-

> "General aims for environmental education include: the need to develop attitudes of care, curiosity and concern for the environment in such a way as to develop a sense of responsibility towards home, school and community; to demonstrate to children the complex inter-relationships between humanity and the environment; and to give pupils the necessary skills to do these things."
>
> (DES, 1986)

It must be noted that both the terms 'environmental education' and 'environmental studies' are used in the above statements. It is both useful and necessary to differentiate between these terms as used within the context of this thesis. Environmental education is advocated by

The Department of Education and Science (1979) as a process to which the whole curriculum and every subject discipline may contribute. Environmental studies, on the other hand, is an approach to learning - that which is concerned with skill development in particular, including the basic skills of literacy and numeracy.

There is currently an active debate in research and writings concerned with environmental studies as to whether this represents an approach to learning or is a discrete subject in its own right. This issue is further developed in section 4.2 below. Her Majesty's Inspectorate state that, to a greater or lesser extent, all aspects of the curriculum draw on the environment as a resource. The latest document to be published by the DES on the subject is in the Curriculum Matters series. This volume, Environmental Education (1989) makes quite clear the viewpoint that environmental education is a cross-curricular approach to learning:

> "In exploring and explaining inter-relationships in the environment, environmental education draws on, and contributes to, the concepts, skills and knowledge underpinning a range of subjects or areas of learning and experience."
> (DES, 1989)

Another writer claims that:

> "It [environmental education] must be a way of looking at life, part of the ethos of the school and integrated into the curriculum in its widest

sense."

(Mares, 1985)

Irrespective of one's position in this debate, it would seem generally agreed that the aims and content of environmental education should be directed towards certain ends, as recommended in the guidelines of various Local Education Authorities. For example, those of the City of Birmingham Education Department (1986) suggest that first and foremost will be the encouragement of clear thinking, the acquisition of knowledge and the art of utilising this knowledge. Secondly, will be an appreciation of the interrelationships of subjects, derived from an appreciation of the links between individual environmental phenomena and the whole of which they are a part. Thirdly it is vital that there is a formation of positive attitudes concerning social responsibility, tolerance, initiative and international understanding by stimulating interest in local, national and world affairs, and the growth of accurate, realistic ideas concerning other people; and finally, there will be opportunities for aesthetic awareness.

The ultimate aim of environmental education is for each school leaver to have formulated a responsible attitude towards the sustainable

development of planet Earth, an appreciation of its beauty and an assumption of an environmental ethic. To fulfil this aim every school should strive to have adequate arrangements for planning and implementing a programme of environmental education. That these arrangements may vary between schools reflects that they must be tailored and modified to the particular needs of individual neighbourhoods and individual children.

Physical processes, ecological interactions and human behaviour shape the environment. Environmental education seeks to make young learners aware of these and to provide the intellectual capacity which is necessary to create within them an informed concern for the way the resources of the Earth are used and the quality of life on it now and in the future.

Indeed, as pointed out by the CEE (1987), environmental education is essential for what may be considered to be a full education.

4.2 APPROACHES, PHILOSOPHY AND PRACTICE - DEVELOPMENTS LEADING TO ITS POSITION IN THE NATIONAL CURRICULUM.

Concerning the practical inclusion of environmental education in the primary school curriculum, this has usually occurred (prior to the advent of the national curriculum) in time devoted to environmental studies, within a very broad understanding of the term, after due time has been allocated for the meeting of the children's needs in the core curriculum areas of language, mathematics and science, and for a range of practical and creative activities. Terms such as 'topic work', 'project work', 'local studies' and 'integrated studies' are often used to be synonymous with environmental studies - as there is usually a strong environmental element in them. The disciplines of history, geography and science have been increasingly included within this environmental studies work, which may occupy anything from one to two hours a week to a far greater proportion of the timetable, when studies will be used as a vehicle for the development of the more 'basic' skills as outlined above.

It is most interesting to note that the primary survey by H.M.Inspectors of Schools

(D.E.S., 1978) discusses "social studies" in a chapter concerned with the content of the curriculum, but does not refer to environmental education as such. Many comments are made in this report about the teaching of history, geography and science, and indeed criticisms are levelled at the content of these courses, which the present author considers would be adequately answered by the more widespread development of an integrated environmental studies approach. For example,

> "to a limited extent children were being helped to acquire an appreciation of man's dependence on natural phenomena and resources .... however, as with history, much of the work tended to be superficial and there was little evidence of progression."
> (Primary Education in England: D.E.S., 1978 - page 75)

It would seem, therefore, that environmental study in the primary school may be regarded far more as an approach rather than as a subject area, and because of this its objectives are defined less in terms of things to be learned than in terms of skills, ideas and attitudes to be developed. In a consideration of objectives, the City of Birmingham Education Department (1980) states that by the end of the primary stage, many

children can be expected to attain :-

1. Intellectual skills, such as the ability

   a) to perceive, to select and to record accurately,

   b) to classify phenomena,

   c) to analyse, synthesise, correlate and evaluate information, and

   d) to generalise;

2. An appreciation of the dynamic relationship between man and his environment.

3. An understanding of location,

4. An understanding of time, cause and effect, endeavour and achievement;

5. An ability to define and use correctly appropriate environmental, geographical and historical vocabulary,

6. An ability to identify values on which given human actions are based and sets of values that are an integral part of beliefs, philosophies and cultures,

7. An ability to identify bias in reported evidence, written accounts of events etc, and

8. The taking of action in everyday situations, in relation to rather than against available evidence.

An analysis of these objectives indicates that there tends to be a definite stress on skills: for example, those of communication in language, mathematics, art and craft; of individual study, such as the use of reference and secondary resource materials, of scientific method - that is, observing, measuring, recording, collecting and classifying, with a developing stress on enquiry, experiment and hypothesis-testing. Naturally many of the skills of academic disciplines will occur frequently in work of this kind, for example from geography will be the use and interpretation of maps, and from history the recognition and use of many kinds of evidence.

Certainly, the keystone of the whole approach is first-hand experience, and this is interpreted to include studying the locality and places further afield, also experiences which are school-based such as caring for small animals, growing plants, recording the weather and items of interest in the school grounds; visits to sites and establishments such as farms, nature reserves, parks, museums, buildings of interest and archaeological sites, and finally, meeting and interviewing people who live and work in the community.

In many ways the range of themes and concerns that can be covered by the environmental studies approach is complex even to the point of being bewildering. In practice, the organisation of work in schools is often presented in the form of flow diagrams, which indicate the range and extent of investigations which might develop from a given theme. There is a heavy onus on the teacher to plan the work, and upon heads of schools to provide guidelines, and at the same time to retain opportunity for spontaneous development. At a higher level, many local education authorities have published definitive guidelines in relation to structure, balance and progression and the ordering of academic skills,

notably Hertfordshire - in its publication Environmental Education Guidelines for the Primary and Middle Years (1978) - and Birmingham, in Further Developments in the Primary Curriculum Environmental Education (1980). These are but two of a wide range of excellent L.E.A. statements. The National Association for Environmental Education's publication Environmental Education: A Statement of Aims (Second Edition, 1982) is also a very valuable contribution to the establishment of guidelines for teachers.

All such documents stress the importance of the benefit of investigations into everyday objects and events, and 'real life' situations that are within the conceptual capacity of the children concerned. Recent statements from the Department of Education and Science reinforce this view. The document Curriculum Matters 5-16 (1985) specifically recommends that the curriculum should be relevant in the sense that it is seen by the pupils to meet their present and prospective needs. As environmental studies usually focuses upon the pupils' immediate surroundings and everyday objects and experiences, then it can be argued that it makes a strong contribution to a curriculum that is indeed highly relevant. (Storm, 1979; D.E.S., 1986) The D.E.S. publication

Curriculum Matters 5-16 also requires that the primary curriculum must have breadth and balance. Again, adequate breadth may be achieved through environmental education:

> "Environmental education which can help pupils to develop an awareness, appreciation and understanding of their surroundings, may be presented through science, history and geography, for example, or can act as a unifying approach for work in and out of school in several subjects and curricular areas."
> (D.E.S., 1985)

The document goes on to explain further that environmental education can be a feature of all, or at least several of the areas of learning and experience it outlines, namely

> "aesthetic and creative, human and social, literary and linguistic, mathematical, moral, physical, spiritual, scientific and technological."
> (D.E.S., 1985)

The D.E.S. suggests that the choice of themes or topics for environmental education

> "should include essential facts and concepts, develop general skills and use pupils' own experiences where possible as starting points."
> (D.E.S., 1985)

Mays (1985) expands this viewpoint by arguing that learning of some kind goes on anywhere, in the form of assimilation of concepts and ideas, and so the 'real world' outside the classroom should not be excluded.

> "The sheer exuberance and variety of life outside school acts as a tremendous stimulus to learning"
>
> (Mays, 1985)

Accepting the definition and scope of environmental education as outlined above, it must be seen to have a very close association with the philosophy and practice of an integrated curriculum. Indeed, environmental studies has been strongly supported by some educationalists because of its ability to incorporate many of the areas of learning of the school curriculum (Bickerton, 1971; Jones, Perry and Hammersley, 1974; Storm, 1979). The document on Geography 5-16 in the D.E.S. Curriculum Matters series states that environmental investigations naturally integrate language, mathematics, computer work, art and history.

This acceptance of environmental education as a form of integration or inter-disciplinary enquiry cannot be stated without reference to

counter-argument or discussion. Rolls (1969) sees four different emphases which may be stressed by teachers of environmental studies. These are firstly, an inter-disciplinary enquiry concerned with a wide variety of problems arising out of the natural environment as it exists or as a result of man's interaction with that environment. Secondly, environmental education is a field of study. The environment is seen as a source of information and material which may be examined at a variety of levels and aims essentially at arousing the interest and curiosity of the children. Thirdly, some teachers regard environmental studies as a discipline. Hirst (1965) has drawn a distinction between "forms of knowledge" (or disciplines) and "fields of knowledge"; it is evident from his reasoning that environmental studies falls into the latter category, being "held together by its subject matter and drawing all forms of knowledge that can contribute to it." There is an inference in Hirst's writing that the "fields" are inferior to the "forms" and this may be the reason for some teachers wishing to elevate environmental study to the status of a discipline. However, it can be argued that if Hirst's criteria for a discipline are accepted - that is, that it should have a

logical structure, that it should employ distinctive expressions testable against experience and that it should have its own peculiar techniques and skills - then environmental education is not a discipline but a 'field' of knowledge. Finally, environmental education may be regarded as a source of stimuli, the environment is exploited "in all its richness for educational purposes." This approach is certainly a child-centred one, where the pupil's interests, capacities and backgrounds are all taken into account and sensitivity and awareness cultivated.

Nevertheless, despite these conflicting views, environmental education is most generally regarded as being an integrated approach to the curriculum, although this fact itself raises some important issues and objections. Watts (1969) and Marsden (1971) directly question the use of the word integrated, and King and Brownell (1966) offer severe criticism of integration and inter-disciplinary studies - defined as "direct attempts to achieve certain educational purposes by crossing, fusing, bridging or surpassing known disciplines." They discuss at length the virtues claimed for such studies, such as appropriateness, simplicity, usefulness, problem-solving

approaches, width of coverage, and modernism. They then make a critical response to each of the claims and, in doing so, present a case for preserving the integrity of individual disciplines of knowledge. They quote Tagliacozzo, who itemised the shortcomings of the combined studies approach by accusing the planners of such courses of

i) including too much organised information at the expense of structure

ii) choosing an arbitrary selection of topics to be taught

iii) introducing the topics without sense of order or sequence

iv) a lack of completeness

v) a lack of economy of teaching effort which results from the above.

A further interesting viewpoint is that at the primary stage, environmental education may be regarded as pre-disciplinary. Marsden (1971) holds this view, which is supported in New Thinking In School Geography (D.E.S., 1972) where it states that the number of primary schools

treating geography as a subject has diminished and

> "Instead, a generic term such as social studies or environmental studies embraces a range of learning which for most children, and quite properly, has not yet become differentiated into the distinctive areas and modes of knowing which are characterised by the traditional subjects."
> (D.E.S., 1972)

Despite these differing viewpoints, it became very apparent in the literature of the five years leading up to the establishment of the national curriculum that environmental studies may be regarded to a greater or lesser extent as an approach to inter-disciplinary or integrated enquiry. Certainly with children of a very young age, it is convenient to regard environmental studies, however broadly conceived and practised, as an approach to learning that can be separately identified. It is useful to reinforce the three categories of interpretation of environmental education, namely:

i) the environment as a medium for education - the use of real life situations as the basis for enquiry learning, particularly with younger children,

ii) the environment as a subject for investigation,

iii) education for conserving or improving the environment - the study of topical problems such as conservation, pollution, population, and the attempt to promote a sense of personal responsibility.

(U.K. Tbilisi papers, 1977)

As pupils become older there would seem to be a natural shift of emphasis towards the third of these interpretations.

Clearly, therefore, there is an ever increasing wealth of knowledge and written material concerning the philosophy and practice of the environmental studies approach to primary school teaching, which can only be a reflection of its total success and recognised value. The United Kingdom's government paper presented at the Tbilisi Conference (1977) concluded that:

> "What is beyond doubt is that environmental study and the enthusiasm and commitment it generates, has enhanced the quality of education in primary schools at large."
>
> (Page 5)

As long ago as 1931 the Primary School Report stressed that:

> "The curriculum is to be thought of in terms of activity and experience rather than of knowledge to be acquired and facts to be stored."

and since that time educationalists have increasingly realised just how important it is that children's learning should be based on practical experience rather than on rote learning and memorisation of facts. In order that sound and meaningful learning should take place, there must be ample opportunity for direct personal experience of the child's own environment. Such experiences should be planned by teachers with due regard given to the concepts, skills and attitudes they intend children to develop during the primary school years.

4.3. ENVIRONMENTAL EDUCATION AND THE NATIONAL CURRICULUM : THE WAY FORWARD.

Having achieved such obvious success and recognised value, the environmental education movement and all those concerned with promotion of this area of learning naturally greeted the Government's The National Curriculum 5-16 consultation document (1987) with great interest. Various key responses were made to this document by organisations concerned with environmental education, one of the most significant being that of the Council For Environmental Education (1987). This identified a number of positive elements in the National Curriculum, yet expressed sincere misgivings. It attempted to draw attention to the possible implications for environmental education of the Government's proposals, and for related and overlapping areas such as development and health education.

The consultation document itself does not include environmental education as a foundation subject. It does however state that :-

> "successive Secretaries of State have aimed to achieve agreement with their partners in the education service on policies for the school curriculum which will develop the potential of all pupils and equip them for the

responsibilities of citizenship and for the challenges of employment in tomorrow's world."

and

"The curriculum should equip pupils with the knowledge, skills and understanding that they need for adult life and employment."
(DES, 1987)

The response of the CEE pointed out that

"Understanding must relate to the issues that underlie what (pupils) learn, as well as to the processes and structures by which things function. Equally, understanding should be related to the interrelatedness among humans, their culture and biophysical surroundings and to the concept of using resources sustainably."
(CEE, 1987)

The latter part of this statement does of course quote directly the internationally accepted working definition of environmental education.

At the time of the publication of the consultation document it seemed that, from an environmental education point of view, the way forward in terms of interpreting the National Curriculum was to lay strong emphasis on a small number of statements which recognise

"relevance to and links with pupils' own experiences"
(Paragraph 8 iii)

which encourage pupils to

"become thinking and informed people"
(Paragraph 23)

and which refer to the development of personal qualities (Paragraphs 23 and 68). It has been argued (McLeish, 1987) that within these almost throw-away statements are the seeds of environmental education and global awareness. Probably the most important statement of the document, however, insofar as environmental education is concerned is as follows:

"In addition, there are a number of subjects on themes such as health education .... which can be taught through other subjects .... It is proposed that such subjects or themes should be taught through the foundation subjects."
(Paragraph 18)

This paragraph can be seen to have vital importance for those who seek to promote environmental education.

"Given the fact that nowhere does the document mention environmental education (or urban studies, or development education, or world studies for that matter), this paragraph must be the life-line to which many in the field will

cling."

(McLeish, 1987)

"In the absence of such inclusion (of environmental education), educators must be content with, and exploit, the reference to cross-curricular teaching that paragraph 18 implies"

(McLeish, 1987)

Quite clearly this interpretation and viewpoint strongly reinforces the important links between integrated and interdisciplinary learning through themes and environmental education. Subjects and themes are seen to have sound reciprocal benefits in terms of understanding and reinforcement. As discussed in section 4.2, this has always been regarded by many as a central feature of environmental education. The Government here recognises the principle that themes can enhance other subjects while being taught through them.

At this stage in the development of the National Curriculum, those committed to the development of environmental education and deeply believing in its importance remained optimistic that it might be promoted in the ways mentioned above, through close reference to paragraph 18 of the consultation document.

In 1988/89 however, events of great significance in the history of this area of learning transformed its status to that of an

officially recognised cross curricular theme of the National Curriculum. Naturally this news was greeted with tremendous enthusiasm by those promoting environmental education.

Without doubt, the recognition of environmental education within the National Curriculum must be set against a backcloth of increasing public and governmental concern for the environment. In November 1987, Norway's Prime Minister, Mrs Gro Harlem Bruntland, published her United Nations World Commission for the Environment report "Our Common Future" which argued for sustainable development in the world. Inevitably public education is needed to achieve this end. The Prime Minister of the United Kingdom, Mrs Margaret Thatcher, backed environmental initiatives in a speech to the Royal Society in September 1988 which was, in no small measure, the trigger for the publication of the DES document 'Environmental Education 5-16'. A most important motivation to the more positive attitude of the UK government to environmental education was the May 1988 meeting of the Council of the European Community when they agreed

> "on the need to take concrete steps for the promotion of environmental education .....throughout the Community"

and adopted a Resolution on Environmental Education to that end. The publication of the government's booklet in the Curriculum Matters series - Environmental Education from 5 to 16 (1989) was well timed to follow this resolution, clearly raising the status of the 'subject' at national level and being helpful to schools and Local Education Authorities in their consideration of how best to organise and implement a policy for this area of learning.

As far as the National Curriculum is concerned, the National Curriculum Council has the task of overseeing the deliberations and progress of individual subject working groups.

In August 1988 the Secretary of State reminded the National Curriculum Council of its responsibility for keeping the whole curriculum under review as well as the core and foundation subjects. Amongst other matters, the NCC was requested to examine the nature of cross curricular issues. In particular, the theme of Personal and Social Education (PSE) was to be studied with emphasis on health education and other related cross-curricular areas. The Interim Whole Curriculum Committee (IWCC) of the National Curriculum Council set about the major task of examining how far cross-curricular issues could be

reflected in the Attainment Targets of the core and foundation subjects. The IWCC was requested to produce a report on cross-curricular issues, then to examine these in relation to the four key stages of learning identified within the National Curriculum and finally to set these within a coherent framework for the curriculum as a whole. The accepted definition of cross-curricular issues in the context of National Curriculum development is

> "aspects of learning and teaching that permeate almost all elements within the school curriculum whether they be formal or informal"

The IWCC identified three "areas" of cross-curricular issues, namely i) dimensions, for example, multi-cultural education, personal and social education ii) skills and competencies, for example, oracy, numeracy, study skills and iii) themes, for example, environmental education and health education.

The basic curriculum entitlement for every child identified by the IWCC is the National Curriculum plus Religious Education, with the National Curriculum consisting of three core and seven foundation subjects plus the teaching of cross-curricular issues. The latter must have progression and continuity like all core and

foundation subjects. In other words, cross-curricular themes are not an appendage but should be seen as central to the curriculum as a whole.

Within this framework, Personal and Social Education was one of the key areas singled out by the Secretary of State for close examination by the IWCC. From the overarching title of PSE, some major themes were identified for initial exploration, these being

i) Health Education

ii) Environmental Education

iii) Education For Citizenship

iv) Careers and Guidance

v) Economic and Industrial Understanding.

It is clear that schools are intended to regard these cross-curricular themes as part of the entitlement of children that goes beyond the core and foundation subjects.

Following on from the identification of the five themes within the PSE umbrella, the IWCC then established (1989) five task groups, one to examine each of the five themes. These groups were briefed to report back to the IWCC, having "mapped" their theme, identified outcome/entitlement for children aged 5-16 and shown how progression in the teaching and learning of the theme might be achieved throughout the four

key stages. A matrix was to be produced for each theme, identifying with the Programmes of Study and Attainment Targets of the core and foundation subjects.

The present author was invited to become a member of the NCC working group on the theme of Environmental Education and, whilst it is not possible to disclose the precise content of the interim report sent to the Secretary of State (IWCC, 1989) or of the final papers prepared by this group, it is nevertheless interesting to consider in general terms the group's agenda from January until June 1989. The task of the group members was:

> "to produce advice on the nature and scope of Environmental Education and how this subject area might be delivered through the core and foundation subjects of the National Curriculum."
> (NCC, 1989)

Key papers written during the course of the group's deliberations include

a)Suggested Broad Outline Structure for the Entitlement of Children of 5-16 Years in Environmental Education Within The National Curriculum.

b)Environmental Education As A Cross-Curricular Component of The National Curriculum : Towards A Rationale.

c)Proposal For The Entitlement of All Pupils of 5-16 in Environmental Education: A Contribution To The Whole Curriculum of Pupils Within The National Curriculum.

d)Knowledge and Understanding In Relation To The Environment (suggested outline for the Entitlement for children of 5-16 years).

e)The Development of Skills (with Draft Skills Analysis Matrix).

The broad structure suggested for providing an environmental education dimension in the National Curriculum recognises and is based on certain considerations - firstly that the curriculum can be understood to consist of two mutually dependent components. These can be thought of in terms of a two dimensional model. This model may be visualised as being made up of vertical divisions, which correspond to the core and foundation subjects, and a series of horizontal divisions which are the cross-

curricular themes identified for the National Curriculum. With the aid of this model the horizontal cross-curricular themes may be imagined as interwoven across the vertical core and foundation subjects, relating substantially to the same material within the attainment targets developed.

Secondly, the terms profile components and attainment targets are reserved for use in the context of the core and foundation subjects only. No new profile components or attainment targets have been suggested for environmental education (or indeed any other cross-curricular theme).

Thirdly, the structure suggested for environmental education as a cross-curricular theme, may, if thought appropriate, be capable of generalisation and adaption so that it can be applied (with minor modification of wording) to all of the other cross-curricular themes. In this way, some degree of correspondence and similarity may be given to all cross-curricular themes.

Finally, it was agreed that emphasis should be given to knowledge and understanding as well as skills. Although the encouragement of pupils to form their own well thought-out attitudes is obviously very important, this is not considered to be a separate activity unrelated to knowledge,

understanding and skills.

The Suggested Structure is based on two broad areas which relate to the core and foundation subjects. Each of the two broad areas is further divided into three sub-sections as follows:

1. Knowledge and Understanding

a) Knowledge about the environment at a variety of levels, ranging from local to global.

b) Knowledge and understanding of environmental issues at a variety of levels, ranging from local to global; to include understanding of the different influences, both natural and human, on the issues.

c) Knowledge of a range of attitudes and approaches to environmental issues and the value systems underlying such attitudes and approaches.

2. Skills

a) Finding out about the environment, either directly through the environment or by using secondary sources.

b) Communicating:

i) Knowledge about the environment.

ii) Both the pupils' own and a range of alternative attitudes to environmental

education issues, to include justification for the attitudes or approaches advanced.

c) Participation

i) As part of group decision making.

ii) As part of making a personal response.

In its deliberations on the scope and purpose of environmental education, the task group was assisted by Curriculum Matters No 13 (DES, 1989) and other documents.

> "from an early age children are curious about the people, animals, plants and materials around them. They learn about their environment through their own first-hand experience, from their parents, through the media and from a variety of other sources. Schools have a role in helping their pupils make sense of these experiences and in developing their knowledge and understanding of the physical and human processes which interact to shape the environment. Schools can also help to foster a reasoned and sensitive concern for the quality of the environment and for the management of the earth's resources. These are, of course, matters of increasing social concern."
> (DES, 1989)

Reflecting and reinforcing the dimensions outlined in section 4.1, the task group's rationale sees environmental education consisting of three distinct but related types of activity:-

i) Education about the environment, with the purpose of developing knowledge and understanding

about values and attitudes.

ii) Education in or through the environment in which the environment is used as a familiar and relevant resource for educational purposes. In this way a good deal of the knowledge and understanding as well as the skills required by the National Curriculum will be developed by pupils.

iii) Education for the environment, in which pupils explore their personal response to and relationship with the environment and environmental issues. This includes the elements of human understanding and behaviour necessary for the development of sustainable and caring use of the environment, now and in the future.

Further analysis of the scope and purpose of environmental education and related teaching approaches envisaged by the IWCC is highly relevant to this thesis - which to a large extent is concerned with the 'integration' debate and how environmental starting points are, or should be, followed up in primary school classrooms. It is the view of the working groups that separate subject areas contribute to environmental education and, in a reciprocating way, environmental education contributes to the subject

areas.

> "consequently it is not expected that environmental education should appear as a subject on the school timetable."
> (unpublished IWCC task group paper, 1989)

However, the understanding of the processes and issues which this 'subject' seeks to promote should not be left to chance or to individual initiative and should properly constitute part of the planned curriculum.

It is considered essential that an entitlement for all children in environmental education is formulated and then matched to the core and foundation subjects. This can be achieved with reference to agreed core subject material. Much of the content can be delivered through the Attainment Targets of the subject areas within an overarching and cross-referenced structure. The importance of relating environmental education to other cross-curricular themes as well as to the core and foundation subjects must not be overlooked. In this way it is possible to adopt an integrated approach which allows for a coherent programme of personal and social education within the curriculum. No single acceptable teaching methodology for environmental

education is recommended. Indeed, it is considered that a variety of approaches should be utilised. However, task-based learning derived from children's spontaneous and direct experiences and investigations of their surroundings should be encouraged, rather than merely "presenting them" with information. One matter which cannot be overemphasised is that co-ordination of the curriculum within each school, with carefully structured policies, will be essential if environmental education is to be properly delivered across the curriculum.

Another essential issue is that of progression. This must be achieved through planned programmes of study which are devised to allow for the fact that environmental education will be included in the core and foundation subjects and other curriculum areas. It is necessary to identify and construct levels of achievement for the relevant knowledge and understanding so that pupils at the four main reporting stages can demonstrate the appropriate assessment objectives. It is recognised that skills progression may not follow a similar sequential pattern of development as knowledge and understanding; however, it is also important to include skills progression in the construction of

programmes of work. It is essential that progression is achieved through planned programmes of study, which should be devised to allow for the fact that environmental education will be a component within a broad range of curriculum subjects while also being one of a number of inter-related cross-curricular areas.

As far as assessment is concerned, the specification of statutory Attainment Targets as the basis for pupil assessment is a matter for the Secretary of State, advised by the subject working groups and the NCC. The report of the task group for environmental education clearly states that in formulating or reviewing Attainment Targets, working groups and the NCC should have regard to the following objectives for environmental education:

i) Knowledge and understanding; to include knowledge and understanding of alternative attitudes and approaches to environmental issues and the value systems underlying them.

ii) Skills and abilities; to include the ability to receive ideas about issues and to communicate views and attitudes to others.

Objectives for assessment should focus on the quality of decision making about environmental issues and include evidence of broad and critical understanding of the variety of interacting elements that constitute such issues. They should also make reference to evidence of critical understanding of and tolerance of different attitudes to issues. Pupil records should be maintained which provide a profile of experiences and attainments. Close reference should be made to recommendations outlined in the report of the Task Group on Assessment and Testing (TGAT report). However,

> "Perhaps in some cases innovatory methods of assessment will be developed appropriate to such aspects of Environmental Education as awareness skills, or the formation of values and attitudes and these used in conjunction with more established approaches."
> (unpublished IWCC task group paper, 1989)

There can be no doubt that environmental education is to be a planned element of the National Curriculum for schools. Set against the backcloth of the resolution of the Council of Ministers of the European Community, it seems certain that as a matter of priority it will be promoted within all schools of the Community.

Within the context of this thesis, the above background to the theory and delivery of environmental education in schools is highly relevant to the organisational framework for the empirical investigation. Within the National Curriculum, environmental education will be viewed as a vehicle through which a co-ordinated and cross-curricular approach can be negotiated. This is indeed the policy adopted by the Centres for Environmental Education (Chapter 5) which are the subject of the empirical investigation as outlined in Chapter 6. The pupils concerned in this investigation are involved in a situation whereby their curriculum takes full account of the definition, aims and objectives of environmental education which have been developed and formulated over a number of years and which have guided the national task group in its deliberations. It is a situation which has been developed as a result of the influence of environmental education centres whose standpoint and philosophy is that where appropriate, children should be educated from the natural environment, based on first-hand experiences. It is firmly believed by the present author that such an approach can enhance academic attainment, and also lead to the development of creative potential, especially when such work is

developed in an integrated and cross-disciplinary manner. Whilst this might be believed, it is also hoped that the outcome and conclusions of the present investigation may go some way towards informing and improving the delivery of cross-curricular work within the National Curriculum framework. Thus attention is now turned to the organisational framework for an empirical investigation into these matters.

Chapter 5 will give an account of the Environmental Studies Centres of the City of Birmingham Local Education Authority, their background and role. It is considered relevant to provide this account for various reasons. First, the work of the six research schools is based on a series of regular visits to one of the centres. This provides a common basis for the development of classroom work. It is not considered ethical to single out and name the particular centre involved. Second, it will no doubt be of general interest to any reader who may be concerned with how environmental education may be promoted, to learn how one particular local authority maintains and organises its central provision. Finally, bearing in mind that a stated

aim of this thesis is to provide material that may be utilised for changing and improving existing educational practice, it is intended that one outcome will be a report to the local authority concerned on data obtained, and perhaps in-service courses, suggesting ways in which teachers may be encouraged to use and develop starting points derived from centre visits in order that children may gain maximum benefit - particularly with regard to the development of their creative thinking potential. Once again, this is a continuation of an existing study by the present author (Palmer and Sands 1987) which makes recommendations for the future use of the Birmingham day centres.

CHAPTER 5

FRAMEWORK FOR EMPIRICAL INVESTIGATION

CHAPTER 5

5.1 The Environmental Studies Centres of The The City of Birmingham - Background and Role

5.2 The Ten Environmental Studies Day Centres

5.3 Evaluation of the Centres' Role

5.1 THE ENVIRONMENTAL STUDIES CENTRES OF THE CITY OF BIRMINGHAM - BACKGROUND AND ROLE.

The empirical investigation outlined within this thesis focuses on the use of one of ten Local Authority Day Study Centres maintained by the City of Birmingham Education Department. It is therefore relevant to describe, albeit briefly, the background and work of these establishments. The ten centres for Environmental Education (detailed in 5.2) undoubtedly have a tremendously significant impact and influence upon the nature and development of environmental education in primary schools of the City of Birmingham. They arose out of the City Education Department's beliefs a) that environmental education is an essential and basic component of the 5-16 curriculum, b) that every school should have and implement a structured policy for environmental education, and c) that organised LEA centres are vitally important insofar as they can assist in the fundamental task of devising and implementing each school's policy for the teaching and learning of environmental education, and can collectively provide opportunities for and a variety of essential first hand experiences of the environment that an individual school cannot

provide.

These fundamental beliefs have been sustained throughout the past decade by a number of influential documents and statements deriving from the Department of Education and Science and national organisations. A research paper analysing the background to the development of the centres as well as their present day role and function (Palmer and Sands, 1987) identifies various statements that have clearly influenced City policy, for example:-

The Report of the Committee on the Curriculum and Organisation of Secondary Schools (ILEA - Hargreaves Report, 1984) states quite clearly the need for new and more systematic study and exploration of a child's environment, recommends that "greater emphasis be placed upon field studies" and articulates the fact that "first hand experiences" of environmental study outside the classroom are so much more meaningful than the "indirect and inevitably somewhat artificial nature of the resources that characterise much classroom learning."

The aims and work of the City's Study Centres also reflect the underlying themes of environmental education as documented by the Council for Environmental Education and the

National Association For Environmental Education, which are to enable young people to:

a) gain knowledge of, enjoy and appreciate the environment

b) understand the relationships within and between their local and global surroundings

c) appreciate how much they depend upon and benefit from the resources provided by the environment, and understand the actual and potential dangers from not using these resources wisely

d) gain an understanding of the political , social and other structures and processes which affect our environment

e) develop skills with which to study the environment; to recognise environmental issues when they occur and to undertake relevant action in response to them

f) develop and show concern for the quality of the local environment and empathy for other more distant environments and the lives of people living there

g) make reasoned judgements between alternative ways of using the environment, and make informed decisions about issues which affect their own, and others' lives

h) explore values and determine attitudes towards environmental issues

i) play a greater part in improving the environment for the benefit of all.

The question : What is basic in education ? underlies the Centres' role. Research indicates (Palmer and Sands, 1987) that City policy is founded on the belief that

> "surely the ability to appreciate, to interpret, to enjoy and to understand his/her own immediate environment is one of the basic and important needs of every child entering into and progressing through our formal education services. Anything that helps pupils develop a response to this basic need and to acquire knowledge, concepts, skills and attitudes, leading to the fulfilment of the objectives (a-i) as set out above may be termed environmental education."

Environmental education is seen, therefore, as being basic to every child's educational needs. Every school, therefore, has both need and duty to establish and operate a policy statement relating to the teaching and learning of environmental education. Such a policy statement should consider the individual needs of all pupils within the school, strategies and resources for teaching and learning, and methods of study, assessment and

evaluation. The policy statement, however, must not be regarded as an end in itself. Indeed, HMI reports on the inspection of individual educational establishments frequently refer to vast files ..... the existence of statements of policy, aims, objectives and methodology. The successful implementation of such statements seems more rarely documented. In a consideration of this process of implementation,

> "It would seem that the most important factors affecting the value of any school's policy statement are the people themselves who have worked towards the production of it and the Head Teacher who enthusiastically and skilfully works on its implementation, using any help and resources that are available."
>
> (Palmer and Sands, 1987)

In the City of Birmingham it is evident that the advisory staff/Heads of Day Study Centres for Environmental Education have a key role to play in this process of helping to devise and implement successfully the required policy statement for individual schools.

In order to fulfil the basic curriculum needs of pupils and the general aims and objectives of a school policy statement for environmental education, a minimum range of specific experiences is essential for every child.

The Day Centres and their staff aim to provide this range of experiences, which include:

- working in a variety of environments and habitats, both urban and rural,
- opportunities for the study of the built environment, industry and economic affairs,
- opportunities for the study of landforms, water, soils and minerals in differing locations,
- opportunities for the study of plants and animals in a variety of habitats and ecosystems,
- opportunities for the study and understanding of people in their own environment, in areas that are familiar and unfamiliar, leading to a) an understanding of the interdependence of individuals, groups and nations, b) an understanding of the role and importance of social organisation, and c) a developing attitude of tolerance towards other people in our world who may hold differing values, faiths and beliefs from our own,
- opportunities for the study of key concepts such as energy and location,
- opportunities for the consideration of the earth as a planet, its place in the solar system and the fact that Earth is made up of a finite collection of resources which must be conserved and 'managed'

in order that the variety and quality of life on our planet may continue.

The provision of a sufficient range of resources and experiences necessary to enable pupils to have these opportunities is clearly no small task. Rather it is a highly complex and demanding task, and one which is rarely possible within the fabric and immediate surroundings of a single school. For example, an inner city school with no trees, gardens or grassland areas would find it impossible to give pupils effective first hand experience of plant families or farm animals. An outer city school bordering on to fields or housing estates would find it equally impossible to do effective urban streetwork and studies of small industries, architecture and the built environment.

The Local Education Authority Environmental Day Centres are a vital component of the City of Birmingham's provision of resources for first hand study of the environment. One of their great strengths must be the fact that they provide both opportunity for and variety of first hand experiences that individual schools cannot provide.

In summary, therefore, it can be concluded that the LEA Centres are vitally important insofar as they

i) can assist in the fundamental task of devising and implementing each school's policy for the teaching and learning of environmental education

ii) can collectively provide opportunities for and a variety of essential first hand experiences of the environment (both natural and built) that an individual school cannot provide.

5.2 THE TEN ENVIRONMENTAL STUDIES DAY CENTRES

1. BIRMINGHAM BOTANICAL GARDENS BASE

Staffing: One Head of Centre/Advisory Teacher.

Facilities: The centre building includes classroom provision. The Centre has use of all the resources of the City's Botanical Gardens, including the private nursery greenhouses and a nature reserve. There are seventeen acres of south-facing slopes with a number of gardens, trees and herbaceous plants from all over the world. The unique teaching area, available to all visiting children, is the linked series of

glasshouses where plants of tropical, hot deserts and cool temperate climates can be examined.

Finance: The Gardens are maintained by the Birmingham Botanical and Horticultural Society, whilst Birmingham Education Department pay the Centre Head and provide the educational materials through a capitation allowance.

Availability and Booking: The Centre is available to all Birmingham LEA schools and Colleges and bookings can be made directly through the Head of Centre.

Use of the Centre: Each academic year, approximately 6,000 pupils visit the Centre

2. BIRMINGHAM MUSEUMS AND ART GALLERY (SCHOOLS LIAISON DEPARTMENT)

Staffing: 1 Head of Schools Liaison
1 Deputy Head
6 Teachers
1 Administrative Assistant

Facilities: The Schools Liaison Department operates on six sites:

Museum and Art Gallery, Birmingham City Centre

Aston Hall

Blakesley Hall, Yardley

Museum of Science and Industry

Nature Centre, Edgbaston

Sarehole Mill, Hall Green

Museum and Art Gallery : Apart from the extensive Art Galleries, the wealth of resources include permanent displays on a wide range of topics including ceramics, costume, fossils, rocks and minerals, zoology, birds, ancient Egypt and local history.

Aston Hall : This seventeenth century house has been restored and furnished to give an impression of its appearance in the 1760's. (The house is closed from January to mid-February each year).

Blakesley Hall : This is a fine example of a timber-framed farmhouse built in the sixteenth century by a wealthy yeoman farmer. Blakesley Hall has ten rooms furnished as they were in 1684. There are also displays on timber-framed buildings, interior fittings and the famous Temple Balsall pottery collection.

Museum of Science and Industry : This museum, founded in 1950, contains stationary steam, gas and hot-air engines, machine tools and a wide

variety of engineering products. Many of the exhibits are working daily. The locomotive 'City of Birmingham' is on display and moved hydraulically every hour. There is an arms collection and a large number of veteran cars and motorcycles, together with Birmingham's sole remaining tramcar and various aeroplanes. There are working demonstrations of scientific, electrical and electronic apparatus and replica workshops, and much more besides.

Nature Centre : The Centre maintains a collection representative of British and European wildlife in naturalistic settings. The wide variety of animals on display are housed in both indoor and outdoor enclosures. The Centre has six acres of grounds including paddocks, fish ponds, streams and rock outcrops. A project room is available to schools by prior arrangement.

Sarehole Mill : This is the last surviving water mill in Birmingham. There has been a mill at Sarehole since the sixteenth century, though the present buildings date from the 1760's. The mill has been restored to working condition and is open as a branch museum. All the milling machinery is visible. The granary building houses an agricultural gallery. In addition, there is a replica of a cooper's workshop and an exhibition

of items relating to Hall Green and J R R Tolkien.

Finance : While the sites and exhibits outlined above are funded through the Museum Service, the staffing costs are shared with the Birmingham Education Department, viz:

Education Department Funding:

1 Head of Schools Liaison

2 Schools Liaison Teachers

1 Administrative Assistant

Museum Service Funding:

1 Deputy Head of Schools Liaison

4 Schools Liaison Teachers

1 Administrative Assistant

The Museum Service funds all day-to-day administrative costs at the six centres. The Birmingham Education Department funds other educational costs through a capitation allowance.

Availability and Booking : The Centres are available to all Birmingham schools.

Use of the Centre : In one academic year, some 75,000 pupils visited the Museum Service establishments.

3. BLACKWELL ENVIRONMENTAL STUDIES CENTRE

Staffing : 1 Head of Centre/Advisory Teacher

Facilities: The Centre is located on the Cropwood Estate, of which some 35 acres are available for environmental studies, including considerable areas of woodland, some pasture-land and a large open space on nearby Hunter's Hill. A network of footpaths enables access to a variety of habitats and allows study of farming, market gardening and crops. The Centre is fully equipped for environmental studies for children of primary/middle school age and includes a large work-room, an exhibition room, a kitchen and toilet facilities. The Centre carries a large stock of resources and operates an extensive loan service to schools.

Finance : The Centre is entirely financed by the City of Birmingham Education Department.

Availability and Booking : The Centre is available to all Birmingham primary/middle schools. The Centre operates a programme allowing the same school to visit the Centre twice in each school term during the year that the school is on the programme. While only one class from a school is involved, the whole of the school staff is involved to a greater or a lesser extent in the

Blackwell programme. Schools considered to need the Blackwell experience have always been identified by local inspectors/advisers. Transport is provided free to the schools by Birmingham Education Department.

Use of the Centre : During a recent academic year, the number of pupil days spent at the Centre was 2,905 and the number of teacher days was 293.

4. CHAPMAN'S HILL SCHOOL FARM

Staffing : 1 Head of Centre/Advisory Teacher

Facilities : Chapman's Hill is a working farm owned by the Worgan Trust. The farm maintains a herd of dairy cows, sheep, pigs and hens. There is a milking parlour and all the equipment associated with a working farm, together with a classroom block equipped for instruction on the theme 'Farms for Food'.

Finance : The farm and classroom block is maintained by the Worgan Trust, whilst the Birmingham Education Department provide the Head of Centre and the educational materials.

Availability and Booking : The Centre is available to all Birmingham junior/middle schools. Bookings are made through the Social Education section of

Birmingham Education Department. Transport is provided free to schools by the Birmingham Education Department.

Use of the Centre : The Centre caters for 4,000 junior/middle school pupils each year. Every junior/middle school in Birmingham, apart from five or six which do not apply, visits the Centre once in any two year period.

5. HAMS HALL ENVIRONMENTAL STUDIES CENTRE

Staffing : 1 Head of Centre/Advisory Teacher

Facilities : The Centre is located within the Central Electricity Generating Board Hams Hall Power Station Site. The main resources of the Centre include three areas of mixed deciduous woodland, about 20 acres in all, a walled garden, a 17th century cottage and a Centre building affording two classrooms, offices and toilet facilities. In addition, St John's Church immediately adjacent to the Centre is available for study and contains much of interest relating to the Adderley family, the former owners of the site. The River Tame forms the eastern boundary of the centre site. The power station complex provides an opportunity to consider energy

supplies and the environmental implications of industrial developments. While the main theme of studies at the Centre is in the area of natural history and woodland ecology/management, it is equally possible to pursue studies in the areas of building and architecture, local history, drawing and painting, number work and language development.

Finance : The Centre is a joint venture between the CEGB and the three local authorities of Birmingham, Solihull and Warwickshire. The CEGB provide and maintain the Centre sites and buildings and pay all heating and lighting costs, while the three authorities each contribute one third to the cost of staffing and educational expenditure. Birmingham Education Department undertakes the educational administration and bears the cost thereof.

Availability and Booking : The Centre is available to all schools within the areas of the three participating authorities. Bookings are made directly with the Head of Centre and a suitable programme of work arranged, in advance, with the individual school. Birmingham schools have free transport provided by Birmingham Education Department.

Use of the Centre: The Centre is visited by approximately 5,000 children each academic year.

6. MARTINEAU ENVIRONMENTAL STUDIES CENTRE

Staffing : 1 Head of Centre/Advisory Teacher
1 Assistant Teacher
1 Classroom Assistant
1 Head Gardener/Lecturer/Demonstrator
2 Craftsmen/Groundsmen

Facilities : The Centre comprises a classroom and toilet facilities surrounded by about 9 acres of land within which are demonstration gardens, a nature reserve, a pond, woodland, three greenhouses, an animal unit, a poultry unit and facilities for studying bee-keeping, weather, outdoor birds and conservation.

Finance : The Centre is entirely supported by Birmingham Education Department.

Availability and Booking : The Centre is available to all junior and middle schools in Birmingham, though particular consideration is given to schools in urban surroundings and to schools with social/economic/language problems. Schools accepted are taken on to the scheme whereby one class per school visits the Centre on one half day

every three weeks throughout a school year. While only one class is involved in visits, the entire school staff are made aware of the programme and ideas are fed into the school curriculum. Transport for pupils is provided free by Birmingham Education Department.

Use of the Centre : The Centre is in use for 840 child days per annum, and there are also collective meetings with heads of schools, as well as meetings with class teachers and individual sessions with teachers.

7. MONEY LANE SCHOOL FARM

Staffing : 1 Head of Centre/Advisory Teacher

Facilities : The Centre comprises a purpose-built classroom with toilet and washing facilities, and a farm-yard with cows, calves, bullocks, pigs, sheep, ducks and hens. There is also a short nature walk along an old hedged lane. The Centre allows nursery and infant children the opportunity to have direct contact with farm animals and the farming environment.

Finance : The farm is owned and maintained by the Worgan Trust, and is farmed as part of the Chapman' Hill Farm. The staffing and educational

activities are funded by Birmingham Education Department.

Availability and Booking : The Centre is available to Birmingham nursery and infant/first schools, to special schools and to special units in other schools, on the basis of half day visits at the rate of one per class per school per year. Free transport is provided by Birmingham Education Department.

Use of the Centre : The Centre is visited by 252 school groups (approximately 8,000 children) each year.

8. SPRINGFIELD ENVIRONMENTAL STUDIES CENTRE

Staffing : 1 Head of Centre/Advisory Teacher
1 General Assistant (provided by Community Task Undertakings)

Facilities : This Centre has been developed to meet the special needs of physically disadvantaged and sensory deprived pupils. The Centre includes an architect-designed building with a fully-equipped classroom and toilet facilities. There is an eight acre reserve of woodland, meadow and fresh-water habitats adjacent to farm land. A listening trail has been developed for this

Centre.

Finance : The Centre building was provided by the Variety Club, who also make substantial donations towards specific items such as a mini-bus. Birmingham Education Department fund the Head of Centre and pay for educational materials.

Availability and Booking : The Centre is available for special schools for handicapped children and to children being educated in special units at other schools: the emphasis is upon physically handicapped children from 4-18 years.

Use of the Centre : During the year an average of 1,400 children and 210 teachers visit the Centre.

9. THE STABLES CENTRE

Staffing : 1 Head of Centre/Advisory Teacher

Facilities : This Centre provides opportunities for both day and residential visits. The Centre building is an adapted coach-house and stables, and provides a teaching block together with kitchen and toilet facilities. The Centre carries substantial stocks of camping equipment, and camp sites are available adjacent to the Centre. Outside the main camping season there is residential provision for small groups at the

centre building. Provision is made for day visits throughout the year.

Finance : All costs are borne by Birmingham Education Department.

Availability and Booking : The Centre is available to junior/middle schools and to special schools and units within the Birmingham LEA. Arrangements are made for day visits, and for one to five nights residential/camping visits.

Use of the Centre : The Centre annually deals with approximately 1,200 pupils making day visits, whilst approximately 1,000 pupils undertake residential visits every year.

10 THE URBAN BASE AND RESOURCES CENTRE

Staffing : 1 Head of Centre/Advisory Teacher

Facilities : The Head of Centre contributes mainly to the Humanities and Streetwork aspects of environmental studies, providing support and advice concerning curriculum development, national and city based project groups, and also linking teachers and City advisers. The Base houses a resource centre which carries a wide variety of literature and equipment including video, micro-software and field work equipment, much of which

is available for loan to schools.

Finance : All costs are borne by Birmingham Education Department.

Use of the Centre : Children do not visit the Centre. Figures for use are not available.

5.3 EVALUATION OF THE CENTRES' ROLE

In a recent research study aimed at investigating the role and value of the Environmental Study Centres (Palmer and Sands, 1987), interviews were conducted with Head Teachers and teachers who are users of the Centres, and questionnaires were circulated to all schools in the city. An analysis of the data obtained leads to the following conclusions, which were most forcefully made by many schools :-

i) The Environmental Studies Day Centres are essential to, and one of the most valuable aspects of, the City's education service.

ii) Provision should be expanded rather than reduced. Schools of the city would like more Centres and more child visits.

iii) There is overwhelming evidence to suggest that whilst schools would greatly appreciate and benefit from more visits to schools by Heads of Centres acting in an advisory capacity, this must NOT be done at the expense of child visits to Centres. Only a visit to the Centre can provide opportunities and experiences that an individual school cannot provide on its own site.

iv) Ideal expansion would involve increased staffing at the Centres, allowing for continuation of child visits and further emphasis being placed on Centre staff making school visits, working with children in their school environments and contributing to the professional development of teachers.

v) The greatest value of the Centres is their child-centred approach. Centre visits are valued for child-centred education, for the teacher's professional benefit and for the benefit of curriculum development in the school as a whole. Replies suggested that all of these are important - with tremendous emphasis being placed on the need for child-centred visits.

This final statement is of particular relevance to the empirical investigation documented within this thesis. An inevitable outcome of the current research is a closer analysis of the way in which centre-based work is followed up in the school classrooms, leading to a greater depth of understanding of the ways in which use of a centre can contribute to curriculum development in a school, to the over-all education and development of individual children, and more specifically, to the development of children's creative thinking potential.

CHAPTER 6

EMPIRICAL INVESTIGATION

CHAPTER 6

6.1 Aims

6.2 Selection of Schools and Classes For Research Sample

6.3 Training and Role of Research Assistant

6.4 Procedure/ Experimental Design, Data and Results

6.5 Connoisseurship and Criticism : Qualitative Evaluations

6.1 Aims

In a small-scale study undertaken during the academic year 1979-1980 (Palmer, 1981) the present author investigated the contribution of a totally integrated environmental studies curriculum to the development of creativity in primary school children. Only two classes were involved in this relatively minor research, but the conclusions were fascinating and raised numerous unanswered questions and issues. It was demonstrated that significantly higher scores on several tests of academic and creative achievement were attained by children who had followed an integrated curriculum. Data derived for the purposes of this study were entirely quantitative, and were subjected to statistical analysis. In addition no attempt was made to explain or illuminate the reasons for the findings.

It is a purpose of the present investigation to implement a far more complex research design aimed at illuminating some of the inter-relationships that may exist amongst teaching styles, curriculum organisation, first hand experiences of our world and the development of divergent thinking abilities. A second purpose of equal importance is to implement the methodology of qualitative evaluation of classrooms known as

Connoisseurship and Criticism in order to demonstrate that this is a valid, useful and insightful methodology that can be successfully applied alongside more traditional research designs.

The basic design detailed below is that of a traditional experiment. The reader will note that a sample of children is placed in an experimental setting. The children are pre-tested and statistical analysis is used to ascertain whether there is any difference between pre- and post-treatment scores. Research hypotheses are supported. Conclusions are drawn.

Within and alongside this traditional quantitative methodology, however, is interwoven the qualitative approach to understanding classroom life. The researcher and research assistant take on the role of educational connoisseurs. Criticisms are written to try to illuminate the complex processes and inter-relationships occurring within the classrooms of the sample schools. Results are a vivid portrayal of the complexities of classroom life. Alongside the written words, the reader's attention is drawn to the accompanying video tape. This provides essential data necessary for analysing the classrooms and writing the final criticisms, and

also serves the purpose of providing any reader with a source of referential adequacy when analysing the accounts.

There follow details of the formal empirical investigation into the effects of teaching methods on the development of divergent thinking in primary school children - including both quantitative and qualitative dimensions.

6.2 Selection of Schools/Classes For Research Sample

Six classes of children were selected for the empirical investigation, one in each of six different primary schools in the large, urban City of Birmingham Education Authority. A detailed selection process took place with the aim of establishing a sample of six well-matched primary schools. As many variables as possible were controlled within the sample. To aid the selection process, advice was sought from Local Education Authority Officers, from Advisers, Advisory Teachers and Head Teachers.

The Head Teacher of each school selected for a short list was interviewed by the present author as researcher and by the Research Assistant. Schools were selected on the basis of their location, size, ethnic make-up and over-all approach to curriculum and classroom organisation. The aim was to establish a sample of three pairs of schools, matched for location, size and ethnic make-up, which could then be sub-divided into two groups of three schools, namely an experimental group and a control group, the latter division being dependent on the schools' approach to curriculum and classroom organisation.

As a result of interviews and advice sought, two groups of three schools were eventually established and permission granted by the Chief Education Officer and Head Teacher of each school for research for the purpose of this thesis to take place. Table 1 overleaf summarises the controlled variables for each school. It can be seen that the experimental group and the control group both comprise three schools. One of the three schools in each group is a medium-sized primary school (around four hundred children) attended by a school population of some 95% ethnic minority children (Asian and Afro-Caribbean backgrounds). The second of the three schools in each group is a smaller primary school (around three hundred children) attended by a school population of 80% white children, generally from very poor socio-economic backgrounds. Finally, the third school in each group is a very large primary school (around seven hundred children) attended by a school population of approximately 90% Asian background children. All six schools are located in the inner city area of Birmingham.

TABLE 1:

SAMPLE OF SIX INNER CITY SCHOOLS - BIRMINGHAM L.E.A.

		Location	Number On Roll	Ethnic Background of School	Age of Children In Sam
PAIR 1	SCHOOL E1	Inner City	400	93% Asian & Afro-Caribbean	2nd Year Junior
	SCHOOL C1	Inner City	400	98% Asian & Afro-Caribbean	2nd Year Junior
PAIR 2	SCHOOL E2	Inner City	320	80% Caucasian	4th Year Junior
	SCHOOL C2	Inner City	300	80% Caucasian	4th Year Junior
PAIR 3	SCHOOL E3	Inner City	680	90% Asian	3/4th Year Junior
	SCHOOL C3	Inner City	700	85% Asian	3/4th Year Junior

Thus the variables of school size, location and geographical background were controlled as far as possible to give two parallel groups of schools for experimental purposes. Before entering into a discussion concerning the differences between the two groups, it should be noted that a fourth key variable was also controlled, this being the age of children in the class selected for research purposes within each school (see Table 1). In one pair of schools, the classes were of second year junior age children; in the second pair of schools, the classes were of fourth year junior age children, and in the third pair of schools the classes were of mixed third and fourth year junior age. Thus the over-all sample of children in the two groups was controlled as far as possible in terms of chronological age.

Finally, it must be stressed that all six schools were to be on the programme of the same L.E.A. Environmental Studies Day Centre (one of the ten documented in Chapter 5) throughout the academic year during which this research was scheduled to take place. This is a key factor of the investigation. All six schools were to receive the same number of visits to the same centre. In each case these visits would be on a regular and progressive basis throughout the

academic year. The content and quality of field teaching was therefore successfully controlled. This would be delivered by the Head of the Centre at all times. Only the approach to, organisation and content of follow-up work in the classroom would differ from school to school.

The key difference between the two groups of schools was the stated and perceived approach to curriculum and classroom organisation. In more particular and precise terms relevant to this investigation, this means the way in which each school claimed to approach and organise the teaching and learning environments to follow up and build upon the first hand scientific and environmental experiences derived from visits to the Local Education Authority Centre. As stated above, the field delivery and range of first hand experiences was controlled throughout the sample. The approach to in-school follow-up work was the key independent variable of the investigation.

As a result of interviews with Head Teachers, Advisers, LEA officers and others with knowledge of Birmingham's inner city schools, it was possible to select the three control group schools, each demonstrating a tendency towards direct instruction and a formal, timetabled curriculum and the three experimental group

schools each demonstrating a tendency towards integration of learning and informality with regard to organisation and timetabling. Obviously it was essential to establish criteria for analysing the outcome of the many interviews and discussions aimed at selecting and classifying schools. These criteria were concerned with the following five organisational issues (by organisation is meant the way in which the class and classroom is structured to facilitate teaching and learning):-

i) The way in which the children are organised in the classroom.

ii) The way in which adults are organised in the classroom.

iii) The use of classroom space.

iv) The use of time.

v) The approach to curriculum organisation/ integration.

From the data obtained and application of the above stated criteria for selection, it was agreed (by outside observers and school staff) that the three schools to be placed within the experimental group demonstrated the following characteristics:-

There is a high level of individualisation of learning. The Head Teachers and teachers concerned believe that this is important for

developing children's ability to work independently and autonomously. A large amount of group work also takes place, encouraging collaborative work where children listen to and learn from each other. Because of this approach to child organisation, the class teacher inevitably has a limited amount of time to be spent with an individual child or with a small group. The classroom space is organised in 'seating groups', where a number of children sit around adjoining desks. This is a flexible arrangement insofar as it allows children to work individually and to join in group discussions as and when appropriate. In some classrooms the children sit in self-chosen friendship groups. In others, the groups are formed by the teacher and are based on achievement. The reasoning behind this is that when children of similar academic ability are seated together, this is helpful for setting up tasks and activities that are well matched to the needs and abilities of the learners.

The three experimental group schools all demonstrate the main hallmark of integration, this being the integration of teaching sessions and the minimal use of timetabling. Arguments put forward by the schools in favour of this method of

organisation of time and curriculum include the fact that there is flexibility for the pupils to choose how much time to be spent on an activity, thus encouraging a significant level of responsibility for their own work. Also, there should be an increase in the pupils' intrinsic motivation to address tasks, resulting from the fact that to a large extent they have control over and involvement in their own learning. Subject areas of the curriculum tend to be fully integrated throughout the week, rather than the more traditional approach of 'basics' in the morning and topic or creative arts in the afternoon. A multi-disciplinary focus is followed rather than a single and separate subject focus. Individuals tend to have their own cross-disciplinary projects as opposed to the whole class undertaking similar, subject-based work. In short, in each of the three schools placed in the experimental group for the purpose of this investigation, an array of evidence was found to demonstrate explicit planning for integration of work based on the field centre visits. A key fact which all schools in this group had in common was that they viewed the field visits as the beginning of integrated investigation and enquiry rather than as a subject-related end product in itself.

As a result of data analysis and application of the above criteria for selection, it was also agreed that the schools to be placed within the control group demonstrated the following characteristics:

There is little emphasis on individualisation of learning. Rather, the class works together for the majority of time. Staff justify this whole-class organisational procedure with the argument that the teacher can spend much more time in discussion with the class, giving opportunities for encouraging collaborative learning, exploring ideas, demonstrating objects and experiments, sharing problem solving and encouraging all pupils to participate in finding solutions. Where group work does occur, the organisation tends to be for teaching purposes, where the teacher instructs a group of children who are at the same stage and ability level and are undertaking the same task at the same moment in time. Otherwise, groups are for convenience and serve organisational purposes such as sharing resources and equipment.

The three control group schools do not operate an integrated day or a fully integrated approach to curriculum organisation. Reasons articulated for a more formal approach to organisation and timetabling included the fact

that there can be difficulty over monitoring "who is doing what" in a large class: so many resources would be required that the teacher would spend more time on resource allocation and management than on teaching and the teacher would be able to devote very little time to individual children and their needs. It was considered that more effective follow-up would be done as a result of visits to the field centre if the class as a whole undertook structured follow-up lessons arising out of first hand field experiences. Follow-up sessions are generally timetabled - as science or environmental studies - and take place as separate sessions from 'basic' work in mathematics and language. The whole class does similar work which is usually teacher-directed, often following a single subject focus. The term 'direct instruction' may be applied to the organisation of such learning environments, referring to academically focused, teacher-directed classrooms using sequenced and structured materials. Goals are clear to the pupils and coverage of content is extensive.

In summary, in each of the three schools placed in the control group for the purpose of this investigation, evidence was found to demonstrate planning for direct instruction and

timetabled follow-up sessions to field visits. Rather than viewing the field experiences as the beginning of integrated investigation and enquiry, there was a tendency to perceive them as an (important) end product in themselves. The field visits 'provide answers' to be reinforced in subject-specific timetable slots rather than 'raise questions' for negotiated enquiry.

Having identified all six schools, negotiation then took place with the Head Teachers to select one class and one class teacher within each school to participate in the field visits and research programme. As a result of generous co-operation on the part of school staff, a situation was established wherein the sample groups were 'matched' so that the ages of children in the three control group classes were equivalent to the ages of children in the three experimental group classes (See Table 1). All six class teachers readily agreed to take part in the proposed investigation.

6.3 Training and Role of the Research Assistant.

The author of this thesis was solely responsible for the design and implementation of the research programme, for negotiation with the Local Education Authority, Schools and Field Centre staff, for administering, marking and analysing the standardised tests of creativity, for focussing and finalising the qualitative criticisms and video tape of classrooms and for analysing and drawing conclusions from all data.

It was considered essential to appoint and to train a research assistant whose tasks would be to observe work in schools and to collect qualitative data to form the basis of the educational criticisms, and to operate a video camera to record samples of classroom based work. This enabled qualitative data to be collected in a completely independent and non-biased manner, preventing a situation of possible bias wherein the same researcher would have been responsible for both data collection, analysis and interpretation. Also, it should be stressed that the training of a research assistant in the highly skilled task of qualitative data collection and techniques of connoisseurship and criticism was considered to be an integral and vital element of the whole process leading to the production of

this thesis. Indeed, preparing qualitative researchers is in itself considered to be a highly skilled task.

> "To say that competent educational criticism requires familiarity with the classroom or school to which the criticism is directed is to say that criticism as a form of educational evaluation is not a quick and easy procedure."
> (Eisner, 1985)

In order to develop the ability to create useful educational criticism it would seem essential that the student is familiar with schools and classroom life. Eisner believes that educational connoisseurship is to some degree possessed by virtually everyone who has spent some time in schools as a teacher, but it can be refined and developed.

> "What is involved in the development of educational connoisseurship is, first, the opportunity to attend to happenings of educational life in a focused, sensitive and conscious way. Second, it requires the opportunity to compare such happenings, to discuss what one sees so that perceptions can be refined, to identify events not previously perceived, and to integrate and appraise what has been seen."
> (Eisner, 1985)

Certainly the educational critic must do far more than describe behaviour. A purely

behavioural description of what teachers and learners are doing in classrooms would fail to address the all-important intentions of the teacher. Also, it would fail to capture and portray the meaning or character of the teaching that is taking place. In educational settings the critic should be able not only to perceive what is superficial and obvious but also what is subtle and covert. The latter is not visible to an "educationally naive eye." Obviously the creation of effective criticism demands the appropriate and skilled use of language. As Eisner states (1985), good critics use language in a way that requires a certain poetic and fluid range of words and phrases. Good use of metaphor, linguistic fluency and imagination are essential attributes for the critic to possess. Without doubt competent educational criticism requires skills of writing that are far more complex than those possessed by a journalist.

> "It requires a broad grasp of educational theory and educational history, and it would be a distinct advantage for critics to have had experience as classroom teachers."
> (Eisner, 1985)

The research assistant who agreed to undertake the classroom based observations for

this investigation does not work in the formal education service at the present time, but has twenty years of experience as a classroom teacher in primary schools of a large urban education authority. The qualifications of the author/research director for implementing a programme of qualitative research include fourteen years of experience as teacher/advisory teacher and Head of a Primary phase centre and, more importantly, a year of full-time study at Stanford University as a student of Professor Eisner. This period included courses on Educational Connoisseurship and Criticism, direct observations of classrooms and viewing of video tapes of classroom life, description and discussion of teaching/learning situations and the creation of educational criticisms and megacriticisms.

A full year of preparation was undertaken before classroom preparations began in connection with this investigation. During this time the research director and research assistant worked together to :-

i) Read the writings of Elliot Eisner relating to the philosophy and methodology of Educational Connoisseurship and Educational Criticism.

ii) Study the work of other authors relating to qualitative evaluation and the understanding of classroom life.

iii) Observe and discuss video tapes of classrooms.

iv) Visit the schools to be used in the research sample.

v) Discuss the aims and methodology of the current investigation as a whole.

vi) Discuss the focus of the forthcoming observations and criticisms.

vii) Establish a timetable and necessary resources - this included organising and arranging a series of visits to each school and to the field centre, establishing a coherent programme of observations for the year as a whole, obtaining video equipment and developing expertise in its use.

Throughout the academic year of empirical research (documented in 6.4 below) the research assistant visited the field centre and each of the six schools as frequently as possible to observe classroom work that derived from field visits. In practice, this amounted to three or four visits per school per term. Video recordings were made and detailed observations undertaken for the

purpose of preparing educational criticisms of each setting. A total of seven criticisms were prepared, one describing and evaluating work in each of the schools and one relating to work undertaken at the field centre itself. These are presented in paragraph 6.5 below.

6.4 Procedure/Experimental Design, Data and Results

As outlined above, six classes of primary school children were selected for this study, one in each of six inner city schools. For the purposes of discussion, the experimental integrated classes will be termed group E (experimental). Within this group were the three experimental schools [E1, E2, E3]. Group E was comprised of a total of ninety boys and girls of mixed ability, sub-divided as follows:-

TABLE 2

Number of Pupils in Group E

School E1	26 pupils
School E2	33 pupils
School E3	31 pupils
TOTAL	90 pupils

The non-experimental, traditional classes will be termed group C (control). Within this

group were the three direct instruction schools [C1, C2, C3]. Group C was comprised of a total of eighty eight boys and girls of mixed ability, sub-divided as follows ;-

TABLE 3

Number of Pupils in Group C

School C1	27 pupils
School C2	29 pupils
School C3	32 pupils
TOTAL	88 pupils

The investigation commenced in September 1988 at the beginning of an academic year, and before any of the six classes took part in the series of visits to the field study centre. At this time all of the 178 children taking part in the investigation were tested and results documented for performance on two tests of divergent thinking. The two tests used were

E.P.Torrance: Torrance Tests of Creative Thinking. Verbal Tests A and B. Figural Tests A and B. Personnel Press Inc., Princeton, New Jersey.

These tests have been discussed at length in Chapter 1, and the reader is reminded of their complex nature. The verbal tests are marked to give separate scores for fluency, flexibility and originality, whilst the figural tests give separate scores for fluency, flexibility, originality and elaboration. In each case, these may then be totalled to give an over-all score of divergent thinking for each child, though this over-all figure was not used for statistical analysis within this study. The tests were administered within all schools during the first week of the academic year, before any schemes of work commenced. (Version A of Tests). The two groups then began the school year, during which they were subjected to the two completely different approaches to teaching and the curriculum as described above. The experimental (E) classes undertook their year's work with teachers committed to following up field visits in an integrated way, whilst the control (C) classes commenced a year's work wherein field work follow-

up would be based on a more formal, subject-orientated approach, with far less emphasis on individual enquiry and personal interpretation.

The six class teachers responsible for the education of the sample children were firmly committed to their adopted approach. In no situation was an organisational style operated specially for the purposes of fulfilling the requirements of this study.

Visits to the Centre commenced in September 1988 for all six schools. These visits continued on a three weekly cycle throughout the academic year.

In June 1989 at the end of the series of field visits and follow-up work based upon them, the six classes were once again tested in an identical manner to the previous year, and results achieved for performance on the same two tests of divergent thinking. (Version B of Tests).

Thus it was possible to compare test scores of the two groups at both the pre-treatment and post-treatment stages, and to draw conclusions concerning the implications of the two differing approaches to curriculum organisation and their possible effect on the development of divergent thinking abilities.

For the purposes of this empirical study, a research hypothesis was formulated at the start of the investigation, namely that :-

> At the pre-treatment stage there is no significant difference between the E and C groups in terms of creative thinking scores.

The outcome of tests were scored according to the instructions in the scoring manual. Examples of children's test papers with an explanation of the way in which these were scored are shown in Appendix 2. Tests were scored without knowledge of the groups (E or C) to which they belonged.

The scores of ninety E group children and eighty eight C group children could be used for statistical analysis, these children having completed the test battery on both occasions.

Statistical analysis at this stage involved the calculation of mean scores and standard deviations, and the use of the **t**-test for independent samples as outlined by Cohen and Holliday (1979). This was applied to determine whether or not the means of these two samples differed so much that the samples were unlikely to have been drawn from the same population. There are various formulae for **t** depending on

circumstances, and in this case it was assumed that the groups were independent and randomly sampled. The t-test was separately applied to each pair of matched schools within the sample.

The raw scores of all children who completed the tests in the pre- and post-treatment stages are recorded in Appendix 3.

Table 4, below, gives the mean scores, standard deviations and t-values calculated on the pre-tests.

TABLE 4:
Pre-Treatment Means, Standard Deviations and t-values

	E1 n = 26		C1 n = 27		
TEST	Mean	SD	Mean	SD	t
Torrance Verbal	22.46	11.71	28.74	17.58	1.53
Torrance Figural	45.07	11.36	52.26	13.71	2.08
	E2 n = 33		C2 n = 29		
TEST	Mean	SD	Mean	SD	t
Torrance Verbal	29.33	14.86	33.14	15.86	0.99
Torrance Figural	49.88	22.96	53.48	22.41	0.62
	E3 n = 31		C3 n = 32		
TEST	Mean	SD	Mean	SD	t
Torrance Verbal	31.22	10.44	33.62	17.33	0.66
Torrance Figural	59.68	13.29	55.34	23.57	0.90

It can be seen from Table 4 that the differences between the means in most instances were very small. In all cases except one, the t value was lower than the critical value for attaining a .05 level of statistical significance. The difference between E1 and C1 on the figural test did reach statistical significance at the .05 level. However, since this was only 1 out of 6 comparisons, the overall pattern remains one of no major differences between E and C schools. Taking the results as a whole, it was undoubtedly possible to confirm the research hypothesis with regard to these tests and to conclude that there was no significant difference between the creative thinking scores of the pairs of classes within the sample groups.

A second research hypothesis was formulated for the end of the year's work, namely that:

> At the post-treatment stage there will be a significant difference between the E and C groups in terms of creative thinking scores. The E groups will have significantly higher scores than the C groups.

A t-test for independent samples was applied as at the pre-treatment stage.

Table 5 below gives the mean scores, standard deviations and t values calculated on the five post-treatment tests.

TABLE 5:

Post-Treatment Means, Standard Deviations and t-values

	E1 n = 26		C1 n = 27		
TEST	Mean	SD	Mean	SD	t
Torrance Verbal	107.73	44.50	29.44	19.98	8.21
Torrance Figural	131.54	30.35	53.41	21.03	10.85
	E2 n = 33		C2 n = 29		
TEST	Mean	SD	Mean	SD	t
Torrance Verbal	82.64	41.69	37.21	13.64	5.91
Torrance Figural	96.97	27.71	60.72	15.64	6.44
	E3 n = 31		C3 n = 32		
TEST	Mean	SD	Mean	SD	t
Torrance Verbal	125.83	36.84	38.66	16.76	12.02
Torrance Figural	133.71	23.28	53.84	21.95	14.01

Results at this post treatment stage clearly demonstrate a very dramatic change in t values, and large differences between the mean scores in all instances. In all six comparisons the

obtained value for t is very considerably higher than the critical value for attaining a .05 level of statistical significance. There can be no doubt that the over-all pattern demonstrated by these statistics is one of major differences between the E and C schools. The second research hypothesis was therefore confirmed and it was concluded that there was a very significant difference in the creative thinking ability of the pairs of classes after their year's work. The divergent thinking scores of each of the experimental classes were significantly higher than those of each of its parallel control class. This difference had not been evident at the pre-treatment stage.

To conclude the statistical analysis of the data obtained, a final research hypothesis was formulated, namely that :

> At the post-treatment stage, the creative thinking scores of the E and C groups differ significantly from their respective pre-treatment scores.

The differences between pre- and post-treatment mean scores, and t-values obtained at this stage of analysis are shown in Table 6,

following.

Statistical analysis was continued in accordance with the t test method as outlined by Cohen and Holliday (1979) relating to the procedures for computing t for correlated means. This procedure is suitable for finding out how a teaching programme affects post-treatment scores.

Once again the results proved to be dramatic and conclusive. In the case of the three experimental schools exceptionally high t values and large gains in mean scores on both tests indicate a very significant difference between pre- and post- treatment creativity scores. All t values of the experimental group schools are considerably higher than the critical value required for attaining a .05 level of statistical significance. There can be no doubt that the creative thinking ability of all E school classes improved dramatically between the pre- and post-testing periods. Scores of the control schools are equally interesting, insofar as they demonstrate a completely opposing trend. For all C classes, mean scores increased only marginally. Indeed, in the case of School C3 there was a fall rather than a gain in the mean score of the Figural test at the post- treatment stage. All t

TABLE 6:
Difference Between Pre- and Post-Treatment Mean Scores, with t values (Correlated Means)

TEST	E1 n= 26				C1 n= 27			
	Pre-Treatment Mean	Post-Treatment Mean	Gain	t	Pre-Treatment Mean	Post-Treatment Mean	Gain	t
Torrance: Verbal	22.46	107.73	85.27	10.85	28.74	29.44	0.7	0.2
Torrance: Figural	45.07	131.54	86.47	16.41	52.26	53.41	1.15	0.3
	E2 n= 33				C2 n= 29			
	Pre-Treatment Mean	Post-Treatment Mean	Gain	t	Pre-Treatment Mean	Post-Treatment Mean	Gain	t
Torrance: Verbal	29.33	82.64	53.31	9.49	33.14	37.21	4.07	1.6
Torrance: Figural	49.88	96.97	47.09	13.53	53.48	60.72	7.24	1.5
	E3 n= 31				C3 n= 32			
	Pre-Treatment Mean	Post-Treatment Mean	Gain	t	Pre-Treatment Mean	Post-Treatment Mean	Gain	t
Torrance: Verbal	31.22	125.83	94.61	14.26	33.62	38.66	5.04	2.5
Torrance: Figural	59.68	133.71	74.03	7.86	55.34	53.84	-1.5	-0.4

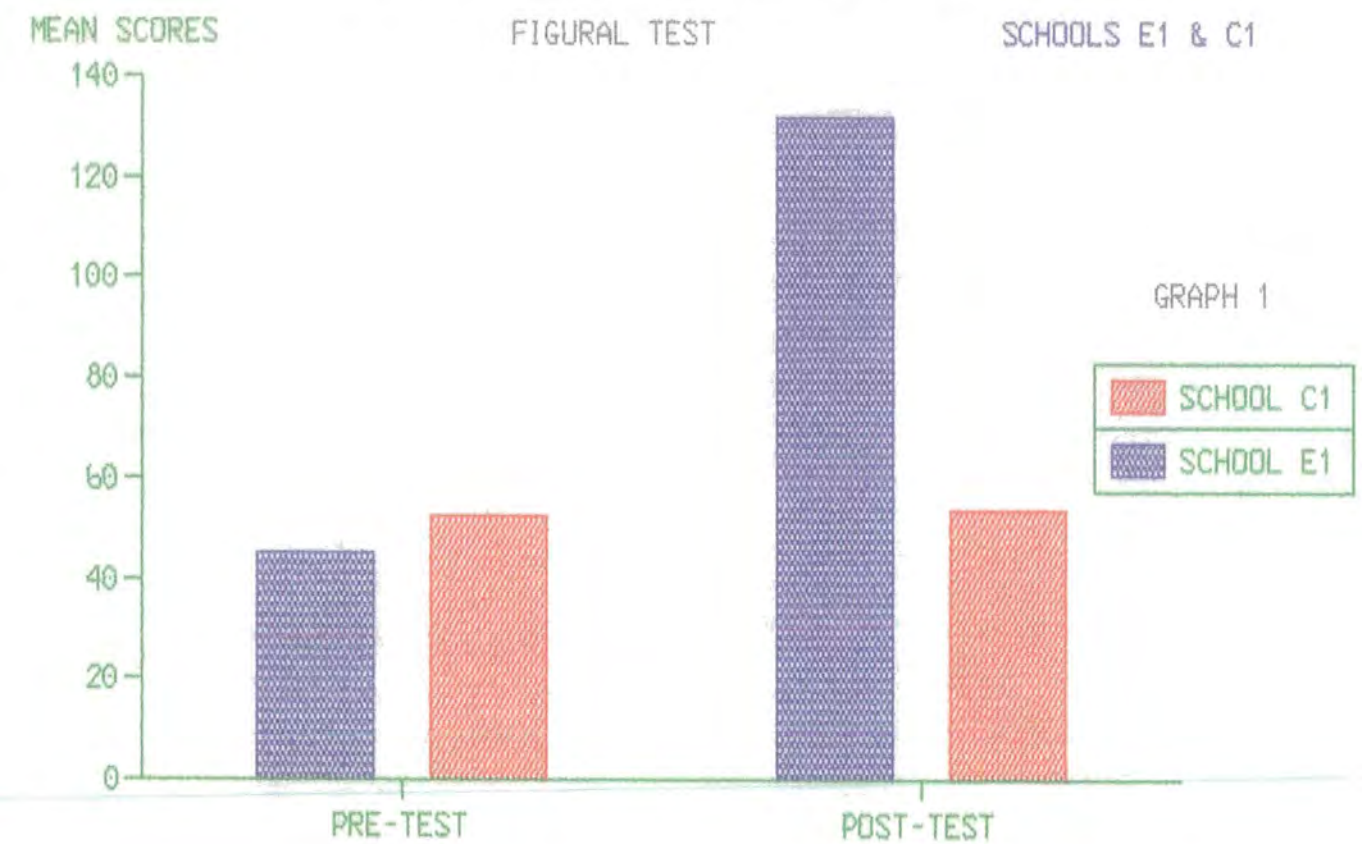
values obtained for the C schools were lower than the critical value for attaining a .05 level of statistical significance except one. The C3 verbal test result (t = 2.53) is actually significant at the .05 level but not at the .01 level. However, since this was only one out of six comparisons, the over-all pattern remains one of no major differences between pre- and post-treatment scores for the C group schools.

Taking these results as a whole, it was undoubtedly possible to confirm the final research hypothesis with regard to the three E schools and to reject it with regard to the three C schools.

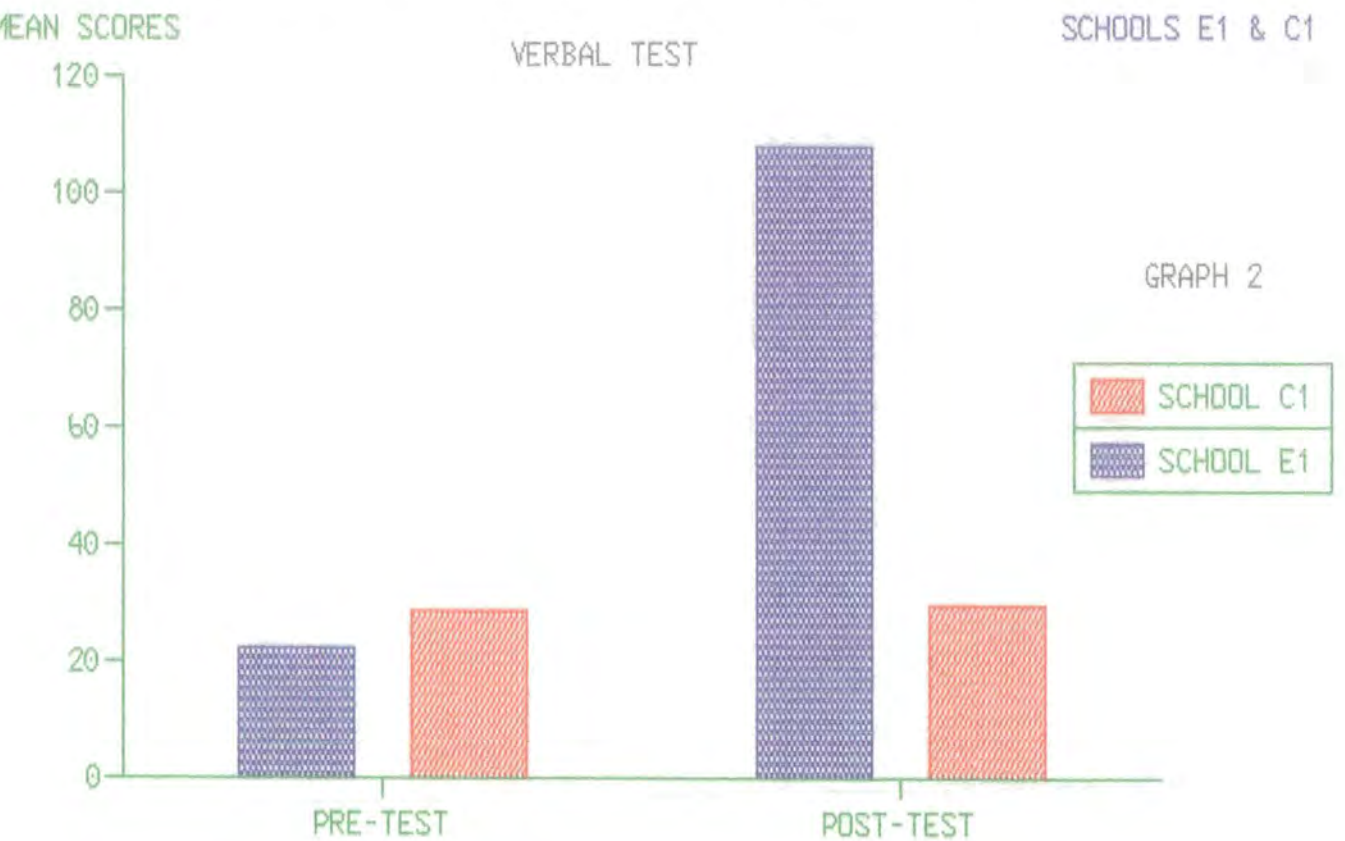
Further analysis of the scores shown in Table 6 reveals most interesting results. Graphical representation of these results follows in Graphs 1-6.

The graphs are presented in such a way that the differences between the post-treatment mean scores of Groups E and C are immediately apparent, as are the considerably higher gains in mean scores attained by the classes in Group E. All three classes in Group E can be seen to have considerably higher post-treatment mean scores than Group C classes on both tests.

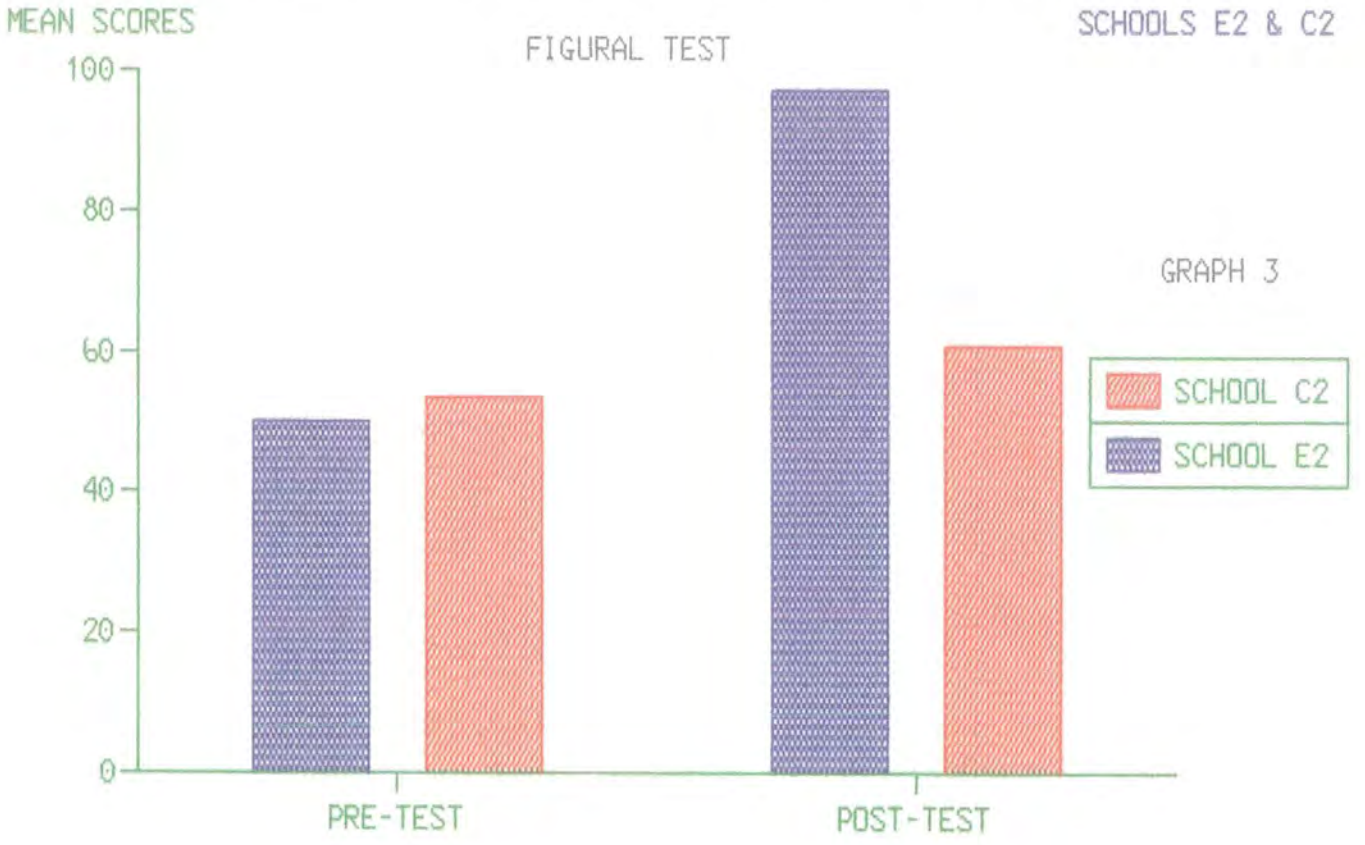
COMPARATIVE PRE AND POST TREATMENT MEAN SCORES



COMPARATIVE PRE AND POST TREATMENT MEAN SCORES



COMPARATIVE PRE AND POST TREATMENT MEAN SCORES



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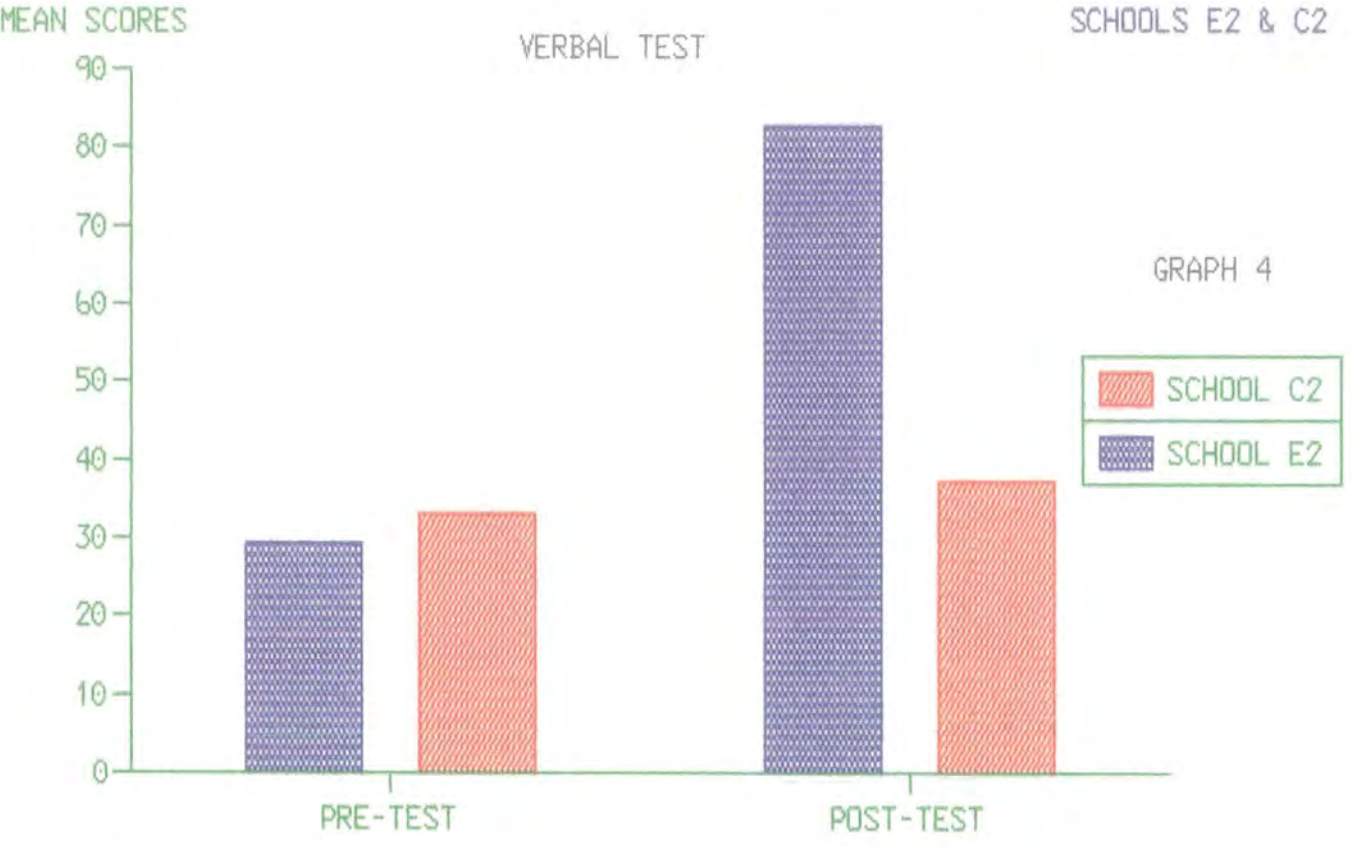
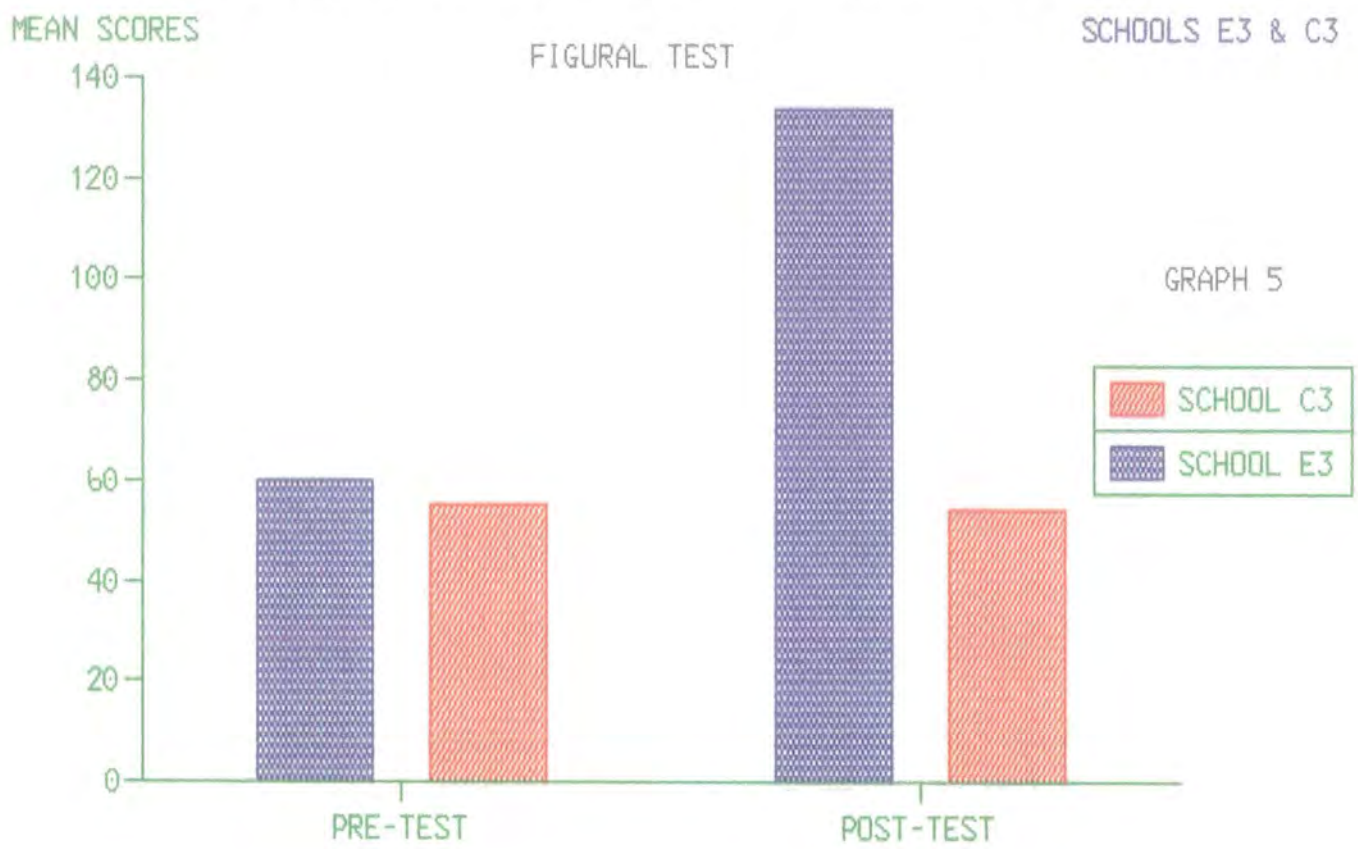
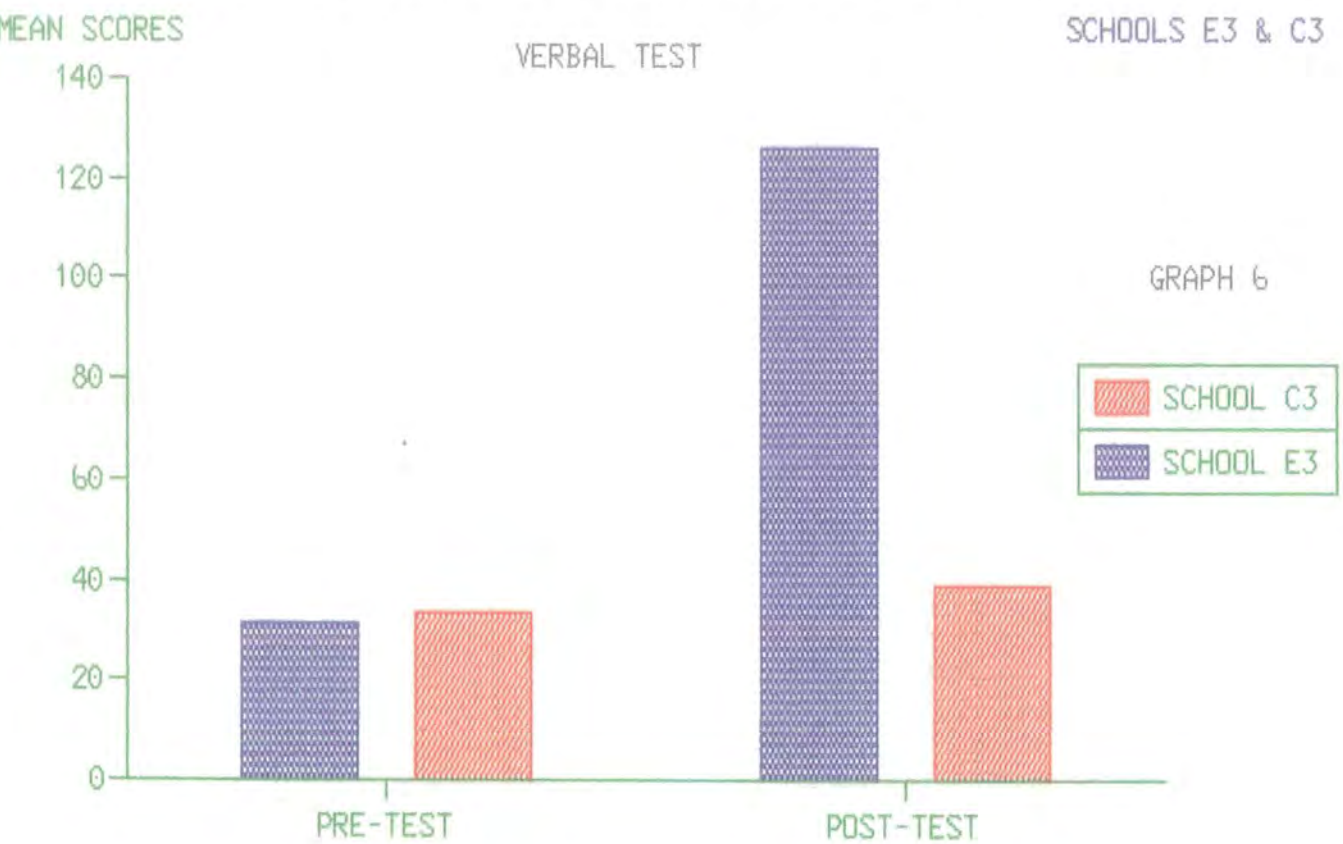


COMPARATIVE PRE AND POST TREATMENT MEAN SCORES



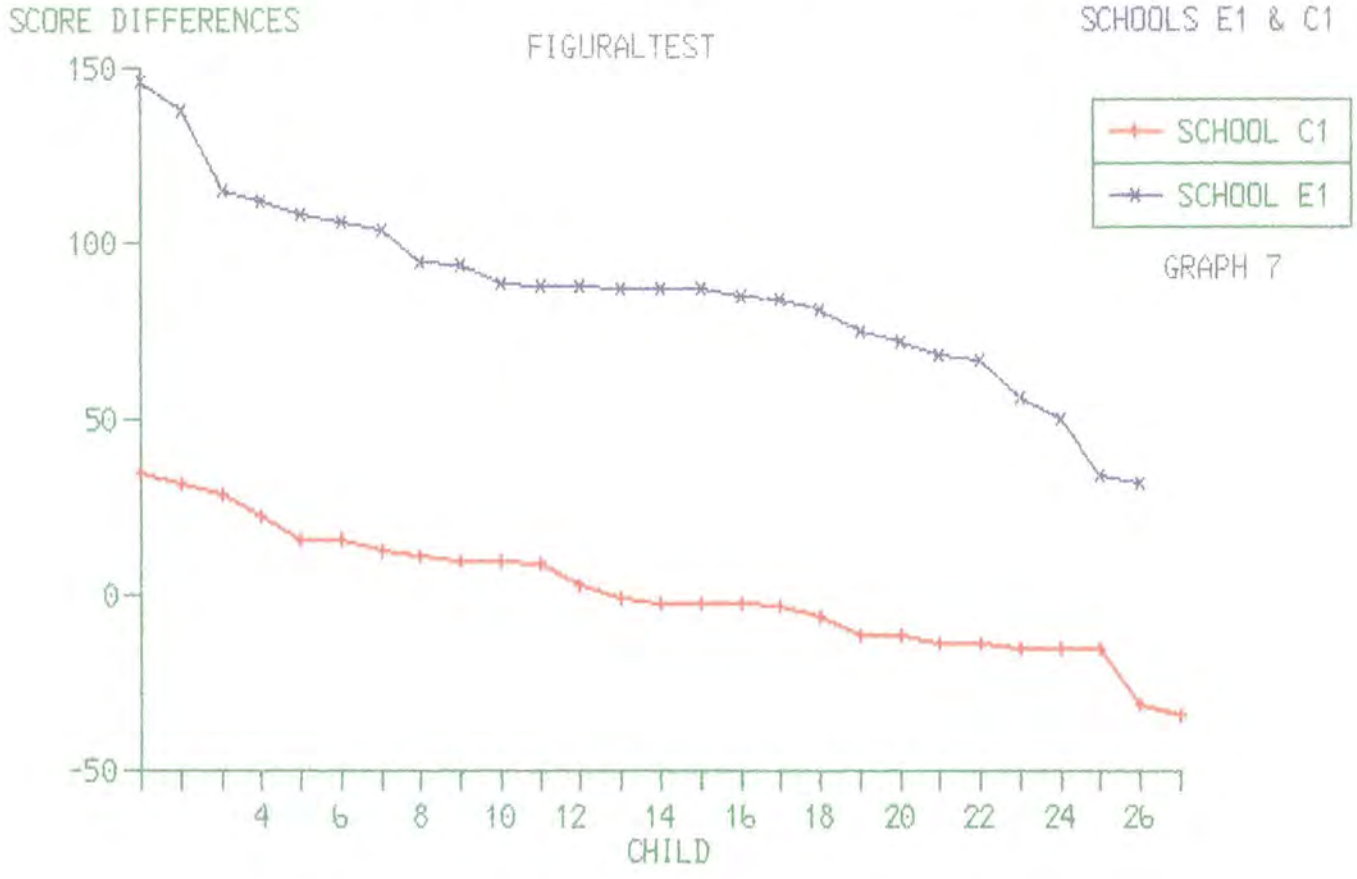
COMPARATIVE PRE AND POST TREATMENT MEAN SCORES



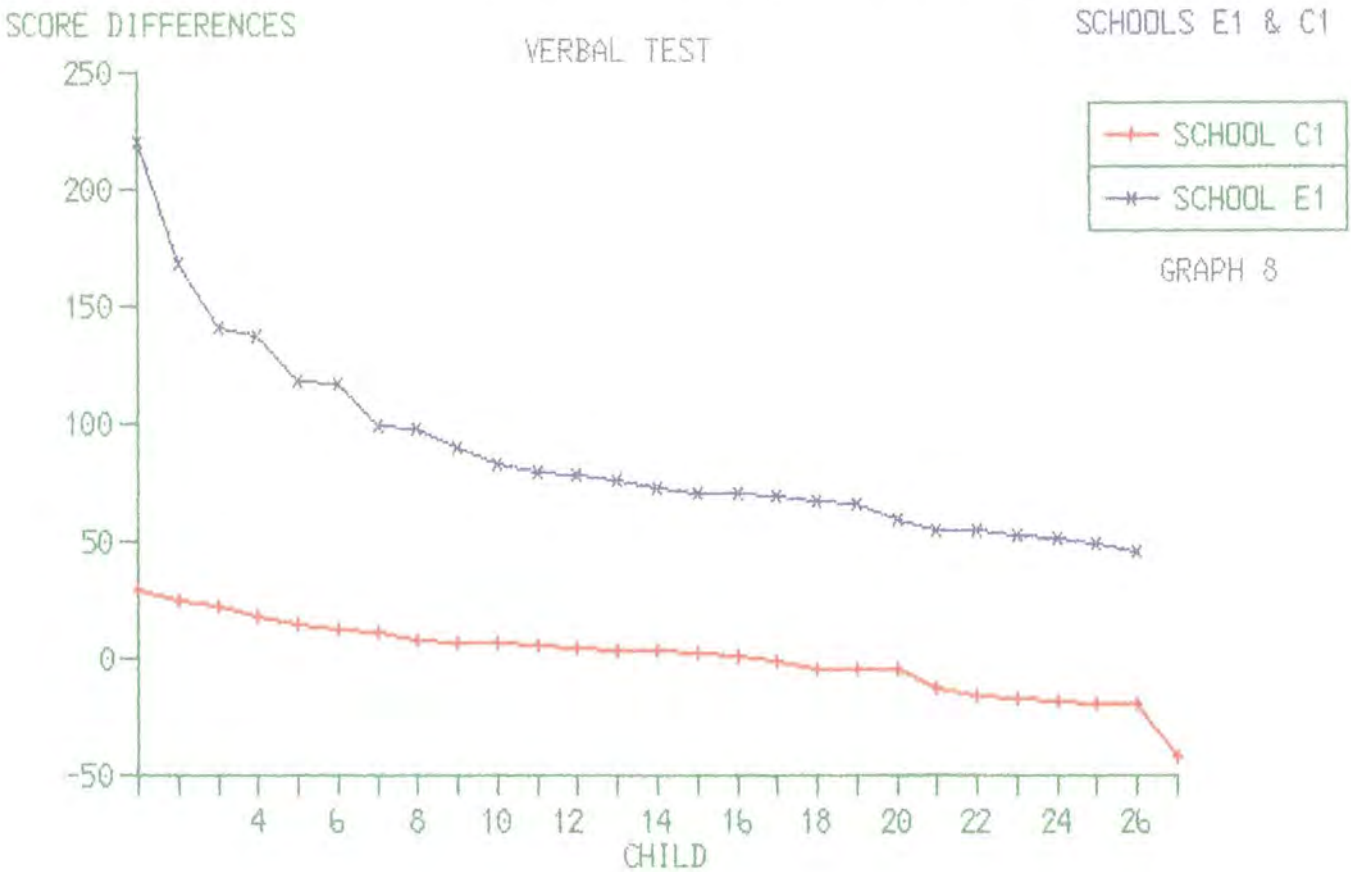
A graphical presentation of the differences between the pre- and post-treatment raw scores for individual children in both groups now follows. A separate graph has been drawn for each pair of classes and for each of the two tests (Graphs 7-12) and on each, the raw score differences for each child have been plotted in rank order, from highest difference to the lowest. A most interesting pattern is demonstrated by these graphs, which show that in all instances the differences between pre- and post-treatment raw scores were higher for the E group than for the C group.

In addition to these graphs, comprehensive tables of test results (Tables 7-18) will be found in Appendix 3. These indicate the raw data and differences between the pre- and post-treatment raw test scores for all schools. From these tables and graphs it can be seen that on no occasion did any child in Group E obtain a lower post-test score than pre-test score. For Group C, however, many post-test scores were lower than in the pre-treatment stage. Indeed, many of these scores were quite considerably lower. They are indicated by a minus sign in the tables and on occasions where the Graph lines for Group C run below the zero level (Graphs 7-12).

RANKED DIFFERENCES IN PRE & POST TREATMENT RAW SCORES

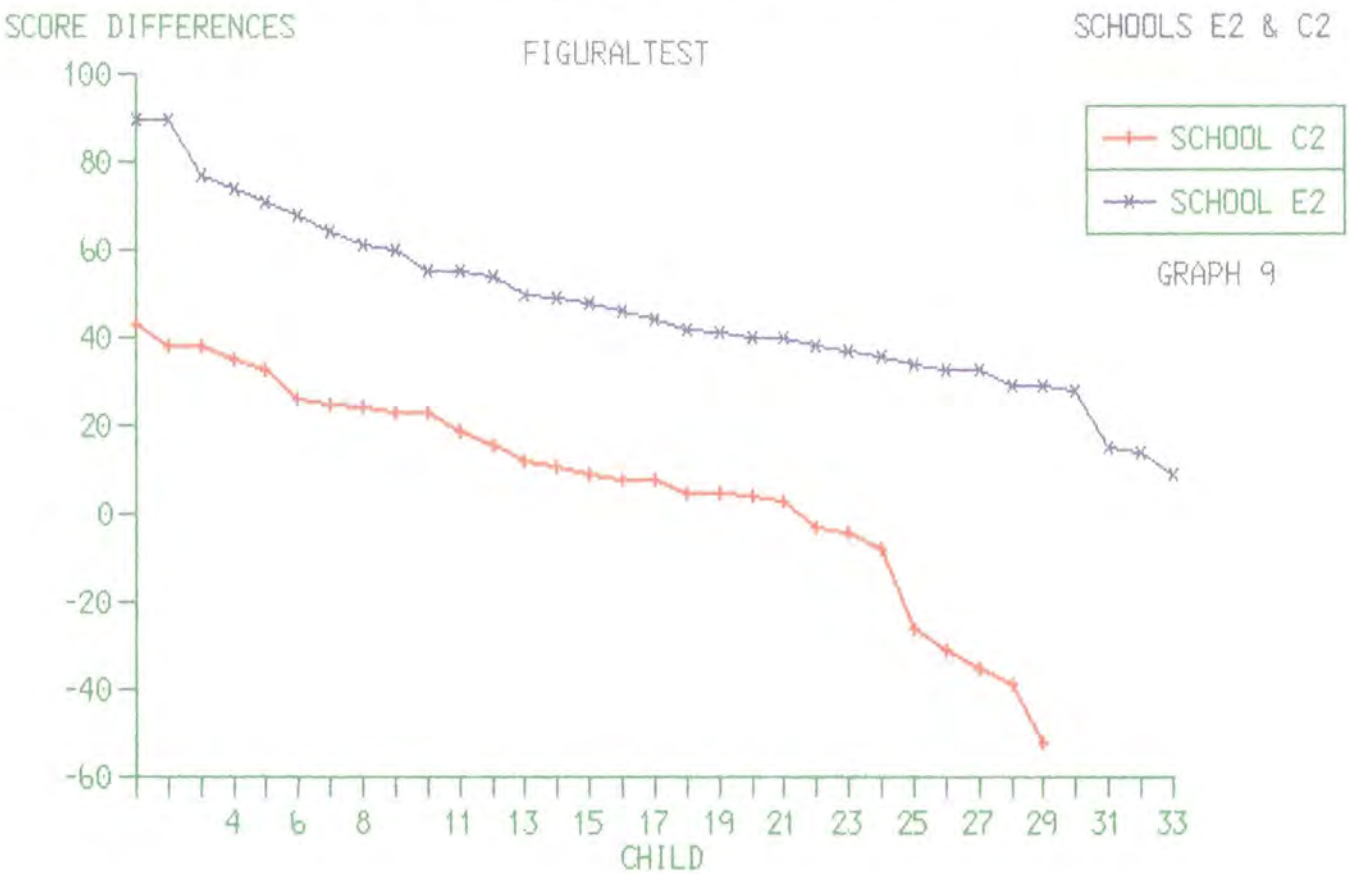


RANKED DIFFERENCES IN PRE & POST TREATMENT RAW SCORES

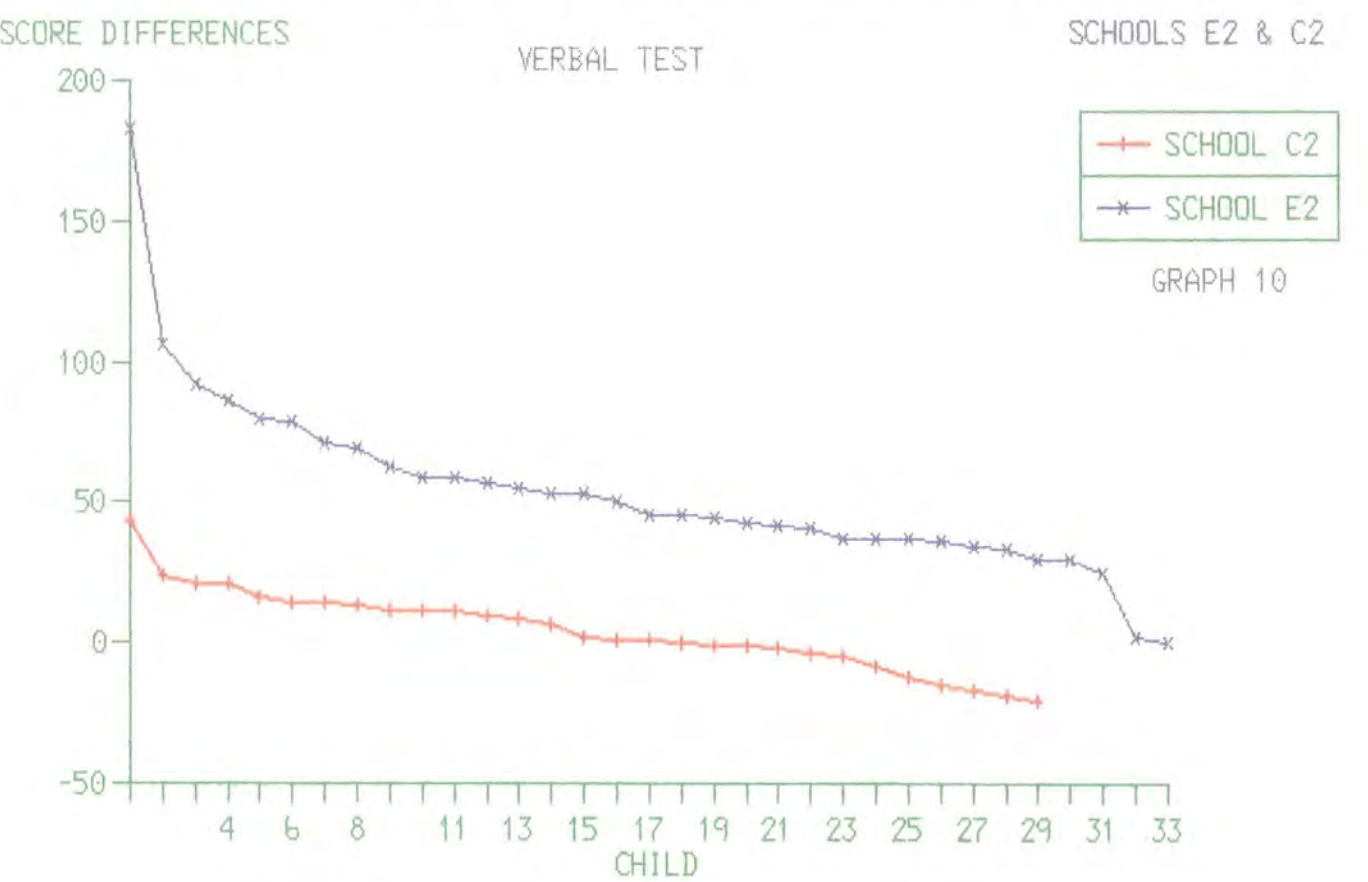


GRAPH 8

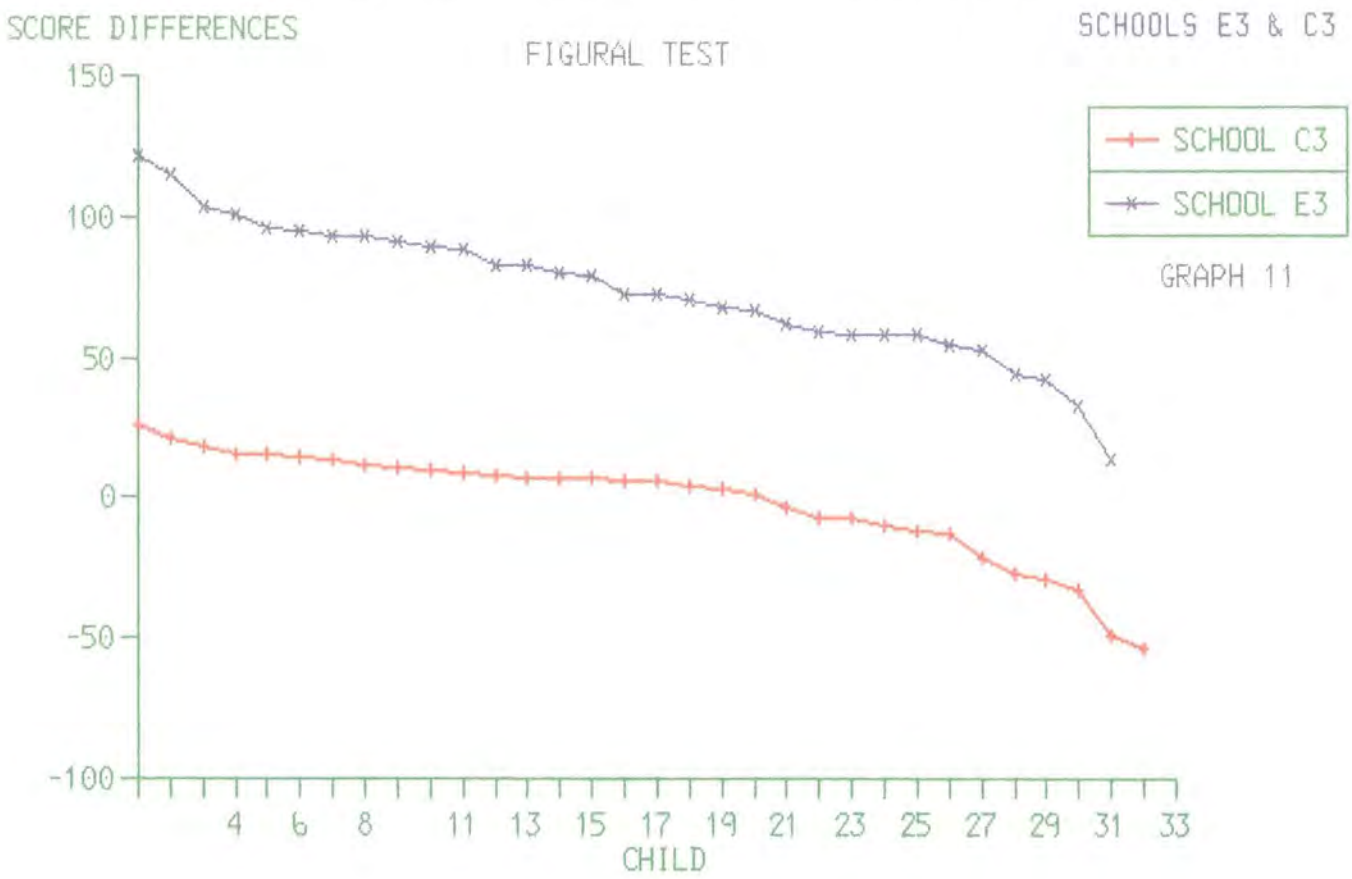
RANKED DIFFERENCES IN PRE & POST TREATMENT RAW SCORES



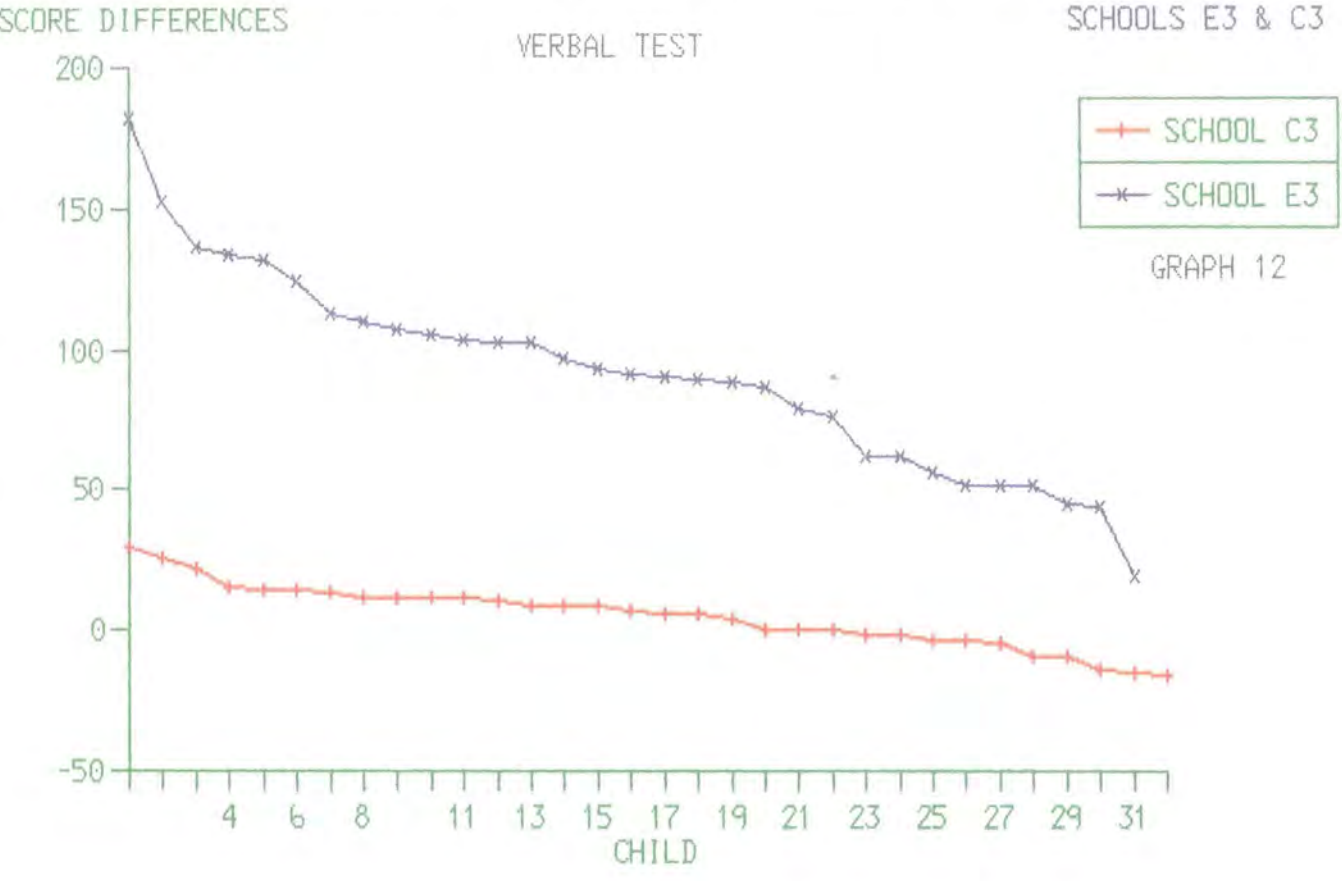
RANKED DIFFERENCES IN PRE & POST TREATMENT RAW SCORES



RANKED DIFFERENCES IN PRE & POST TREATMENT RAW SCORES



RANKED DIFFERENCES IN PRE & POST TREATMENT RAW SCORES



GRAPH 12

Finally, the reader's attention is drawn to the precise details of the Torrance figural and verbal test results (Tables 13-18) at the post-treatment stage. From these tables a breakdown of scores of the dimensions of fluency, flexibility, originality and elaboration can be seen and analysed. In particular it can be noted that the E Group children score very highly on the fluency and originality dimensions compared to the C Group children.

The results of this particular empirical investigation, therefore, show that children who have worked according to an integrated method of class and curriculum organisation have achieved outstandingly higher scores in all dimensions of tests of divergent thinking ability than children following a more traditional approach to curriculum organisation.

In interpreting the results of this experimental study, it should be noted that the same person administered the battery of pre- and post-tests. The task was undertaken by the author of the study rather than the classroom teachers. This was very important insofar as it ensured that test conditions were as identical as is humanly possible to achieve for the two Groups. Indeed it is vital with Torrance Tests that identical

wording and approach is used for all children by the test administrator.

It must also be pointed out that the author is well aware of the problems of a research design in which two teaching methods and approaches to organisation are compared, involving testing before and after the experimental teaching period. It is not easy to achieve classes in a sample which are really parallel in the sense that each child in one is matched with a child in another. Matching in this instance is certainly less than perfect, and is limited to a statistical analysis of test results to ensure that there is no significant difference between classes at the outset. This is considered to be an adequate method, since the essence of the study is actually a qualitative analysis of teaching methods, attempting to illuminate and demonstrate their effectiveness or otherwise in certain areas, in particular, the development of creative thinking abilities.

Furthermore, the results reported here are limited in terms of scope and sample size. This was necessitated by the time available to the investigator. Indeed, one of the problems to be encountered by any investigator contemplating a score of creativity derived in this way is the

tremendous amount of time required for marking and scoring the Torrance tests. At least half an hour per child's paper would seem a fair estimate in order to obtain accurate results - that is, one hour for each combined verbal and figural result - not including time required for tabulation of scores, which in itself is another major task. Once again, it should be stressed that all marking and score tabulation was done by the author as researcher in order to achieve fairness in marking and scores with the highest possible level of accuracy across the sample as a whole.

Finally, it must be pointed out that experimental bias may well have arisen as a result of teacher effectiveness and commitment to the organisational styles and methods involved. One important comment relating to this point is that the author did not know any of the class teachers prior to the commencement of the study, and so was therefore approaching the investigation from an unbiased perspective. Secondly, no attempt was made to control the variable of teacher difference. As Eisner himself remarked when discussing the progress of this study, not only would this have been virtually impossible but also it would not have been helpful. The whole point of applying the connoisseurship model of

evaluation throughout this investigation was to look for and hopefully illuminate excellence in the approaches of individual teachers. Finally, therefore, this chapter now turns the reader's attention to the qualitative element of the investigation, carried out alongside the more traditional experimental research design as described above.

Throughout the academic year which was the duration of the experimental period, lessons at the field centre and in all six classes were regularly attended, observed and recorded on video tape by the research assistant to the study. The outcome of these visits was a vast amount of qualitative data collected by a completely independent, unbiased and trained investigator. The pre-figured focus agreed by researcher and assistant was to concentrate in particular on teacher-child interaction, organisation of classroom and materials, evidence of creativity (demonstrated by original, fluent, elaborate or flexible thought) and the status of the field experiences (seen as an end product to be reinforced or as starting points for enquiry?)

The main intention of this critically important dimension to the study was to write vivid descriptions of classroom life, portraying

not only WHAT was happening but WHY, hopefully to illuminate and to provide insight into the nature of the results achieved at the end of the formal experiment. In other words, it was intended that written educational criticisms and video material should help to provide an explanation of any differences that occurred between pre- and post-treatment test scores.

There follow the results of this qualitative dimension. On the following pages are seven written accounts - one criticism based on work at the field centre, and one for each of the six classrooms based on follow-up lessons. Much thought was given as to whether to write six separate Criticisms, that is, one for each classroom, or two substantial ones, that is, one for the C group classes and one for the E group classes. The disadvantage of writing six separate accounts is that inevitably there is repetition and overlap of work as all teachers and children worked from common starting points. On the other hand, no two class atmospheres are the same and it was decided that it is essential to include a reasonably brief account of each classroom in order that the reader may have insight into the richness and variety of approaches to teaching and learning across the sample as a whole and the

subtle differences between the classrooms in each group. A video tape is bound within this thesis (Appendix 4, Volume 2) depicting some of the original data. This will no doubt be of general interest and of importance from the point of view of providing evidence of referential adequacy. It must be stressed that the video tape - in the tradition of the Eisner methodology - contains original data. No attempt has been made to provide a commentary or interpretation, as this material would invalidate the purpose for which it is intended. No doubt at a later stage, when the video tape may be used for curriculum development work with teachers and students, it will be edited and a commentary provided.

It is intended that the reader shall have the benefit of reading and viewing these items, perhaps applying the art of mega-criticism himself, before further attempt is made at analysis and drawing conclusions.

6.5 Connoisseurship and Criticism: Qualitative Evaluations.

Author's Note :- The names of all schools, adults and children observed in this study shall remain anonymous. All names mentioned within these accounts are therefore fictitious. Whilst the names are fiction, the descriptions are a portrayal of fact!

THE FIELD CENTRE....

AN INTRODUCTORY GLIMPSE AT THE STARTING POINT FOR LEARNING AND INVESTIGATION

The Environmental Studies Centre is an oasis of tranquillity sited in the bustling heart of England's second city .... adjacent to one of the busiest main roads leading to Spaghetti Junction ... within walking distance of the city centre with its high rise stores, hotels and offices, crowded pavements and ever-tangled traffic....

A long leafy driveway leads from the roadway into this haven of peace, winding through trees and bushes, gradually opening out to reveal magnificent gardens, an orchard, greenhouses, poultry pens, pond, woodland and an exceedingly well camouflaged single-storey classroom building.

The door of this building is open. Mrs Russell stands at its entrance, ready to welcome her party of young visitors from the heart of the inner city. Like other classrooms, this building contains desks and chairs, but there the resemblance ends. As the children enter the room mouths open wide in astonishment and eyes threaten to burst from their sockets. To many, it must seem as if they have stumbled upon an Aladdin's cave of treasures.

They gaze around a room brimming over with colourful and in some cases bizarre bric-a-brac like a botanical Steptoe's yard: squat inflatable vinyl frogs jostle for position with collage bees and honeycombs, globes, microscopes, soft toy animals, vegetables grown in the Centre's garden and the reconstructed skeleton of a young fox found in the grounds; large collages and embroidered hangings depicting many plants and animals, together with food chain mobiles, are suspended from the beams of the classroom roof, spinning gently in the breeze from the open door; the walls are covered with posters, sketches, paintings, maps, graphs and written work from various schools, while incubators, brooder boxes and lugubriously-bubbling fish tanks bear witness to the presence of living creatures in this naturalist's 'young curiosity shop.'

This is obviously a room in which children do not merely sit passively, but are encouraged to be active - to observe, think and do, using their eyes, their ears and their imaginations. Although

in some ways it is the focal point of the children's work during their half-day visits, in others the classroom is merely the meeting point from which to disperse and explore other aspects of the Field Centre.

Mrs Russell takes them on a guided tour of the Field Centre and its five different habitats - the garden, the woodland, the pond, the field and the nature reserve. Some habitats are maintained, others are not. During this time, it is easy to see the curiosity and excitement of the children gradually increasing as they discover the rich, extensive resources of the Centre:

"Look, miss, there's a wasps' nest!"

"I saw a fox's den - and some speckled wood butterflies."

"There's lots growing in the garden - crab apples, pears, runner beans, carrots, lettuce, onions, cereals, cabbages ..."

"Ugh! I hate cabbage."

"It's good for us, isn't it, miss?"

"Why?"

There are many other sights to see, surrounded as the children are by the glory and variety of trees in the grounds, with oak, hawthorn, horse-chestnut, laurel, cherry, sycamore, guelder rose, broom, yew, pine and beech, amongst others. Fruits and seeds can be collected and discussed. Greenhouse, bird box, beehive and weather station offer other opportunities for study. In autumn, the ground is strewn with a patchwork quilt of leaves which can be collected, identified and examined at the Centre, before being taken back to school to form the basis of numerous other activities. As the children gather armfuls of leaves, questions spring out like water from a fountain:

"I've got ten different sorts of leaves to take back, miss. How long do you think it will take me to find out which trees they came from?"

"I like all the different shapes - I wonder how many of them are symmetrical..."

"What about all the colours? I'm going to make a list of all the different shades I've seen. Then I can try to mix them all in paint."

"How can we measure how high the trees are without climbing up them?"

What's the biggest tree in the world, sir?"

"How do plants find food to keep them alive? Do they just live on rainwater?"

"Are evergreens really ever green?"

As autumn gives way to spring and spring in turn to summer, the schools continue to visit the Field Centre. The many flowers growing in the grounds are identified and discussed. Seeds are collected and sown in pots; soon words like 'germination' and 'pollination' will become almost second nature to the children as they learn more about flowers, fruits and seeds.

"How do you think the seeds are spread, children?"

"The wind might blow some of them away, miss."

"Some of them might get caught in an animal's coat, and get brushed off again later."

"Miss, I've got another idea - perhaps a bird might fly off with a seed in its beak, and then drop it on the ground instead of eating it."

The children are quick to notice and comment upon the wildlife sharing the grounds of the Field Centre with them. The habitats are home to many different creatures - from the strutting cockerel and his flock of hens, amiably cohabiting with a paddling of ducks, to the foraging squirrels rustling through the trees and the many species of bird life wheeling overhead. Each creature has its own fascination for the human observers; some can be seen at close quarters, in the grounds or at the bird table, whilst others require binoculars to capture a fleeting glimpse of a flickering tail or a bright-blinking eye. Even a cast-off feather is a source of wonder:

"It feels ....like.... greasy, sir."

"Do birds get wet when it rains?"

"Are squirrels like rodents, miss?"

"We've got some near us. They keep pinching all the food we leave out for the birds."

"Look, there's a robin. I thought we only saw them at Christmas time."

"I wonder how it got its red breast..."

At first glance, the pond seems unoccupied - apart from a pair of dabbling mallards who, having been disturbed, stare, silent and disdainful, at their visitors through the reeds. Closer inspection soon reveals a teeming mass of mini-beasts waiting to be scooped up and surveyed, collected and classified, respected and returned to the water.

"Hey, John - what's a pooter for?"

"Dunno. Pooting, I suppose."

The children soon become absorbed in the search for these creatures, marvelling at the intricacy of their tiny bodies, the delicacy of their wings - and the number of their legs.

Back in the classroom, magnified containers help the pond-dipping detectives in their task of separating insect from arachnid, mollusc from crustacean. Pencils hover and dart over paper, brows furrow in concentration as the children try to capture the catch a second time....sometimes a third and fourth.

Also housed in the classroom building are numerous other creatures - guinea pig, lizard, locust, rabbit, gerbil, Chinese hamster, leaf insect, salamander, snake, axolotl and pachnoda beetle, as well as an aviary of small birds and tanks of tropical fish. All grist to Mrs Russell's mill.

"There's so much to see, miss. I think my brain will burst if I try to remember everything."

Under Mrs Russell's guidance, some of the children's questions may be answered at the Field Centre itself; others may deliberately be left for

them to investigate back at school, whilst a few problems may never be neatly or completely solved. Options and approaches are left entirely to the interests and enthusiasms of the individual teachers. Each is free to delve into this rich seam of first-hand experiences, to pluck out a precious stone and cut and polish it into a multi-faceted diamond. The process may be an intricate and complex one, but therein lies both the inspiration and the challenge.

C GROUP

ST AIDAN'S SCHOOL

The class attending the Field Centre this year belongs to Miss Fairfax, the Deputy Head teacher of St Aidan's School. A visit to her classroom rather reminds one of how the same St Aidan's School classroom must have looked some twenty or so years ago, with its high ceiling and windows which appear to have been designed to let light in but not to permit the occupants of the room to waste their time looking out. The pancake yellow brickwork, intended to brighten up the surroundings, is about as cheerful as a bowl of watery custard. The classroom frieze boards act like a restaurant menu, indicating the homely fare on offer - maths in the form of a number line and sets of multiplication tables, English in the form of lists of spellings, Geography in the shape of a world map, and so on. Even the blackboard bears signs of the "Chef's Special" by way of a set of division sums and a list of spellings to be learned that week, together with scattered notes of activities to be undertaken and administration to be completed.

The children's desks are laid out in rows facing the blackboard, with the teacher's desk acting as the focal point of the entire room. This is in accordance with Miss Fairfax's own personality and style of teaching, which were revealed to be both formal and authoritarian in nature. She is very much the schoolmarm stereotype, with an approach to her teaching which matches her appearance - traditional, unfussy and functional. This brisk, no-nonsense attitude might be mistaken for sternness or even severity, although Miss Fairfax does permit herself to unbend and smile occasionally. For much of the time, however, it is business as usual with Miss Fairfax, the classroom chef, mixing the main ingredients of the three R's with the recommended amounts of instruction, information and invocations to "listen", "remember" and "concentrate." Her stick of chalk or blackboard ruler act as a spatula, helping to dispense the nourishment Miss Fairfax deems necessary for a healthy diet of learning; only the tall white hat is missing, and rarely if ever does the menu change.

On my first visit, last autumn, the children were identifying and studying the many leaves they had brought back after their recent Field Centre

experience. As is the pattern with Miss Fairfax's lessons, she began by reviewing the work that had been done during the previous lesson as she handed out the children's folders of work. These folders were kept as mementoes of the class's Field Centre lessons, and added to throughout the year, becoming increasingly bulky and dog-eared as time went by; at this early stage in the term each folder already contained numerous identical cyclostyled work sheets, diagrams to label and pictures to colour, all on the theme of trees and leaves. The majority of folders were commented upon while her potential victims waited with bated breath. The written work had all been marked in some detail, and notes of corrections to be made had been left on each page in Miss Fairfax's neat, precise handwriting.

During this mini-diatribe, Miss Fairfax was not slow to praise well-presented work, showing it to the rest of the class for their edification and remarking :-

"That's a nice oak leaf sketch, Robert..."
or

"Neat handwriting here, Jennifer...well done!"

Those children earning praise were suitably pleased, while others were stoically less so.

Having dispensed a little gratification and a somewhat larger measure of constructive criticism, Miss Fairfax proceeded briskly onward to the business of the day, producing and distributing the follow-up work sheet she had devised for this lesson. She then reviewed the learning which had taken place during the class's recent visit to the Field Centre, and which had been incorporated into the design of the work sheet. This was done by means of a question and answer session, conducted in Miss Fairfax's clear and evenly-paced tones, and aimed as ever at factual accuracy:-

"What do we call some of the foods that trees get from the soil?"

"Minerals, miss."

"That's right, Akeel. Well remembered."

As she went on to work through the work sheet line by line and answer by answer, Miss Fairfax was at pains to employ the correct scientific vocabulary

and constantly encouraged her pupils to do likewise. Her revision of the work sheet included mentioning every missing word needed for an answer, writing them on the blackboard and pronouncing them phonetically to help the less able children. A number of other children (presumably the more talented members of the class) were given the option of producing their own piece of writing rather than including the facts in work sheet form. Some of the more enterprising chose this option, but the majority preferred to complete the work sheet as provided. On this occasion, it involved an account of trees and their autumnal leaf loss.

Before setting the children to work, Miss Fairfax was careful to emphasize the importance of correct spelling and vocabulary:-

"What's the word we use to describe a leaf which is drying up?"

"Dead, miss."

"No, Pauline. Think again."

"It's a bit like a potato crisp, miss."

"That's not the word I'm looking for. Come on, somebody... It starts with a letter B."

"Breaking up?"

"That's two words, Ka-Kit. I'm looking for one. It's got something to do with breaking up, but it's an adjective not a verb. It's a describing word. It means easily broken."

"Brittle, miss."

"Well done, Patrick. You can have a house point for that. Do you remember? Mrs Russell used it at the Field Centre. And how do you spell it - with one 't' or two?"

"Two t's, miss. It's like 'little'."

"Good, Melanie. You were listening well yesterday. A house point for you, too."

The session continued much in the same vein, with teacher directed question and answer based solely on facts of the subject in hand, with a scattering of house points for those who gave good answers.

Miss Fairfax answered any questions the children had about the tasks they were set and once the introduction was over, the children were set to work on filling in the answers to the sheet. These answers were then to be written up in "best" i.e. on lined paper which would then be included in each child's folder. Miss Fairfax was equally precise on the way in which the work was presented, specifying in her step-by-step instructions :-

> "A two centimetre margin - use your ruler to measure it properly, please. Keep the title very close to the margin, and make sure the date is on the top right-hand corner of the first line. Miss a line and then start writing. Don't forget - when you're copying it up, I want your best writing. Not second best. When you've finished that, you can colour the margin."

As I was to discover during my visits, this pattern was constant and apparently unchanging; the children were usually passive, well-disciplined and obedient, listening quietly and attentively as Miss Fairfax directed the lesson. Those whose attention wandered from time to time were soon recalled from their reverie by a pointed comment from the sharp-eyed pedagogue. Others all but launched themselves into the air, in their eagerness to give the correct answer.

On this occasion, the children settled down quickly to the task of completing the work sheet and earning Miss Fairfax's approval, with a minimal amount of head-scratching and pencil-chewing, and perhaps more acceptance than genuine enthusiasm. The graveyard hush of the classroom was broken only by the clatter of the occasional shifting chair, invariably followed by a disapproving frown or glance; the task was carried out painstakingly, sometimes laboriously, and often without moving from the desks unless consulting Miss Fairfax in the matter of spelling or punctuation.

A number of other assignments including identifying and sketching the collected leaves, using squared paper to help measure their areas and calculating the amount of deterioration (i.e. loss of chlorophyll) within each leaf were provided to occupy the class when the work sheet was finished. The children were expected to complete all these in due course, but were allowed

to choose the order in which the activities were attempted. The leaves available included hawthorn, oak, horse chestnut, eucalyptus, laurel and sycamore. In case of doubt detailed tree charts of Britain and Northern Europe were pinned up on a frieze board, and there was a plentiful supply of text books to aid identification and sketching; samples of each leaf had also been dried, mounted on card, labelled and covered with clear film by Miss Fairfax as further teaching aids.

Subsequent visits to Miss Fairfax's classroom served to prove that, although the subject matter might change, her teaching techniques rarely did. They were as predictable as the movement of the hands of a clock.

The topic under consideration in the Spring term was a study of the various bird species in the grounds of the Field Centre. The children spent their time at the Centre identifying the birds and learning about their colours, characteristics, habitats, diet etc, making notes which they could write up on their return to school.

Back at St Aidan's, the children continued to work on Miss Fairfax's work sheets, as well as colouring and labelling various line drawings of birds. As before, the atmosphere remained purposeful and industrious. One lesson I visited did generate a lively discussion; the children remembered much of what they had been told at the Field Centre, although the occasional question of "how" or "why" seemed to be neglected or ignored in favour of Miss Fairfax's ideas of what the class needed to know. A certain amount of sketching and painting from text books took place, and the more able children produced some research work using the classroom library books. As a result, a number of colourful and accurate bird pictures were displayed on frieze boards and in the corridor, alongside neatly written captions describing their colour, dimensions, habitats, diet and so on.

In the Summer term, the class did some pond-dipping at the Field Centre. The children were placed in mixed ability groups, and house points were awarded to each group for the number of different mini-beasts they could gather from the pond - provided that each creature could be successfully identified.

"Who can tell me what different small creatures we might find in or around the pond?"

"Insects, miss."

"Good..."

"And arachnids."

"Well done, Tammy"

"How many legs do insects have, Lisa?"

"Six."

"And arachnids?"

"Eight, Miss."

"Well done, Lisa. Now children, what about creatures with shells. What do we call them?"

"Crustaceans."

"Molluscs."

"Which is it? Do you know the difference? That's something we can find out at school. What other creatures might we find, Islam?"

"Um... centipedes, miss."

"Yes."

"And millipedes as well."

"Good boy. Do centipedes really have a hundred legs?"

"No, miss. Just quite a lot."

"Any other creatures you can think of? Carl?"

"Plurals, miss?"

"No, Carl. Plurals are what we do in English, remember? Plural means more than one."

"What about leeches, miss? There might be some in the pond."

"Yes, there might, Nadia. Good girl."

With help from a number of ready reference charts at the Centre, the children soon began to learn how to try and identify each species. Miss Fairfax continued to direct operations

"When you find something in your net and you want to know what it is, these four Key Cards will help you. They have lists on them of all the pond-dwellers you might find this morning. Key A has the names and pictures of all creatures with a shell and no legs. On Key B you'll find creatures with no legs and no shells. Key C has creatures with three pairs of legs on it ..."

"They're insects, miss."

"That's right, Abdul. And on Key D you'll find creatures with more than three pairs of legs. Now before we start, I want you to look at the Key Cards and find out which one has centipedes and millipedes on it."

The children looked slowly and carefully through all the cards in turn.

"They're not on any of the cards, miss. Why not?"

"Because centipedes and millipedes don't live in water. They're not pond dwellers, you see. Right, off you go...."

A lost opportunity to set the class a small problem-solving exercise, but typical of Miss Fairfax's concentration on specifics. In the words of Joe Friday, the laconic hero of fifties cop series 'Dragnet':

"The facts, man - just give me the facts."

Needless to say, the collection and identification of species generated a spirit of competition between the groups which occasionally threatened the harmony of the class as a whole, particularly as some of the children seemed intent on making the most of their new-found freedom of movement

"Hurry up, Bahader - we need a water boatman before Miss gets here. Come on, you've had three goes already."

and at times the gaining of house points almost became more important than the activity and

observations themselves. Fortunately, Miss Fairfax's vigilance soon enabled her to restore order whenever the risk of conflict arose.

Upon returning to school, the children launched themselves on further sketching, worksheets and fact-finding about the characteristics and life styles of the various pond dwellers they had seen. The great majority of the class soon became adept at identification and description of each species, producing numerous drawings and paintings for the classroom walls and corridor; the emphasis in both prose and picture was firmly and almost exclusively upon factual accuracy, with little or no evidence of creative use of the imagination - even during their Environmental Studies lesson, some reading practice was going on. However, close observation of both Miss Fairfax and her approach, the considerable effort put into the preparation of lesson material beforehand and its delivery in the classroom, reveals a genuine concern for the progress of the pupils in her care. The children themselves reminded me forcibly of rows of empty bottles edging slowly along on Miss Fairfax's conveyor belt of knowledge. The targets set for the year may have been limited, but there was no doubt in my mind that the bottles would be filled to a greater or lesser extent, and that the children would know what Miss Fairfax wanted them to know by the end of it.

C GROUP

ASHWOOD SCHOOL

In Mr Akbari's classroom, there is a place for everything, and everything is in its place - including the children. When I visited the class, I soon discovered that Mr Akbari maintains firm discipline - the children even stand behind their chairs until asked to sit at the start of the morning and afternoon sessions. Once in position, they are seated in ability groups of four to six, in quite a crowded room with fairly narrow gangways between the desks. These gangways are Mr Akbari's territory alone; he patrols them like a benevolent taskmaster aboard a Roman galley ensuring that the ship is being rowed rhythmically - and in the right direction.

The regular patrols take place within another regular framework, since the frieze boards of the classroom are decorated by various posters, charts and items of children's work - a drawing, a worksheet or some illustrated writing - displayed on regular pieces of paper mounted on regular sheets of backing paper in regular colours. The displays are neat and tidy, as precisely positioned and uniformly patterned as the windows of a high rise tower block.

As one might expect from this formal approach, most of Mr Akbari's Environmental Studies teaching is done as an illustrated lecture to the whole class or a detailed question and answer session, reviewing the learning experiences from the Field Centre, with the children providing the correct factual responses. He moves round the room slowly, pausing from time to time to survey the multitude, dignified in repose, solid and dependable, authoritative. His voice is deep, clear, measured and yet monotonous, with the dark-brown intonation one might expect of a humanised Dalek. The children listen in respectful silence, dark eyes following his every gesture as eloquent fingers describe elegant curlicues in the air. He marshals and delivers the facts skilfully and with precision, each statement constructed and fitted painstakingly into the tower block of information he builds brick by brick, pane by pane.

This introduction is usually followed by some form of written activity for the class as a whole - the completion of a gapped worksheet, or perhaps the

writing up and illustration of notes the children had made during their visit to the Field Centre, occasionally some creative writing on a relevant theme chosen by Mr Akbari - and perhaps some art or craft work. The more able children were sometimes unleashed upon research work using the numerous library books available in the room. The pick of these contributions was eventually chosen for mounting and display on the classroom frieze boards. In addition, each child had his or her own Environmental Studies folder into which all the worksheets and other pieces of work were secured throughout the term.

In common with numerous other schools who visited the Field Centre during the autumn term, the children were studying trees. Having collected a variety of leaves, fruits and cones, sketched a number of different trees and taken bark rubbings at the Centre, they returned to school. Mr Akbari began the follow-up lesson by asking

"Who can remember the different trees we saw at the Field Centre?"

"Hawthorn and elder, sir."

"Yes, good. Anyone else?"

"Mountain ash, sir."

"Well done, Nirmal."

"There were lime trees, too...."

"And silver birch. And horse chestnuts."

"Can anyone remember the name of another kind of chestnut tree?"

"The sweet chestnut, sir."

"Yes, that's right, Sabila. Well remembered."

"What about field maple trees, too?"

"Good, Azra. Now there's only one tree we've forgotten - can you think which it is? No? Here's a clue - its name starts with a letter 'R'"

"Is it a rowan, sir?"

"That's the one. Well done, children. You've remembered all of them between you."

Mr Akbari's questioning technique is almost invariably information-seeking ; rarely does he venture into the realms of speculation or uncertainty, preferring to treat each Field Centre visit as a hungry traveller would an orange or some other piece of fruit - squeezing every drop of nourishment from it while the flavour is still fresh.

In addition to naming the trees at the Field Centre, the children were asked to measure height and girth, collect fallen leaves, take leaf and bark rubbings and distinguish between evergreen and deciduous trees. Back in the classroom, the children could be found completing a worksheet or writing their own account of the visit, and perhaps producing intricate charcoal drawings of the arrangements of veins in leaves, making leaf prints or painting large pictures of trees and leaves. Mr Akbari had provided a colourful collection of books about trees and plants which the children were able to consult when identifying leaf shapes, and large tree posters containing diagrams of leaves, twigs, fruits and bark were also displayed on the classroom walls, flanking the children's art work.

Later in the term the children collected tree fruits and seeds, and also learned about various methods of dispersal. Just before Christmas, as a way of bringing the topic to a suitably seasonal conclusion, the children collected and sketched a number of evergreens, heard about the origins of the Christmas tree and other traditions of the festive season.

During the follow-up lessons Mr Akbari was keen to emphasize the correct scientific language, and encourage the children to use it

"The green in the leaves is called ... ?"

"Chlorophyll, sir."

"That's right, Azad. Well done."

"And how is the chlorophyll made ..?"

The children responded eagerly, arms extending like radio aerials, anxious to show off their knowledge and beaming with pleasure when their

contributions were valued. New words were rolled round the tongue like favourite vintages at a wine-tasting festival.

Mr Akbari always circulated around and between the groups of children while they were working, making himself available to advise, prompt and suggest, although he discouraged random movement round the room by others and rarely permitted more than a fleeting collaboration between children in the groups. Instructions were given, received and repeated with patience and good humour; the children worked to the best of their ability, retaining and recording much of the learning they had gained from their Field Centre visits.

At one point, as a contrast to the other activities, Mr Akbari introduced a simple experiment to illustrate the movement of water through plants for the children to conduct, observe and write up their own accounts afterwards. Having decreed a set layout for the recording of the experiment, as Mr Akbari did with other pieces of work, it was not difficult to detect a 'sameness' about the finished efforts - which were accurate if not inspired, written as they were under the scientific headings of "Method", "Observations" and "Conclusions".

In the spring term, the class undertook a study on the topic of weather. Once again, the emphasis was very much on the retention of factual information - ranging from the points of the compass and the significance of wind direction and speed, to rainfall, temperature, the identification of clouds and the uses of measuring devices such as thermosticks, rain gauges, thermometers and weather vanes. Drawings of the Stevenson Screen and the weather vane were made at the Field Centre, and the Beaufort Scale was also mentioned.

Back at Ashwood , the majority of these activities was supported by the use of library books, and various worksheets devised by Mr Akbari, most of which seemed to be standardised for use by the whole third year - presumably to serve as evidence of progress made in the subject timetabled as Environmental Studies. Indeed, Mr Akbari was an enthusiastic producer of such follow-up materials, which were invariably science-based and full of detail, testing cognitive ability to the full. One typical example involved the construction of a crossword puzzle, the clues and answers to which

all referred to types of weather or climatic conditions; another asked the children to mark a number of different temperatures on the diagram of a thermometer; a third required them to label various items of scientific equipment and state what they were used to measure.

Weather records were kept week by week at Ashwood, including details of maximum and minimum temperatures, cloud cover, wind direction and speed, state of the ground and rainfall. The children produced their own copies of the British Isles weather maps published in one of the quality morning papers; and a large line graph of local daily weather temperatures at Ashwood School, winding along beneath the blackboard like a skeletal caterpillar, was plotted by a different pair of more able children every day.

While the weather topic was under consideration, Mr Akbari invariably used the question and answer technique to begin most of the lessons:

"Who can tell me which sort of clouds look like lumps of cotton wool with flat bases?"

"Cumulus clouds, sir."

"No, sir. They're stratus clouds - I think."

"Which of them is right, children - Pervaz or Saleem?"

"Dunno, sir."

"Then you'd better look them up on the cloud chart in your folder. And when you've found the answer, I want you to tell me what cirrus clouds look like."

Mrs Russell at the Field Centre took advantage of the mild winter weather to encourage the children to search for signs of spring in the various habitats, listing and sketching any signs they had detected. The final visit of the term linked the weather theme with that of the leaves they had been studying before Christmas, by considering the relationship of climate to leaf size. Plants from various areas of the world were studied, leaves were measured and related to the climatic conditions in which they grew.

This might have given the children an opportunity to speculate or develop theories of their own from

the work at the Field Centre, but, true to form, Mr Akbari took the helm when they returned to Ashwood.

"Who can tell me the names of some of the climatic regions we learned about at the Field Centre? Shafiq?"

"Desert, sir."

"Good. Anyone else? Think of some other warm areas..."

"Tropical, sir."

"Well done, Sughra. Abrar?"

"Temperate, sir."

"Yes. What about a cold desert?"

"Arctic..."

"Sub arctic, sir."

"Make your minds up, you two."

And so on... Once the facts of each case had been established, Mr Akbari was at pains to inform the children how the weather conditions affected leaf development; the children duly recorded each statement, drawing various leaves and labelling them with the appropriate weather conditions affecting or producing them.

As ever, lessons at Ashwood School proceeded methodically week in week out, matching Mr Akbari's measured tread, as visit followed visit. Constantly, the emphasis was on learning gained from the concrete world, facts and figures which could be proved, measured or shown to be true - perhaps at the expense of real understanding on occasions, although the children's pride in their knowledge was both heartfelt and appealing. Mr Akbari himself took genuine pleasure in the achievements of his children, and their determination to please in all aspects of their work. Indeed. no-one could fault either teacher or taught for their application throughout the year.

In many ways, the image of the Roman galley springs readily to mind when reviewing the progress of Mr Akbari and his Ashwood 'crew' - the ship is steadily and unerringly propelled on the navigator's chosen course until it eventually reaches the harbour, delivering its cargo safely to shore before preparing to set sail on another voyage. Will the next journey be undertaken for purposes of trade, or of exploration?

C GROUP

CHESTNUT COPSE SCHOOL

Early in September, Mrs Kennedy's class resembled some of the houses around the school itself - in need of repair; the framework was still standing, but there were gaps in the plasterwork, holes in the roof, broken windows and the foundations seemed to be in danger of subsidence. The class had been undisturbed as top infants, but during their first year as juniors they had been taught by three different teachers. This had left a legacy of insecurity and lack of confidence within many of the children, and for much of the first term Mrs Kennedy was struggling to establish control and good working habits, reminding me greatly of a circus juggler's plate-spinning act. To her great credit, Mrs Kennedy strove manfully to improve on the children's lack of social skills.

Being a capable and practical teacher, Mrs Kennedy had adopted a pragmatic approach to her year's work with the class; before they could produce work acceptable to her, there was an urgent need to settle the children down. Only in this way could she repair the unit and restore it to 'serviceability' again. Accordingly, she insisted on 'quiet times' while the children were working, in order that the usual classroom bustle should not spill over into uproar; when addressing the class, she kept her voice deliberately low-key and controlled, so that the children had to give her their full attention when she required it - although there were occasions when she did insist rather than attempting to persuade. Mrs Kennedy varied her technique according to the needs of the situation; she could be persuasive when necessary, and firm at other times. If lessons took the form of hoops through which her charges had to jump, then jump they would - and, thanks to her ringmaster's approach, there were good signs that the class had settled into a pleasant and co-operative unit by the end of the year.

In order to begin to establish some sort of standard, Mrs Kennedy conducted most of these early lessons on a didactic and formal basis; her approach consisted largely of the illustrated lecture with question and answer, followed by the same piece of written or illustrative work for the whole class to attempt. Her questioning was almost exclusively devoted to fact-seeking, and

the digestion of information acquired from the visits. The children bubbled away like overheated cauldrons in response to Mrs Kennedy's promptings - almost too enthusiastically for her at times, and perhaps because of her perceived need for firm discipline at the outset of the year she may not always have made the maximum use of the children's obvious interest to engineer situations in which they were required to speculate or to satisfy their natural curiosity.

As well as setting a number of class assignments, Mrs Kennedy created her own worksheets - a combination of photocopied pictures, adaptations from commercially produced activity work cards and 'fill in the blanks' sentences - based on the teaching points she had hoped to gain from each Field Centre visit. The children were seated in ability groups, and Mrs Kennedy constantly circled the room, inevitably devoting much of her time to the less able or confident children, involving them with patience and good humour; once she felt that she had the measure of her charges, Mrs Kennedy was able to relax a little and extend the range of classroom activities to take greater account of individual levels of ability. During my early visits the atmosphere in the classroom was often noisy and restless, and Mrs Kennedy had to be constantly alert to these changes in mood in order to coax any worthwhile contributions from the children.

At this stage in the year, the majority of the children were lacking in concentration, tending to function rather spasmodically like an ailing tannoy system, and sometimes with similar sound effects. Nevertheless, the classroom itself was colourful and welcoming, with evidence on the frieze boards of mathematical, language and science activities, even if the early displays often consisted of matching sets of the "best work" from the class as a whole. The advantage of a frieze board running the entire length of the back wall enabled a number of large pictures or collages to be constructed during the year, including what appeared in the autumn term to be an entire High Street shopping arcade complete with shop fronts, vehicles, customers and urban wildlife.

Early visits to the Field Centre were based on a study of trees, under the title of 'Woodland Past and Present.' Having identified various different types of tree at the Centre, sketched them and

collected samples of their leaves from which to make leaf prints at school, the children returned to write their own account of "what we did."

"Now, children, look carefully at the leaves you collected. How many ways are they different from each other? Let's make a list on the blackboard."

"Little leaves and big leaves, miss."

"Give me one word that means little and big. The leaves are all different ....."

"Sizes, miss."

"Yes. Good boy, Mohammed. Who can spell the word 'size'? Tell me another way leaves are different. Tajinder?"

"Shapes - some are broad, and some are narrow. Some are one big leaf and some look like they're made up of different chunks stuck together."

"Good. Anything else?"

"Colours, miss. There are green leaves, and red ones..."

"And yellowy ones, too."

"One at a time, children. Baljit?"

"I know another way they're different, miss. The edges of the leaves are different - some have jagged edges, and others are straight."

"That's right. Well done. There's only one more word we've missed. Mrs Russell used it at the Field Centre - who can remember what it was? It starts with a letter 't'. It means what you can feel when you touch and feel the leaf."

"Taste, miss?"

"No, Monazzim, but it was a good try. We don't eat leaves, do we? Anyone else like to guess? The first three letters are 't', 'e' and 'x'"

"Miss, miss - I know."

"Go on, Jaspreet."

"Texture, miss."

"Excellent, Jaspreet. Now, can anyone spell it?"

As a follow-up to work done at the Field Centre, Mrs Kennedy played a version of Kim's Game, using a tray containing various different leaves to encourage greater facility in identifying specimens from holly, yew. oak, privet, laurel, beech, and so on. Sets of commercial work cards on the theme of trees and woodlands were also used to reinforce the learning. Throughout the lessons, the emphasis was upon facts and information - trees and leaves were identified, drawn and painted, as were their various fruits and seeds.

The nature of trees and their usefulness to human life were also considered, and samples of numerous woods were on display alongside a collection of library books on the subject of trees. The more able children were given simple research work to do using these books to discover which parts of the world each piece of wood came from, and Mrs Kennedy spent a considerable amount of her own time producing suitable worksheets and cards.

A number of different ideas and topics were covered, including a comparison of differing woodland areas (temperate and tropical) throughout the world and the topical subject of rain forests in South America. Mrs Kennedy was at pains to explain the implications behind the loss of rain forests, and encouraged the children to take an interest in the issue whenever items were broadcast on radio or television news bulletins. Maps and a globe were available to help the children locate the areas of the world under consideration, and to show where the various samples of timber on display in the classroom came from. These reference sources were consulted avidly, the children gazing at the globe with all the intensity of a fortune teller at a fairground.

Mrs Kennedy also incorporated a video recording about 'Pauline's Family In Borneo' in order to compare and contrast life styles in other parts of the world with the children's own urban surroundings at home. The children investigated the difference in diets, how the food and drink was obtained, and the cost in money and labour terms. The results were listed, largely in a standard table format. Once again, the required information was obtained after viewing the programme and answering a series of questions from

Mrs Kennedy, before completing a number of worksheets based on the material contained in the broadcast.

The children were quite intrigued at a lifestyle of hunting and living off the land.

"Wish I lived over there," sighed Abdul. "I'd have lots of exciting adventures in the jungle."

A good opportunity of producing some worthwhile creative writing, art work or drama thus presented itself. The more able pupils managed to write accounts of how different their lives would be were they living in Borneo rather than Birmingham, though these were necessarily uniform in content and in quality, informing like an auction catalogue rather than inspiring like an explorer's journal.

Another topic undertaken by the children of Chestnut Copse School later in the year was given the title 'Wildlife In The City'. Visits to the Field Centre involved searches on land, in the air and in the water to discover how many species of wildlife inhabited the urban area of the Centre. Bird-watching, pond-dipping and land searches of the various habitats of the Centre led to a good deal of experience in identifying its many inhabitants. The activity aroused considerable excitement amongst the groups of children, who soon became accustomed to handling petri-dishes, magnified containers, sweep nets, pooters and white trays.

"Coo, miss, I feel like Sherlock Holmes doing this!"

New words began to enter the children's vocabulary:

"Who can tell me what we call a creature without a backbone?"

"A .... invertebrate, miss."

"Good, Usman. I can see you've been listening."

The various groups of invertebrates were named, and the children's catches were then examined, counted and classified:

"This creature has ... how many legs?"

"Eight, miss."

"So it belongs to ... which group of invertebrates?"

"Arachnids, miss."

"That's right, Harvinder. Well done."

Back at school, the results of these surveys were listed on more of Mrs Kennedy's worksheets. Graphs were drawn to illustrate the numbers of creatures found. The more able children spent some time researching the habits of common invertebrates and writing short accounts about them; the whole class drew and painted pictures which were incorporated into a giant panoramic landscape running the length of the back frieze board. When this was finished, the children were inordinately proud of it:

"It's the best frieze we've done for Mrs Kennedy - everybody in the class has got a picture on it, not just them what can draw."

And as the year continued, Mrs Kennedy contrived to involve all the children in contributing towards the classroom and corridor displays, whether in writing, paint or collage. As a result, the fragmented collection of individuals she had inherited at the beginning of the year began to come together as an integrated group, gaining in confidence and a sense of purpose; the contribution of their Environmental Studies work to this process should by no means be underestimated.

If, at the outset, the children were an unpromising pile of bricks, then their visits to the Field Centre served in part as the cement which helped to bring them together, restoring the fabric of the building.

As Shakespeare once wrote :

"One man in his time plays many parts....."

and so it is with the resourceful Mrs Kennedy - functioning as architect, ringmaster, botanist, detective and bricklayer, amongst many other roles; such is the craft of teaching in urban primary schools today.

E GROUP

WAYSIDE SCHOOL

Mrs Morgan of Wayside School has a warm personality and an enterprising approach to both the work and to the children themselves. She is friendly, relaxed and softly spoken, harnessing all the skills of a good children's TV presenter without the breathless brashness of the contemporary, tee-shirted brigade. Her classroom has a friendly, rumpled, 'lived in' look, always packed with colour from books, posters, frieze boards and mobiles, and with the evidence of a variety of written and practical activities scattered haphazardly around - a room for children, rather than a classroom, where plimsolls, pipe cleaners and paint pots mingle carelessly with soft toys, string and scissors in a ragbag of cheerful chaos. The children themselves are seated in mixed ability groups and, as I soon discovered, actively encouraged to exchange ideas and help each other as much as possible - becoming in the process as close-knit as a classroom kibbutz.

Much of the autumn term was spent on an integrated topic loosely entitled "Food, Glorious Food". The children had returned from their early visits to the Field Centre clutching a number of fruits and vegetables from the grounds to study, having also tasted a number of unusual foods including lychee, olive and ginger. Back at school, Mrs Morgan took each item of Field Centre produce in turn, asking her contemporary Walter Raleighs

"Which parts do we eat?"

Answers varied from item to item....

"The root, miss."

"The stem."

"The leaf, miss."

Eventually, one of the children observed:

"It's not always the same, is it? Why not?"

Various theories were exchanged and the children spent some time investigating the problem. Afterwards these vegetables were classified, measured, sketched, painted, written about,

depicted in cross-section and in collage form - and some were eventually cooked. Truly a case of "read, learn and inwardly digest" !

Throughout this process the children were constantly encouraged to use all their senses when handling the produce, to move freely around the room in search of books and apparatus, and to discuss these observations with their colleagues. From this initial beginning, the scope of the topic was widened to include numerous other aspects of food; a study of various tins and packets enabled the children to discover the main ingredients of our foods, as well as some rudimentary ideas about nutrition; one frieze board was fully occupied by a colourful cutaway diagram of the human digestive system, and another was devoted to the rules of good food hygiene; graphs of favourite snacks, fruits and dishes were drawn, based on statistics taken from all the classes in the school, and the children were encouraged to produce the "mouth-wateringest" menu they could imagine.

"I'd start with melon, then I'd have roast beef and Yorkshire pudding, and I'd finish off with strawberries and cream."

"What about fish fingers and ice cream?"

"Not on the same plate, John!"

The latter activity was later extended to include the menu they would offer customers if they were running their own restaurant, and the menu card later became a useful exercise in handwriting practice. The menu itself stimulated some animated discussions, with much lip-smacking and brow-furrowing, as personal tastes clashed with more commercial considerations.

"And I'd have lots and lots of chips.."

"You can't have chips with everything."

"Why not?"

"Cos not everybody's like you. If you're running a restaurant, you have to cater for what other people like. You need a choice of different things."

"Why?"

"So people will come again. If people are going out to eat, they don't want something ordinary - you can get that at home. And chips are ordinary."

"But lots of people buy chips every day - you can make plenty of money selling chips."

"But not everybody likes chips.

"I do. I'm always having chips."

"Too much chips isn't good for you, is it, Miss? You'll turn into a chip one day. Serve him right, wouldn't it, miss?"

Mrs Morgan was not slow to respond.

"I wonder what might happen if David did turn into a chip one day. Let's write a story about it."

Needless to say, a number of imaginative and curious scenarios about David's transformation were created, and read out to the rest of the class one Friday afternoon with great delight. Mrs Morgan placed no restrictions upon the scope of the stories, with the result that many of them bordered on the surrealist. Throughout the writing of these and many other stories, Mrs Morgan acted as a catalyst in sparking off the class imagination, fully prepared to take the risk of allowing the children to experiment with ideas and thus express their own personalities freely. As a result, the classroom fairly hummed with activity, words and ideas swooping around like honey bees, with Mrs Morgan as the queen of the hive.

It was at this stage that the more epicurean members of the class expressed a desire to investigate some of today's more exotic 'foreign' foods - including spaghetti, curries, pizzas, snails and frogs' legs. Accounts of the origins of these dishes were researched from library books and magazines in school, whilst parents and family friends were persuaded to send other recipes and cookery tips. Perhaps the ultimate manifestation of parental involvement came with the organisation of a number of 'dinner parties' for the children to try out these recipes after school, which soon became known to the cognoscente as "nosh-ins." Not only were the children learning theoretically in school, but they were also able to practice

life skills outside it by being a host or a guest at these functions. Some children were even taken to "a real restaurant" for the first time, as a direct result of the enthusiasm generated by their classroom work.

From the real thing, the children went on to design fantasy foods of their own - new ideas for breakfast cereals inspired a number of descriptions and paintings of unconventional flavours, colours, products and packaging. Once again, no restrictions were placed on the imaginations of the children, with the result that a remarkably wide range of expression soon became evident. Even the mixing of paint colours became a problem solving exercise, as the children were encouraged to experiment and to find out for themselves. Observing Nilesh, hunched like a young Quasimodo over his paper and absorbed in the design of his latest market leader, Mrs Morgan asked the class

"Does anyone fancy a purple breakfast cereal?"

The prospect was not universally popular. When he was asked what he intended to call it, back came Nilesh's answer

"Beetawix, miss."

Francis spent some time perfecting various bizarre new flavours, including raw octopus and garlic flakes.

"It's for people who don't like breakfast," he explained.

The study of food was later extended by reference to food supplies for man from farming, and those in the natural world. Back at the Field Centre, the children were intrigued at the range of foods needed by the ducks, hens and wild birds there. Various mobiles depicting different food chains were soon suspended from the classroom ceiling. A considerable amount of written work sprang from these researches, and the subject of food readily lent itself to song and story - with the music of 'Oliver!', and Roald Dahl's fantasy stories of 'Charlie and the Chocolate Factory' and 'James and the Giant Peach' being particular favourites. The Dahl tales inspired numerous pieces of writing inventing new confections and culinary adventures, which the children took great delight in reading to each other.

The extent to which the class as a unit constantly supported its individual members was quite remarkable, and sprang I suspect from the sense of a learning adventure being shared by everyone, including Mrs Morgan. She was honest enough to admit when there were questions to which she did not know the answers, turning a potentially awkward situation to good account by involving the entire class in trying to discover solutions to problems.

Indeed, whenever I visited the school during this term, the children were engaged in a variety of purposeful activities, ranging from mathematics, science and creative writing to art and craft work, accompanied by the buzz of conversation as they helped each other. Throughout the proceedings Mrs Morgan remained discreetly in control, prompting and inspiring without dictating or dominating, as close to her children as a well-loved older sister. It was no surprise to hear the label "Miss" occasionally being replaced by that of "Mum", though the children concerned were unaware of any slip of the tongue; at the same time, it served to verify the quality of the relationships being formed between Mrs Morgan and her pupils.

Later in the year, the class was studying bird life at the Field Centre. In addition to noting and identifying the various species around the Centre, observing them through binoculars, representing the numbers graphically, drawing and painting the birds and researching their habits in library books, the children then began to take account of the number of different species in and around the Wayside School grounds. Birds of both fact and fantasy were painted and modelled in papier-mache, frieze boards became aviaries and the classroom ceiling was festooned with colourful bird mobiles. Feathers from a variety of birds ranging from the humble sparrow to the lordly peacock were investigated under microscopes, arousing both curiosity and wonder

"Look at the little hooks linking it together.."

Simple experiments were carried out on these feathers to demonstrate how waterproof they were. One group of children set out to discover as many uses for feathers as they could, and eventually came up with ten different functions. Some children tried making wings from card, laying out

the individual feathers so that they overlapped in the same way as a bird's primary and secondary feathers would. Others studied worksheet pictures of the bones in a bird's wing and compared them with the bones of a human hand and arm. Indeed, the topic gave rise to worksheets of various kinds but, perhaps unusually, these were employed as aids to learning rather than as the focus of the lesson.

The whole class was fascinated by the concept of bird migration. Nughman spoke for many:

"How do they know which way to go when they couldn't read a map if they had one?"

The children often spent time discussing the workings of animal instinct, and deciding whether or not similar instincts existed in human beings.

"Humans are cleverer than animals, aren't they, miss?"

"Does that mean we can do everything better than they do, children?"

"Course we can. Our brains are bigger than theirs."

"I don't think Dawn's right, miss. We can build flying machines, but we can't do it ourselves, can we?"

"We couldn't find our way for hundreds of miles without a map, miss."

"I think animals and people are clever in different ways, miss. Like our class - we're all good at some things, but not always the same things. Tommy's good at football, but he can't draw as good as Jason."

Another highlight of this topic work came when a group of interested children collected twigs and grasses from the neighbourhood of the school and tried to build bird's nests, using soil and water to make "real mud." The theory of human supremacy over the animal kingdom was severely tested, as the children soon began to realise that the task was not as easy as they had anticipated. Nevertheless, they persisted in their endeavours with untiring determination; even the class hardcase became absorbed in the nest-building

activity and, when interrupted, was heard to remark to the offender:

"Shurrup, I'm doin' somethin' delicate!"

As James, elbow-deep in muddy twigs after an hour's concentrated effort and wrestling with a creation somewhat akin to a lopsided pincushion, wryly observed

"This is the last time I call anybody a birdbrain."

Various other activities were incorporated into this topic on birds; the children heard legends and folk stories about birds from all over the world; they wrote their own poems and stories about birds, and sang songs about them too. The children tried to imagine what life as a bird might be like. They did not find this easy - as Salma remarked

"It's not easy writing in me when I'm trying to think in bird."

Thanks to the enthusiasm of the children and the inspiration given by Mrs Morgan the topic seemed to snowball, almost taking on a life of its own as time went by.

Not only did the class's knowledge of bird species improve, but as their confidence and interest grew they became less inhibited in their approach to other lessons, seeming increasingly capable of solving (or attempting to solve) other problems in flexible and imaginative ways. A typical example came with the challenge to design a squirrel-proof bird table, which produced a number of ingenious Heath Robinson style drawings and explanations, involving liberal uses of bait, camouflage, trapdoors, catapults, mallets and similar anti-squirrel devices.

Perhaps this snippet of overheard conversation holds the key to Mrs Morgan's teaching style and influence:

"Why don't you ask Mrs Morgan? She'll know the answer."

"I've tried doing that, but she just bounces your questions back at you again, and makes you find out on your own."

The trampoline effect of Mrs Morgan's flexibility of approach has undoubtedly contributed to the growth of self-confidence within her pupils. She allows her children to take the risk of attempting creative ideas, and does not try to discourage individualism or to impose conformity of thought. The children themselves appear to have gained considerably in their own willingness and ability to confront problems, to use their own initiative and to discover solutions. Instead of becoming victims of the force-feeding style of teaching, they have been able to make an active, self-directed contribution to their own learning; and, like Oliver Twist, they come back wanting more.

E GROUP

ST JEROME'S SCHOOL

Whenever I visited Miss Baptiste's classroom, there was an unmistakeable atmosphere of mutual respect coupled with a bubbling enthusiasm for learning, which promised a keen and harmonious working relationship throughout the year. Indeed, the free and easy classroom mood, often with echoes of laughter in the air, was not only achieved through a shared sense of purpose but also sprang from the chemistry of wonder, delight and the sheer exuberance of youth in which learning becomes a joyful experience. Miss Baptiste sets the tone by being herself and by allowing the other children to express their own personalities, albeit within a secure and disciplined environment. In terms of their work, this is an atmosphere in which children can be comfortable in being wrong, can be inspired to try again and to learn from their mistakes.

The children are seated in mixed ability groups, in a classroom bursting with colour, as bountiful as a market garden. Children's work is not confined to the classroom frieze boards, but trails around the walls and windows of the room like spirals of honeysuckle around a cottage door. Illustrated poems and stories appear alongside graphs and accounts of scientific experiments, plans, paintings, models and collages. Through it all Miss Baptiste continues to plant ideas like seeds here and there, encouraging them to grow and to flourish.

The topic under consideration in the autumn term was one of simple mapping. During their early visits to the Field Centre the children visited all five of the Centre's habitats, finding their way around by using a simple plan of the grounds devised by the teacher at the Centre; they then measured the different areas (the field, the garden, the orchard, the nature reserve and the wood), collected various specimens of leaves, flowers and fruit, and devised their own symbols to indicate any crops growing there.

Back at school, the children completed written accounts of what they had seen on their visits. Rather than a dull report of "this is what we did," Miss Baptiste encouraged the children to concentrate upon one or perhaps two experiences which they remembered (and described) vividly,

before combining the writing to create a patchwork quilt of recollections. Being free of the usual stultifying effort involved in remembering and writing about every event in chronological order, the children were thus able to focus their attention on what really interested them.

"I saw a wasps nest! I wonder how they build one."

"Where do they go in the winter - on their holidays?"

"The fox cub's skeleton was spooky."

"I saw some frogs in the nature reserve. They were hiding from us, I think. I expect they can see us coming with their big, bulgy eyes. It must be fun to be able to long jump like they do - what's the longest distance frogs can jump?

"Where do frogs come from?"

"Why don't many people like frogs? I think they're fun. I think I'd like to be a frog."

"A witch might turn you into one!"

"I'm going to write a story about that..."

And write they did, page after page, swiftly and with increasing fluency as their imaginations were fired by the impact of their experiences - instead of a penny plain, parchment approach, the children's efforts produced a twopence coloured tapestry of images and impressions gained from the Field Centre.

The practical aspect of mapping developed apace; from the simple plans of the Field Centre, they began to map the school buildings, both inside and out. The problem of superimposing ground floor and first floor plans intrigued one group of children; another group turned their plans into reality by making simple models of the school building using shoe boxes and other scrap materials; a third took the process one stage further by modelling individual classrooms. And not satisfied with these efforts, the children launched themselves into drawing up plans of an ideal school of the future - incorporating a number of novel ideas of the kind of facilities which might then be available to their grandchildren.

"I think we'll have invented computers that can talk to schools in other parts of the world by then."

"And telephones might have little screens so you can see who you're talking to. In colour, too."

"The teachers will be able to turn things like TVs and videos on and off in their classrooms just by speaking. They won't have to leave their seats."

"That's nothing. They do that now - they tell us to do it for them!"

Some children even drew plans of their own homes, though this activity was not without the occasional sacrifice:

"My mum said if I didn't tidy my room up first, nobody would be able to see where the furniture was!"

Plans gave way to simple maps of the neighbourhood, and in turn to maps of the British Isles and other countries. Many of the children had relatives abroad, and produced a fascinating diagram of their family connections around the world. They brought in photographs and souvenirs for a classroom display - rich fabrics and expressive wood carvings, real family treasures which were shared and valued by all. So much so, that they were all safely returned, with letters of thanks, when the exhibition was finally dismantled.

From maps and plans, the children moved on to consider the various trees at the Field Centre. In common with many other schools, the children of St Jerome's identified trees and collected leaves, fruits and flowers to take back to school. They painted tree pictures, measured their heights and girths, made leaf print patterns, measured their areas using squared paper, and carried out various other activities. When someone asked Miss Baptiste

"Miss, what's the biggest plant in the world?"

the search for an answer became the source of much head-scratching and leafing through library books.

The children also studied many of autumn's features, being particularly fascinated by the mysteries of hibernation.

"I expect their mums tell them when to go to sleep..."

"How do they know when it's time to wake up?"

"If they're asleep all that time, how come they don't starve to death? I would!"

Such was the interest roused that the children often spent their break times reading library books in attempts to find out answers to their questions. Even when these answers were not forthcoming, children like Sandeep were duly philosophical:

"We don't know the answers, but we can have fun guessing. Besides, if we knew everything, life would be very boring, wouldn't it?"

Life in Miss Baptiste's classroom was far from boring; even questions that no-one could immediately answer became the subjects for further investigation, and if not every answer could be found, there were enough facts to remember (and to relish).

"What do we call the green colouring in leaves?"

"Chlorophyll, miss."

"Good boy, Matthew. Well done."

"Can anyone remember where the stick insects come from? Which country? Vijay?"

"Vietnam, I think."

"That's right."

"What sort of toad did Mrs Russell show us yesterday?"

"Miss, I know.....miss! It was a Xenopus toad."

"...and what sort of creature is a salamander? Can you tell me, Valdheer?"

"It's an amphibian, miss. It can live on land and in the water."

"What does the word camouflage mean?"

Whenever Miss Baptiste asked her questions, a forest of hands was raised in reply. Correct and incorrect responses were equally valued, and it was obvious that the children were far from disconcerted if their first answer was not accepted. In fact, lack of immediate success only spurred them on to redouble their efforts.

As the animal studies continued, their influence began to manifest itself elsewhere in classroom activities; stories were written describing the discovery of new imaginary species of animals, with ever more extraordinary characteristics and life styles; an extensive survey, with charts and graphs, was made of the pet-owning population of the entire school; numerous myths, legends and folk tales about animals from around the world were read by and to the children, and sometimes acted out; several songs about animals became part of the class's repertoire, whilst countless paintings, collages and models of animals from fact and fiction adorned walls, shelves and bookcases in and around the classroom in a display that would have made even Gerald Durrell envious.

In the Spring term, the children of St Jerome's School undertook a study of birds. Starting with their visit to the Field Centre they began to observe, identify and count the different species of wild birds there, as well as speculating as to which of them might be likely to visit the school playground. On their return to school, the children kept a daily count of feathered visitors and recorded them in both tabular and graphic form.

"Look, miss, there are two magpies and a blue tit in the playground."

"And see - that's a robin over in the corner!"

Several feeding posts for wild birds were set up round the school, and pairs of tip-toeing, clipboard-clutching spies could be seen stealthily observing them.

"Don't write so loud, Marsha - you'll scare 'em off!"

Feeding activities soon led Shahid to the shrewd observation that not all birds ate the same kinds of food; this launched an interesting study of beak shapes and food preferences. Feathers were closely observed under microscopes, and their uses also came under consideration.

"Children, can you tell me some of the reasons why birds have feathers?"

"To help them fly, miss."

"Yes, Louisa. Any other reasons?"

"So they know what sort of bird they are."

"Sometimes the colour of their feathers helps them to hide if an enemy is after them."

"Feathers keep them warm. And dry if it's raining."

"How do birds stay dry in the rain, children?"

"I know, miss."

"Go on, Simon."

"They have a sort of oil on their feathers that makes them waterproof. The rain just slides off."

"Here's a question for you - how can you have a bird that isn't a bird?"

After a number of suggestions, little Baljit, owl-like and solemn in a large pair of spectacles, suddenly rose like a rocket in flight and announced

"Got it, miss. It's a ladybird - its name makes it sound like a bird, but in fact it's an insect."

Miss Baptiste was not the only person to ask questions .....

"What would happen if birds had no feathers, miss?"

"Why do we say 'as the crow flies'?"

"What do you think, children?"

The ducks and hens at the Field Centre were studied, sketched and pictures were then painted back at school. Questioning from Miss Baptiste established that words such as "grit", "digestion" and "crop" had been added to the communal vocabulary.

Library books, posters and RSPB leaflets were consulted avidly in search of information and photographs to help with the task of transforming the classroom into a still-life bird sanctuary. Each of the birds that were modelled or pictured had a story or a poem written about it, even legendary creatures such as the phoenix and the firebird. As before, the worlds of music, literature and drama became interwoven with the work of the children, helping to improve basic vocabulary, general knowledge and self-expression.

A similar process took place when the class went on to study invertebrates and do some pond-dipping at the Field Centre later in the year. Species were netted, identified, observed under microscopes, researched back at school and then captured (if only for a temporary posterity) in pencil, paint or fabric. The children wrote and illustrated accounts of the adventures they imagined might happen to them if they were an invertebrate in the Field Centre pond....and so on.

The secret of Miss Baptiste's obvious success with her children might well be equated with the skill of the green-fingered gardener, who keeps her territory full of life, interest and colour throughout the year. In her own way Miss Baptiste tends the children in her classroom as the gardener cultivates young plants, feeding them with the nourishment of knowledge and the light of success, maintaining the optimum conditions required for healthy growth. Few would fault the quality of her results.

E GROUP

STONEBRIDGE SCHOOL

The class chosen to visit the Field Centre this year was the fourth year class of the deputy Head Teacher, Mr Bailey. By contrast with the other schools, the children at Stonebridge had an extra resource available in the shape of Mrs Castle, the Environmental Studies post holder at the school. Mr Bailey and Mrs Castle worked together as a teaching team.

The classroom is bright and cheerful, with displays of mathematical and language work competing with a striking pantheon of the gods from Greek mythology, all freely interpreted by the children themselves, gazing down rather intimidatingly from Olympian heights upon the classroom below. Well stocked bookshelves and neat piles of assignment cards guarantee work for idle hands. The window ledges are crammed with models and pot plants, carefully labelled with the names of their proud owners. The children are seated in ability groups of between four and six pupils, the desks arranged informally around the room. Mr Bailey, as befits his position, bustles about planning and organising arrangements and equipment. Mrs Castle takes the responsibility for much of the follow-up work to each Field Centre visit.

When the children visited the Field Centre in the autumn term, they began by studying the invertebrates in the pond. Various groups of children took up position around the edge of the pond and, nets in hand, began gently to skim the surface of the water. Using Mrs Russell's charts, the children had little difficulty in applying their newly acquired knowledge of insects, crustaceans, arachnids et al and classifying their catches according to number of body parts, legs etc.

"Look what we've got - a water boatman and a pond skater!"

"What's this one, John?"

"Well, if it's got six legs it's an insect. Any more than that and it might be an arachnid or a crustacean. You'd better count 'em and see."

"Can we swop you a water scorpion for a snail?"

Having accounted for all the creatures they had caught and replaced them in the water, the children returned to school and began to record the results of their activity. With the help of Mr Bailey, the school's computer expert, the children began to refer to library books and set up their own database on 'Mini-Beasts'. Group and individual contributions were composed, edited by a committee of the children, typed in on the computer and the results printed out neatly in extra-large letters, ready for display. Creative writing in the form of poems and stories was drafted in longhand, however laboriously, and then transferred to the keyboard. Even the captions for the many paintings and drawings around the classroom were produced by the computer, operated by young typists with casual ease. The children chose the creatures they wished to write about; Hafiz's is a typical example of how even the less academic children in the class felt able to make a contribution:

> "My animal is called a newt. A newt lives in water and it eats insects. It is a vertebrate and it has four legs. It can be brown or green. It has a head, a body and a tail. It has a backbone too."

This in ten minutes from a pupil who normally dawdled for anything up to an hour in constructing even a couple of simple sentences.

It did not take the children very long to set up a database which had detailed references to the habits and lifestyles of ladybirds, dragonflies, water scorpions, butterflies, newts, bees, leeches, snails, pond beetles, spiders, caterpillars, water boatmen, frogs, water beetles, pond skaters and various other creatures. Information could be (and often was) called up at the touch of a button, and the entire database was made available to the rest of the school as a reference source.

Other visits to the Field Centre included a similar search to find invertebrates on land, carried out with such painstaking attention to detail that the entire nature reserve, woodland, field and garden seemed to be plagued by grazing swarms of locust-like children, rummaging through the undergrowth. Once more, the catches were identified, observed and recorded.

The children soon became expert in identifying the various species they found. They took particular pleasure in observing some of the more unusual invertebrates kept at the centre.

"That Giant Snail was fantastic, miss."

"I liked the Hissing Cockroach best."

"I wonder why it's hissing - perhaps it doesn't like people."

"What noises do you think Giant Millipedes might make, children?"

A lot if they all had boots on, miss."

How did the Red Rumped Spider get its name, miss?"

"I don't know, Basmin. What do you think?"

"I think the King of the Jungle smacked him for being naughty. Perhaps he trapped someone he shouldn't have in his web. I'm going to write a story about him when we get back to school."

As time went by, the children became more and more absorbed in the new worlds they had seen at the Field Centre. They had no difficulty in separating fact from fiction, and yet were not at all afraid to fantasise or speculate about how or why these tiny creatures came to be. Indeed many were the Kiplingesque tales of 'How The Red Rumped Spider Became' or 'Why The Cockroach Came To Hiss'.

Later in the year, their interest in the more curious or bizarre forms of animal life developed into a study of reptiles and amphibians, ranging from the snake and the axolotl to the fire salamander and the wall lizard. Once again, speculation ran riot.

"What a strange name - axolotls. Where do they come from?"

"What do they feed on?"

"I'm going to look these places up in an atlas, and draw a big map of where their real homes are."

Throughout these visits, Mr Bailey and Mrs Castle remained discreetly in the background, making themselves available for consultation but allowing the imaginations of the children full rein. The nature database on the Stonebridge computer was expanded week by week to include detailed biographies of new creatures from anolis lizards to xenopus toads.

Some of the boys developed a curious almost ghoulish interest in "skellingtons", and they were intrigued by those of lizard, frog, rabbit, fish, fox cub and snake which could be seen at the Centre. One of Mrs Castle's contacts worked at a local hospital, and was able to borrow X-rays of human bones for the children to inspect. They were amazed at the variety of skeleton 'designs', and took great pleasure in comparing animal with human.

"I thought all skellingtons were the same - just bigger or smaller. But they're not .."

"Watch how this leg moves, miss."

"How do our knees and elbows work, miss?"

"I bet elephants have big skeletons - not as big as a dinosaur, though!"

"If we didn't have no bones we'd be all floppy, wouldn't we, sir?"

And perhaps the ultimate question:-

"Who decided skeletons should be made this way?"

Towards the end of their year's work, the children progressed from reptiles and amphibians to mammals and fish. The differences between species were analysed and discussed.

"Mammals have hair or fur on their bodies.."

"..and they're warm-blooded, sir."

"Fish live in water, they're cold-blooded."

"Sir - if tropical means hot, how come tropical fish are cold-blooded?"

The children considered which creature they would like to be if they had the choice.

"I'd be a lion, 'cos they're king of the jungle.."

"I'd be a sloth - you can do nothing all day and nobody grumbles at you."

"Bet you'd be bored in no time, Abbas."

"I'd be a cheetah, 'cos they can run ever so fast.."

"I wouldn't like to be an elephant, 'cos you get killed for your tusks."

This latter statement reveals evidence of the children's increasing awareness of current conservation issues. At various times of the year, often spontaneously, they touched on issues such as pollution, acid rain and nuclear waste; even though these considerations were incidental to the task in hand, both Mr Bailey and Mrs Castle were flexible enough to realise that the children were genuinely interested and to give time to discussions of the matter. To those who value a lesson by the amount of written work springing from it, no doubt these sessions may have been considered 'a waste of time'. However, I feel that this was far from the case - the children were addressing issues on which they had genuine concerns.

On a more down to earth level (literally!) the children applied their newly gained science knowledge to the school grounds at Stonebridge. They built a small wormery in the classroom, drew diagrams (top and cross-section) and experimented by leaving various foods on the surface of the soil.

"Look, sir - the cheese is still on top."

"The small leaf has been pulled down under the soil.."

"But the two big leaves are still there."

"Worms don't seem to go for cauliflower.."

"I'm not surprised, sir. I can't stand it either!"

"Have the worms taken any of the food we left, children?"

"Yes, miss. The onion...and the small bits of crisp."

"What flavour crisps do worms like, then?"

"Ready salted, I think."

"Not a lot of people know that!"

The children also kept weather charts, carried out traffic and litter surveys, observed and listed the number of wild birds visiting the playground. They sorted and decorated pebbles, even tried some simple woodcarving from broken branches and tree roots. They used fir cones and other natural materials to make models of hedgehogs and spiders, collected and classified leaves from the playground, and even set up a nature trail around the neighbourhood encompassing a number of new discoveries they had made.

"My dad was surprised when I told him all about the wildlife around our streets. He said he must have been walking about with his eyes closed for years. I'm taking him round our trail next Saturday."

Throughout the year, they wrote - often before being asked, and with increasing confidence;

"The owl listens carefully,
Unblinking,
Silent in the too-peaceful night.
He waits, still as a feathered statue,
Dappled in moonlight,
Menacing,
Awaiting his timid and unwary prey.
Suddenly his eyes flash red with fire,
Back go his wings
And he dives from his perch.....
The owl is wise
Because he looks
Before he leaps -
Not like we do!"

There is no doubt that the partnership of Mr Bailey and Mrs Castle has harnessed the interests and talents of their pupils to the full throughout

the year. Unlike many contemporary teachers who believe in launching their children like darts at the dartboard of knowledge, expecting them to fly straight and true to the target, the Stonebridge team has the flexibility to resist this temptation. Like Stevenson, their philosophy appears to embrace the thought that

> "to travel hopefully is a better thing than to arrive...."

The Stonebridge children appear to have done both.

CONCLUDING DISCUSSION

This thesis documents an account of a very wide ranging research study and indeed an ambitious study in the sense that it has attempted to bring together two very different paradigms or approaches to investigating life in school classrooms. It would seem appropriate to organise any conclusions which may be drawn from the work into a number of categories, namely:-

- Comments on the data obtained and on an analysis of the empirical study documented.

- Comments on the research design and the attempt to bring together two apparently contradictory approaches to investigating learning.

- Comments on the implementation of the National Curriculum for schools and on how ideas and data generated within this study may be of value to teachers, and, related to this:-

- Comments on the basis of this study for future research and curriculum development with teachers and students in training.

First and foremost, data derived from the traditional research design involving pre-treatment and post- treatment testing shows without any doubt that when a comparison was made between a sample of children who had completed a year's work based on a subject-orientated, non-integrated curriculum and a sample of children who had completed a year's work based on a totally integrated and thematically based curriculum, there was a very significant difference in the resultant scores of the two groups in tests of creative thinking. The classes following an integrated/environmental theme approach gained outstandingly higher scores on all dimensions of both the Torrance Figural and Verbal tests. Not only that, but many children in the classes following a more traditional subject orientated approach actually achieved lower levels of success in the post-test phase. The results as a whole are clearly quite dramatic and raise a number of interesting questions concerning the nature and nurture of creativity and divergent thinking abilities and the validity of the experiment. Even the least sceptical reader would surely wish to pursue some reasoned explanation for the conclusive statistical outcome of the experiment. Quite obviously a number of contaminating

variables will have affected the validity of the experimental design. Indeed the present author expresses optimism with some caution for the beneficial effects of an integrated approach to classroom organisation on the development of creative thinking in children. Present statistics have clearly demonstrated that perhaps this optimism is well-founded. Yet there are obvious variables which may have affected the outcome such as teacher enthusiasm, effectiveness and commitment to the teaching methods involved. It is the firm belief of the present author that success in nurturing creativity in children is most likely to be achieved by someone who has a sincere belief in and commitment to the philosophy and methodology of a thematic, integrated approach to learning based on first hand environmental experiences and furthermore, has the desire to organise and implement a curriculum delivery based on this commitment.

This comment is very much in accordance with the view of a number of writers, for example, Haddon and Lytton (1968) which is that development of creativity is based on the teacher's confidence in the child's ability to think in an original and adventurous manner, often seeking new

directions.

> "If the teacher can enter into the child's thinking, if he/she is prepared to let work develop in unexpected directions according to the child's needs and interests, if he/she can find and express genuine pleasure in the child's efforts, then self-initiated learning can be developed. It is in this climate that divergent thinking abilities are seen to flourish."
>
> (Haddon & Lytton 1968)

In reply to the question about teacher effectiveness and commitment to organisational methods, it must be emphasised that the researcher did not know any of the teachers prior to the commencement of the investigation. All were recommended by their head teachers as being highly effective, professional and enthusiastic class teachers. All demonstrated a great commitment to the organisational style which they chose to adopt. As the year progressed, none of the teachers brought disappointment to the researcher or research assistant. Without exception, they welcomed the intrusions into their classrooms, and demonstrated tremendous enthusiasm for visits to the field centre and follow-up work derived from them. All were one hundred per cent committed to the task of helping their children to derive the greatest benefit from these first hand learning experiences, even though their approaches to the

organisation of teaching and learning were so much at variance.

In terms of the experimental design, it must be emphasised that all teachers understood at the outset that they were taking part in this research without knowledge of whether they were in an 'experimental' or 'control' group setting. For this reason there should have been no difference in their enthusiasm for or commitment to taking part. This is related to the possibility of the "Hawthorne Effect" having some contaminating influence on the results. Research into this effect (Roethlisberger and Dickson, 1939) is concerned with expectancy - that is, when programmes of change or treatment are instituted, expectations for their effectiveness are very likely to be involved. For example, research subjects who are aware that a certain teaching programme is being investigated "know" that it may well have a beneficial effect - why else would a researcher be interested in it? In the present research, as all teachers and children started from an identical base of knowledge about their status in the research, it must be argued that expectations of outcome would have been the same for both the experimental and the control groups.

Related to this debate, the qualitative criticisms are of enormous value insofar as they clearly indicate a very high degree of teacher enthusiasm in all classes. The value of integrating qualitative with quantitative data will be discussed at greater length below but this is but one example of how the written Criticisms really have served a most worthwhile purpose in helping to eliminate possible contaminating variables in the experimental design. At this stage it must also be mentioned that the children themselves in all six classes were outstandingly enthusiastic about their environmental studies work, both inside and outside the classroom. They too greeted classroom visitors with enthusiasm and welcomed involvement in creativity testing and talking about their experiences and work. This fact must have relevance to the debate concerning teacher enthusiasm and effectiveness as a contaminating variable. Whilst this obviously cannot be dismissed as irrelevant, it is hard to believe in the light of data obtained that it alone accounted for such variance in the children's post-test results. Finally on this subject, the point has already been made in Chapter 6 that Elliot Eisner himself who has taken a keen personal interest in this

study, remarked that the control of teacher difference would not only have been virtually impossible, but also unhelpful. The whole point of applying the connoisseurship model of evaluation was to look for and hopefully identify and illuminate excellence in the approaches of individual teachers.

Other contaminating variables concern the selection of schools in the sample. Once again it is a virtual impossibility to identify a perfectly matched grouping of children in schools. The best possible job was done to control school size, location and ethnic background of the children. In so doing the schools were also "matched" as closely and accurately as possible in terms of their stated and perceived approach to curriculum organisation and delivery of work in the area of environmental education. The resultant statistics could well be analysed with reference to the age of the children concerned and the type/location of the school. The sample was not well matched insofar as the children's ages ranged from second to fourth year juniors and the ethnic backgrounds varied considerably. Nevertheless, great care was taken to pair the schools as accurately as possible taking these

variables into account and the final data reveals an overwhelming trend across the whole sample, irrespective of age or background. It is noted that the difference in scores may be due to teaching methods generally rather than to the basis of environmental studies which was chosen as the focus for this investigation.

Having acknowledged these features associated with the validity of the experiment and the control of variables, the fact remains that the resultant statistics did indeed suggest this overwhelming trend. One major conclusion must be drawn - that it is indeed possible to harness and nurture divergent thinking abilities in school classrooms and that there is a definite relationship between teaching methods and the development of creative potential in children of primary school age. Statistics alone suggest that this is the case. What they do <u>not</u> address is the HOW or the WHY.

Thus, the second major component of the research design is seen to be of utmost importance. The methodology of Connoisseurship and Criticism was employed to be 'in tandem' with the statistical findings, to investigate the 'how'

and the 'why' and to attempt an illumination of the teaching and learning approaches that led so successfully to creative development. Indeed, the statistical data and traditional research experiment documented within this thesis could be viewed merely as supportive material to substantiate qualitative evidence collected throughout the school year. It is actually hoped that the two sets of radically different data will be viewed as mutually supportive, both giving substantial weight to the claim that teaching method and creative development are closely related. Before pursuing further comments on the attempt to bring together two radically differing research methodologies, it would seem relevant to draw at least some conclusions from the qualitative classroom Criticisms. This is done with a fair degree of hesitation, since the whole point of such writings is that they stand alone with their message, rich in metaphor, which must be interpreted by an individual reader. No attempt is here being made at a serious metacriticism. Nevertheless key conclusions emerge from the accounts of classroom life which these writings portray. First and foremost, it would seem that the very essence of integrated teaching and learning as a result of direct

contact with the environment involves children in thinking for themselves, in personalised and meaningful learning, and in expressing facts and ideas in an original and interesting way, without regard for subject-barriers and formalised, rigid "right or wrong" answers. Evidence is found in all of the E group classrooms that children working in this way readily developed great fluency and speed in their writing and recording. The sheer volume and speed of their work was impressive throughout the periods of observations; so too was the range and scope of their ideas, their willingness to tolerate uncertainty, to try things out and to improvise. The Criticisms show that they could cope with the unusual, perhaps the bizarre and certainly with situations which had no obvious or "right" answer. These children were encouraged to and were willing to investigate and to seek out answers and solutions. They also demonstrated a good sense of humour, and very obvious enjoyment of their investigations. Many thoughts and ideas clearly derived from active imaginations.

Children in the C group classrooms also enjoyed their studies enormously - a fact without doubt. Nevertheless an air of 'strait-jacketing'

prevailed. Focus of attention was almost always on that which was "right", the obvious and the factually accurate. One could readily detect an unwillingness to dice with uncertainty. Facts were to be learned (and indeed they were) and recorded in an appropriate format. Work on the whole appeared to be far less fluent. Much recording was done by way of work sheets - in class-based lessons, where gaps were to be filled in with the "right" answers.

An over-emphasis on factual knowledge was documented, and certainly a lack of real enquiry in the children's work. Findings are very much in accord with comments of Goodlad (1984) whose observations of intellectual activity in a large number of schools were critical of direct instruction in teacher-directed classrooms:

> "Only rarely did we find evidence to suggest instruction likely to go much beyond mere possession of information to a level of understanding its implications and either applying it or exploring its possible applications. Nor did we see activities likely to arouse students' curiosity or to involve them in seeking solutions to some problem not already laid bare by teacher or textbook."
> (Goodlad 1984)

Data also supports the description of direct instruction provided by Rosenshine (1979):-

> "Direct instruction refers to academically focused, teacher-directed classrooms using sequenced and structured materials.
> ..... Questions are at a low cognitive level so that students can produce many correct responses and feedback to students is immediate and academically oriented. .....Interaction is characterised as structured, but not authoritarian. The goal is to move students through a sequenced set of materials or tasks."
> (Rosenshine - In Stodolsky 1988)

It seems very obvious and inevitable that after a year of working in this way, the children found it difficult to respond well to exercises in fluency, flexibility and originality of thought.

Further analysis of the written Criticisms and qualitative data shows that it is possible to identify other particular elements of learning situations which may be seen to be parallel to aspects of the measures of creativity. For example, constant practice in the skills of field observation and sketching and of detailed analysis of phenomena prior to representation in original artistic or diagrammatic form must indeed foster skills necessary to achieve high scores on the originality dimension of figural tests of divergent thinking. This individual perception

of objects and situations was emphasised throughout the work of the E classes. With constant emphasis on sketching and recording of detailed observations in a way considered appropriate by the learner, it seems inevitable that increased fluency and elaboration of ideas and recorded work will result. It seems appropriate to conclude that this has direct bearing on the fact that the E group children had very much higher scores on the figural tests than the C group children. They scored extremely high on all dimensions including fluency and elaboration. Similarly, the E classes seemed to have far more constant and sustained practice in the skills of writing field notes based on personal and original thoughts, in compiling rapid word lists based on immediate personal impressions and in writing 'instant' and original comments and ideas about field and classroom "situations" (rather than subjects). This can only be seen as a major contributing factor to the incredibly high scores attained by these children on the verbal tests. Verbal fluency scores in particular are outstanding across the whole E sample.

The literary criticisms also reveal interesting insights into teaching styles and teacher-learner interaction, bearing in mind that a pre-figured focus was to observe and comment on evidence of 'teaching for creativity'. The E class teachers facilitate learning within non-authoritarian learning environments. The criticisms suggest an atmosphere of 'freedom' in E classrooms, wherein children are free to explore and develop their own interests, enthusiasms and original ideas and the teachers also recognise freedom insofar as they are not constrained within the limits of pre-planned and rigid organisation of activities. Mrs. Morgan, for example, was quick to capitalise on the spontaneous suggestion that David might turn into a chip, Mr Bailey's children chose the creatures they wished to write about and Miss Baptiste actively encouraged her pupils to concentrate on their most memorable experiences. Linked to this sense of freedom and the importance of spontaneous expression is the fact that clearly, the 'creative' teachers are always totally supportive of self-initiated learning, actively encouraging the children to hypothesise, to explore ideas and problems and to engage in practical investigations and experimentation. Of key psychological importance

here must be the fact that this teaching style encourages the location of motivation within each individual learner.

Whether consciously or unconsciously, it would also seem apparent from the accounts of 'creative' classroom life that these teachers actually encourage creative thought processes insofar as they support and facilitate the development of ideas in new directions, the making of connections that are not immediately obvious, and the building on to the novel ideas of others. They do not readily supply solutions or give away outcomes.

> "Why don't you ask Mrs. Morgan? She'll know the answer."

> "I've tried doing that, but she just bounces your questions back at you and makes you find out on your own."

Furthermore, they recognise that factual errors occur and are indeed expected and inevitable. The whole notion of uncertainty and ambiguity is handled in a positive and purposeful way. Questions discussed with the children are

meaningful yet open-ended, perhaps having no predetermined answers - certainly having no answers that are speedily arrived at by recall to inwardly digested facts: this is of course, in such contrast to the atmosphere portrayed of the C classrooms and their related teaching styles which clearly have little room for error and ambiguity.

A great deal of qualitative evidence has therefore been provided to substantiate many of the views of E.P. Torrance and in particular, the belief that creativity is a concept that can be nurtured in pupils and that certain methods of instruction will contribute towards creative growth. The evidence is indeed strong that "creativity does not have to be left to chance."

Adding the weight of the quantitative investigation to this qualitative data seems to provide almost overwhelming evidence in support of this view.

It was with a sense of uncertainty and perhaps adventure that this research study was designed and implemented. It actually represents the bringing together of two radically different approaches to investigating classroom life under

the umbrella of one investigation. This fact was known and understood from the outset and the work proceeded with the keen interest and support of Elliot Eisner himself and other colleagues at Stanford working in the same field. It many ways it is unique, this probably being the first attempt to employ the Connoisseurship and Criticism methodology in English primary schools, it being undoubtedly the first doctoral thesis to be produced in England which applies Eisner's model and also being a first attempt at integrating this model within a traditional experimental research design. As mentioned in the introduction, all of these matters were discussed with Eisner and others and it was concluded that a doctoral thesis was perhaps a most appropriate forum for attempts at originality of this kind. Nevertheless the work was not undertaken lightly and was underpinned by the much emphasised belief of Eisner that the Connoisseurship and Criticism model should in no way be totally divorced from traditional research designs. It may well be used alongside quantitative methods to aid illumination and understanding of processes and phenomena in classrooms.

"Creative scientific work in any field depends upon new models or new methods to guide inquiry. Insofar as effective criticism reveals aspects of educational phenomena that were previously unnoticed or underestimated, a fresh focus for conventional scientific study could be provided."

(Eisner 1975)

It was an intended aim of this thesis to document the first investigation of this kind, attempting to utilise the two differing paradigms alongside each other - one clearly deriving from an artistic base and the other from a scientific base. Without doubt it may be concluded that the connoisseurship model has been successfully utilised to provide an increased insight into and understanding of classroom interaction and processes that affect the development of divergent thinking abilities. The written criticisms and video tape provide a wealth of data associated with this focus. The quantitative data is undoubtedly helpful in so far as it substantiates any conclusions which may be drawn.

Both methodologies and forms of data could have been employed independently of each other as sound approaches to educational research. Utilised alongside each other they have confirmed research hypotheses and illuminated many of the

complexities contributing to these outcomes. Between them they have provided a very convincing array of evidence upon which to make judgements about the development of creativity. Their combined use would, therefore, appear to have tremendous potential for deepening our understanding of classroom processes and for improving the quality of educational practice.

A second fundamental aim of this research was to produce a final document and associated materials that would make a useful and valuable contribution to curriculum development in schools and to the initial training of teachers. In other words, this thesis is not intended as an end product in itself, rather as a starting point for further work. Perhaps there could be no more appropriate time to consider its findings than at this initial stage of the implementation of the National Curriculum in schools. Indeed no conclusions would be complete without reference to the National Curriculum and how this work may find relevance within its implementation. Before so doing, it must be stressed to readers that this investigation was designed and undertaken before the advent of the Education Reform Act.

It has been forcibly argued (Elliott 1988) that the Great Educational Reform Bill would do little to cater for creative learning.

> "The problem with G.E.R.B.I.L. is that it divorces 'standards' from 'human excellence'. And this is why there is no room for creativity in Mr. Baker's Bill. The curriculum will consist of objects to be possessed in the form of facts and skills rather than of objects of thought-situations, problems and issues which are capable of challenging, activating, and extending natural powers of being. Only a curriculum of the latter kind can provide a context for the achievement of human excellence."
>
> (Elliott 1988)

Indeed the National Curriculum Council task groups are actively engaged in analysing the specified core and foundation subjects into testable attainment targets. Educational standards are thus specified as measurable targets, which can be defined independently of the study and processes of education. In 1975, Stenhouse illustrated the consequences of target setting:

> "Literary skills are to be justified as helping us to read Hamlet. Hamlet must not be justified as a training ground for literary skills."
>
> (Stenhouse 1957)

It is perhaps difficult to envisage how teachers will be able to justify the content of education other than in terms of it being

instrumental for achieving targets of attainment. Many classroom teachers apparently share this pessimistic perspective. Small scale research into teacher attitudes was conducted by the present author in order to substantiate this view. Discussions took place in the context of in-service National Curriculum related courses in six Local Education Authorities in the West Midlands and the North East of England. One of the great concerns expressed by almost all teachers interviewed is that the National Curriculum will recommend and necessitate new approaches to curriculum and classroom organisation, leading to the probable imposition of subject boundaries and prescribed schemes of work.

Perhaps a more optimistic viewpoint should at least be considered. Legislation allows for some freedom of interpretation, certainly for the implementation of teaching and learning strategies considered appropriate by an individual teacher and above all, for the continuation and development of the existing good practice which characterises learning in so many primary schools. Central to the National Curriculum documentation is the notion that a broad, balanced and meaningful education in the core and foundation

subjects is a basic entitlement for all children. Fundamental to the thesis being developed here is that this is readily achieved when children's natural processes of learning are understood and engaged. A concrete example will serve to illuminate this fact. Consider the following scenario and 'snatches' of conversation taking place within it:-

A class of middle infant children pursue their topic on trees. The glorious golden bronze and amber shades of autumn leaves brighten the surface of grey table tops. One group of children has collected a series of horse chestnut leaves, recently fallen from the tree. A great deal of discussion takes place about the shape of these leaves and the interesting colour patterns which can be seen in them. Close observation reveals that the edges of the leaves tend to be brown and brittle whilst the interior veins retain their deep green colour. This pattern seems to be shared by almost all of the leaves that the group has collected. The children try and see if it is possible to put their leaves into order or sequence, ranging from the leaf with the largest amount of chlorophyll ("green") left in it, to that which has the least. Two leaves have but a

small amount of chlorophyll left. In both cases it follows the line of the central vein of the leaf .... and the surrounding areas are brownish yellow, brittle and crumbling ....

Rafaqat - Look how many leaves we've collected, Miss.
Changaze - What sort of leaves are they?
Amardeep - I've found a picture of them in this book. Here they are. They're horse chestnut leaves.
Shiraz - They're a funny shape, aren't they, Miss? Not like ordinary leaves.
Amardeep - More like a lot of little leaves stuck together.
Rafaqat - The ones at the top are longer than the ones nearest the stem.
Changaze - Look at all the sharp edges on them.
Rafaqat - Like tiny teeth aren't they?
Shiraz - And they've all got little lines on them.
Amardeep - My granny's hands are like that. They've got blue lines on the back.
Changaze - Everybody's hands have.
Teacher - That's right. They're called veins.
Changaze - Veins? What are they for?
Teacher - Well, in people they help carry our blood round our body.
Amardeep - But trees don't have blood. What do they need veins for?
Teacher - To carry goodness through the leaves. This helps them to grow healthy and strong. The colour of the leaves tells you how healthy they are.
Shiraz - So green means they're healthy?
Teacher - Yes.
Rafaqat - But these leaves aren't green all over. Look.
Changaze - They are. Well, they're green in the middle anyway.
Shiraz - Where the veins are.
Rafaqat - But not on the edges. See, they're going brown.
Amardeep - Brown and yellowy.
Rafaqat - And crinkly.
Amardeep - And bits are coming off.
Shiraz - Miss, he's broken it!
Teacher - Don't worry, there are plenty of

leaves left.

Changaze - And they all look the same as that one.

Shiraz - See, they're green on the inside and brown on the outside.

Rafaqat - That leaf must be older than the other one.

Changaze - How can you tell?

Rafaqat - It's got more brown in it.

Shiraz - So has this one. And this one.

Amardeep - This one's got lots of green still left.

Teacher - Let's see if we can sort them out. Let's put the greenest leaves on this side of the table and all the browner leaves on that side.

Amardeep - All our leaves have got some green and brown in them.

Rafaqat - Perhaps the brown comes in autumn and makes the leaves fall off the tree.

Shiraz - Do all leaves go brown like these, Miss?

Teacher - That's a good question Shiraz. Perhaps we could try to find out when we've finished sorting these horse chestnut leaves.

THE CHILDREN SPEND TIME SORTING THE LEAVES

Rafaqat - These two leaves have hardly any green left in them. Look. There's just a bit left.

Amardeep - Where?

Shiraz - There, see? Along the middle of the leaf.

Changaze - Where the middle vein is.

Rafaqat - It's the same on this leaf, too.

Changaze - The rest of the leaf is all brown and crackly.

Shiraz - It looks old and crumbly on the outside.

Rafaqat - But there's some life left on the inside.

Without doubt, this example illuminates a situation wherein children's natural processes of

learning are engaged. Environmental education and science are taking place within their own familiar surroundings. The knowledge, understanding and processes of science are being developed in the context of pupils' individual potential and natural curiosity. The teacher acts as facilitator and enabler of this development. The approach to organisation is through a topic which clearly has science as the central core. It is not difficult to identify and extract the science content, yet it is apparent that other areas of the curriculum arise from and underpin this core. For example, what wonderful language and art work may derive from "the glorious golden bronze and amber shades of autumn leaves brightening up the surface of grey table tops". Work in the core area of mathematics could include measuring and counting the leaves, perhaps looking at the area of chlorophyll left in them. Cross curricular skills of detailed observation and investigation are essential to the task being undertaken. Patterns are recognised, the concepts of order and sequence are considered and indeed the task invites further investigation .... do all horse chestnut leaves lose their chlorophyll in a similar pattern?.... what about leaves from other varieties of trees? Once again, the children's

natural capacity for learning is engaged using familiar objects from the world around them. They readily demonstrate a capacity to make connections, to discover and to test their own ideas, arguments and discoveries. In this particular classroom, experience and learning is organised in an integrated cross-curricular way through an environmental topic with obvious scientific content.

Within the framework of the National Curriculum, the teacher's role is clearly stated (within the science documentation) as that of enabler, who may interact with pupils, pose questions, provide appropriate challenges and experiences and offer the children the possibilities for new ways of thinking. Also embodied in the National Curriculum is the notion that a child's understanding of the world is developed by both existing ideas that are available and by processes by which these ideas are used and then tested in new situations. Children's early experiences of the world are obviously of vital importance. Through these experiences they continually develop ideas which enable them to make increasing sense of their environment and of the inter-relationships that

exist among things and happenings within it. It is intended that a child's knowledge and understanding and ability for problem-solving will progressively increase as new experiences with objects and events are encountered and as skills of investigation and exploration are mastered and developed.

If this view of teaching and learning is to be embodied in a curriculum that seems firmly rooted in its instrumentality for achieving extrinsically related targets, then more than ever before teachers must consider their philosophy and approach to classroom and curriculum organisation and delivery. Perhaps two approaches may be identified. First there is that which builds upon the natural experiences which every child automatically brings from the home and personal interaction with the world to each learning situation. Such an approach is commonly used within nursery and reception classes and to a lesser extent with children of older primary school age. That is, it becomes less overtly recognised as the sole basis for curriculum organisation as children progress through school. It would be a rare teacher however, who denied that the children themselves and their wealth of

experiences provide the basis for at least a substantial amount of learning. A second approach is the organisation and delivery of subject matter rather than a focus on what the children have already experienced. This may be sub-divided into two very differing approaches as documented and discussed in Chapter 3, namely the thematic/integrated approach, perhaps pursued through topics, and the non-integrated presentation of subject knowledge as that which is worth assimilating as an end in itself. It is the view of the vast majority of teachers interviewed that the advent of the National Curriculum will necessitate and command a dramatic shift of emphasis from the first of the above outlined approaches to the second - and in particular to 'subject strait-jacketing' and non-integrated delivery, with an associated move towards formality and rigidity of methodology.

It is a key conclusion of this thesis to challenge this pessimism and indeed the dominant view of learning that the National Curriculum documentation suggests. Perhaps a major problem lies in the sequence in which Orders and documents have emerged from the National Curriculum Council. At the time of writing, the Attainment Targets and

Programmes of Study for Mathematics, Science and English are firmly in place. Working groups for a number of the foundation subjects have been established and a great deal of interim documentation (as stated in Chapter 4) has emerged from the cross-curricular task groups of the Interim Whole Curriculum Committee of the N.C.C. The irony is that no framework for the curriculum as a whole has yet been published for consultation and the vast majority of teachers are familiar only with the Orders for core subjects of mathematics, and science. Most know little or nothing of the place of cross-curricular issues, progress of foundation subject groups or the NCC view of an overall curriculum framework. Clearly this must give a somewhat distorted perception of the curriculum - perhaps as as a jigsaw puzzle with two solitary and as yet unrelated pieces. It would seem that cross-curricular themes and the eventual mapping of knowledge, understanding and skills of these on to the attainment targets of the core and foundation subjects could go a very long way towards providing that unifying element which the curriculum as a whole clearly requires. A generously optimistic scenario is that the cross-curricular dimensions, skills and themes, rather than arising out of essential content or

being an 'appendage' to this, may actually be the pinnacle of learning - the overarching unification which inter-relates the essential content of the statutory areas of learning. Whether this optimism is well founded can only be conjecture at the present time; certainly the Environmental Education Task Group of the IWCC is hopeful that a second major phase of work will involve mapping of the stated entitlement to all core and foundation subject attainment targets and demonstrating the inter-relationships of these within an overall framework.

It is therefore suggested that in the National Curriculum we do not necessarily have a strait-jacket of subject compartmentalisation. Rather, we have the opportunity within a framework to promote a sound and well researched entitlement which is delivered as a coherent whole.

This delivery must take account of each of the various approaches to learning and a range of methodologies. Without doubt there should always be a place in the curriculum for addressing subject matter in its own right and as priority as and when this seems appropriate. Yet the planned implementation of a co-ordinated and progressive

integrated approach which takes account of the learners' own experiences, interactions with the world and perceptions and qualities of objects and ideas, must continue to have a very high profile in primary education.

In Chapter 3 it was argued that the skills of aesthetic education are not only a basic part of a school curriculum, but also that they are a central necessity. In no way should the development of imagination be left to chance processes. Not only is this fundamental experience on which other basic skills depend, but it can also be related to the development of intelligence. Without positive attempts at encouraging image making and image perceiving, intelligence itself may remain under-developed. It was also argued that aesthetic experience can provide the integrating element in a curriculum which is designed not to create artificial boundaries in knowledge and learning, but to develop a structure to thought and imagery in a way which is unique to each individual learner. Aesthetic education begins with images, with the perception and qualities of objects and ideas, and of sensory material. It aims at encouraging the learner to have experiences of objects in the

world around him, enabling sensitisation to the qualitative aspects of such experiences. Aesthetic education may be regarded as a vehicle for penetrating the ideas concerning the relationships that exist among human life, our culture and our bio-physical surroundings. The data contained within this thesis inevitably supports and reinforces this argument.

An unplanned yet vital outcome of this present research is that it is well-timed to inform the National Curriculum debate and contribute evidence strongly in favour of promoting cross-curricular themes such as environmental education and an integrated, child-centred approach recognising the centrality of aesthetic experience to the delivery of the curriculum as a whole. Perhaps a radical change of emphasis in the minds of educators from

"the curriculum consisting of objects to be possessed in the form of facts ....."

To

"Objects of thought-situations, problems and issues ....which can provide a context for the

achievement of human excellence."

(Elliot, 1988)

is extreme optimism ..... but it is firmly believed that dissemination of data and informed conclusions contained within this thesis may go some way towards helping teachers to interpret the National Curriculum as an opportunity within a framework rather than as a strait-jacket of subject-specific content.

Without doubt this study will be the basis for future research in a number of areas. Firstly, having trained a research assistant and developed personal skills in the methodology of Connoisseurship and Criticism, this model will be employed on many future occasions. It may well be further used to portray aspects of the implementation of the National Curriculum, approaches to this and classroom interactions which occur as a result of it. The model may also be employed to illuminate aspects of classroom life which may then be investigated according to the methodology of more traditional research designs. Certainly there would be no hesitation in using it once again with a pre-figured focus within a traditional design. It is considered

that this approach was both successful and informative. Secondly, the nurture and development of creativity in children remains a subject of great importance. The feasibility will be investigated of a longitudinal study which aims to monitor and measure the progress and attainment of the children involved in the present sample. A most worthwhile long term study might continue to measure their divergent thinking abilities over a longer period of time and also monitor their progress in academic areas of learning - taking into account teaching methodologies and approaches to curriculum organisation. Along similar lines, it would be of great interest to pursue a longitudinal study of creative ability, academic attainment and curriculum organisation, starting with children as they enter school and tracking their progress through the primary years. Thirdly, the area of Environmental Education is of concern, and further research, informed by the present data, may well monitor the teaching and learning of this cross-curricular theme and make recommendations as to how field work experiences may best be followed up within the overall framework of the National Curriculum.

Finally, in addition to further research, it is intended that this study will be the basis for a great deal of curriculum development work both within the context of in-service education of teachers and with students in training. Indeed a major 'phase two' is planned, wherein the present data, including the criticisms and video tapes, will be shared with teachers and students for a variety of purposes.

Courses may focus on a combination of :

i) The Connoisseurship and Criticism model - its values and application - with the advantage of examples of English primary education.

ii) The concept of creativity - its importance and nurture; creative teaching styles - exemplified with qualitative data.

iii) Environmental Education as a cross-curricular theme - approaches to organisation and delivery, the importance of first hand environmental experiences and ways of developing these in classroom learning situations.

iv) The Implementation of the National Curriculum - approaches to a whole curriculum framework.

It would of course be impossible to consider any of these in isolation. In the context of this thesis they have all inter-related with and informed each other.

A great deal has been said within these pages about Creativity and Connoisseurship. But what of Change? Perhaps there has been no more appropriate time than the present to consider the concept of change relating to teaching and learning situations. The above discussion on the implementation of the National Curriculum for schools highlights one substantial way in which change may come about. Adding the third 'C' to the title actually highlights the most important principle underpinning the entire work. This research should be understood as an original investigation undertaken in order to gain knowledge and understanding about classroom interactions. It has resulted in substantially improved insights and a convincing array of evidence upon which to make judgements about the development of creativity. It is intended that these insights and evidence may be employed to

bring about change in approaches to and organisation of learning - which hopefully may go some way towards informing and improving the quality of educational practice.

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APPENDICES

APPENDIX 1

TORRANCE TESTS OF CREATIVE THINKING:

EXAMPLES OF TEST ITEMS

VERBAL TEST EXAMPLES

Activities 1-3 ASK AND GUESS

The first three activities will be based on the drawing overleaf. These activities will give you a chance to see how good you are at asking questions to find things out that you don't know, and in making guesses about possible causes and consequences of happenings.

Look at the picture. What is happening? What can you tell for sure? What do you need to know to understand what is happening, what caused it to happen and what will be the result?

Activity 1: Asking

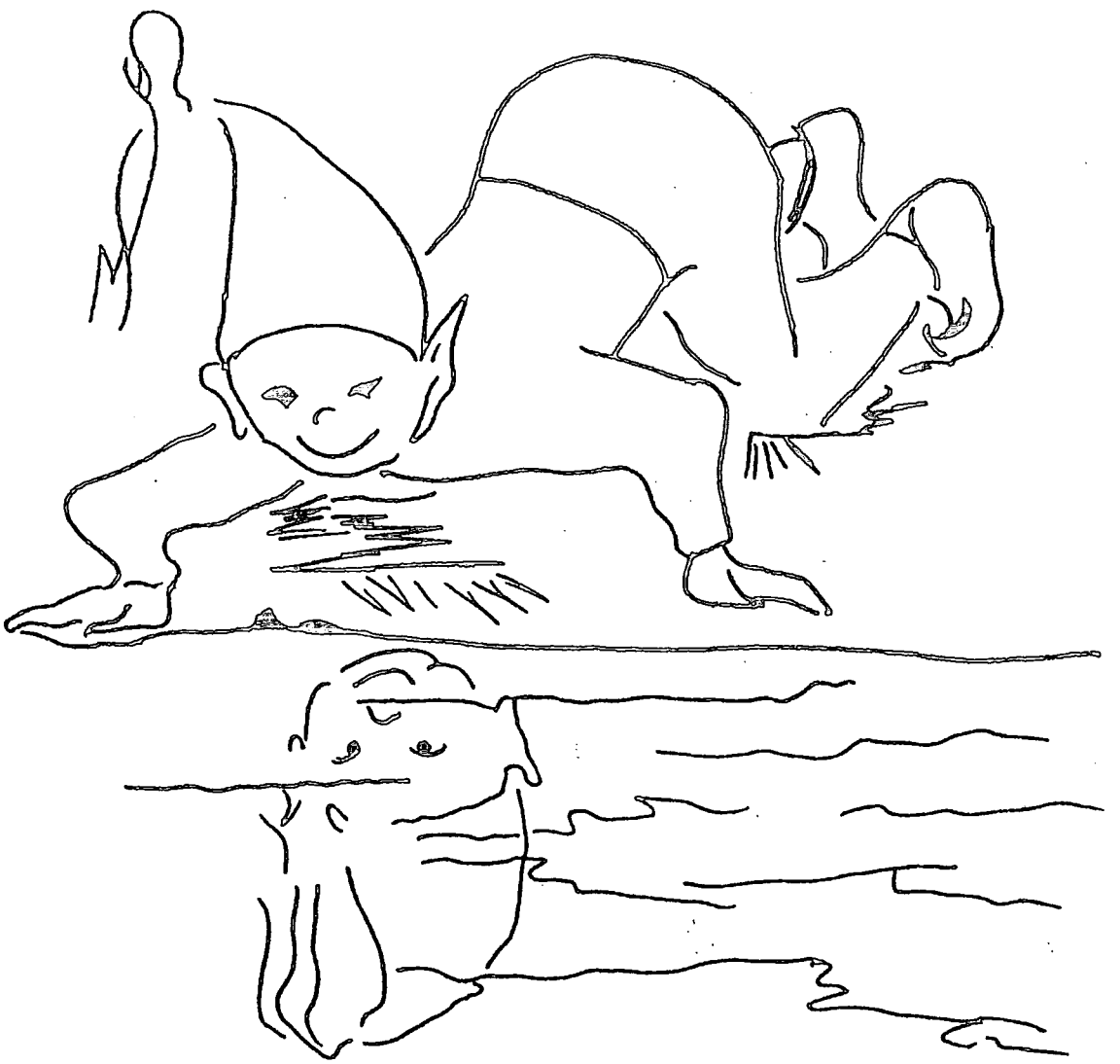
Write out all the questions you can think of about the picture. Ask all of the questions you would need to ask to know for sure what is happening. You can continue to look back at the drawing as much as you want to.

Activity 2: Guessing Causes

In the space below, list as many possible causes as you can of the action shown in the picture. You may use things that might have happened a long time ago that made these things happen. Make as many guesses as you can. Don't be afraid to guess.

Activity 3: Guessing Consequences

List as many possibilities as you can of what might happen as a result of what is taking place in the picture. You may use things that might happen right afterwards or things that might happen as a result long afterwards in the future. Make as many guesses as you can. Don't be afraid to guess.

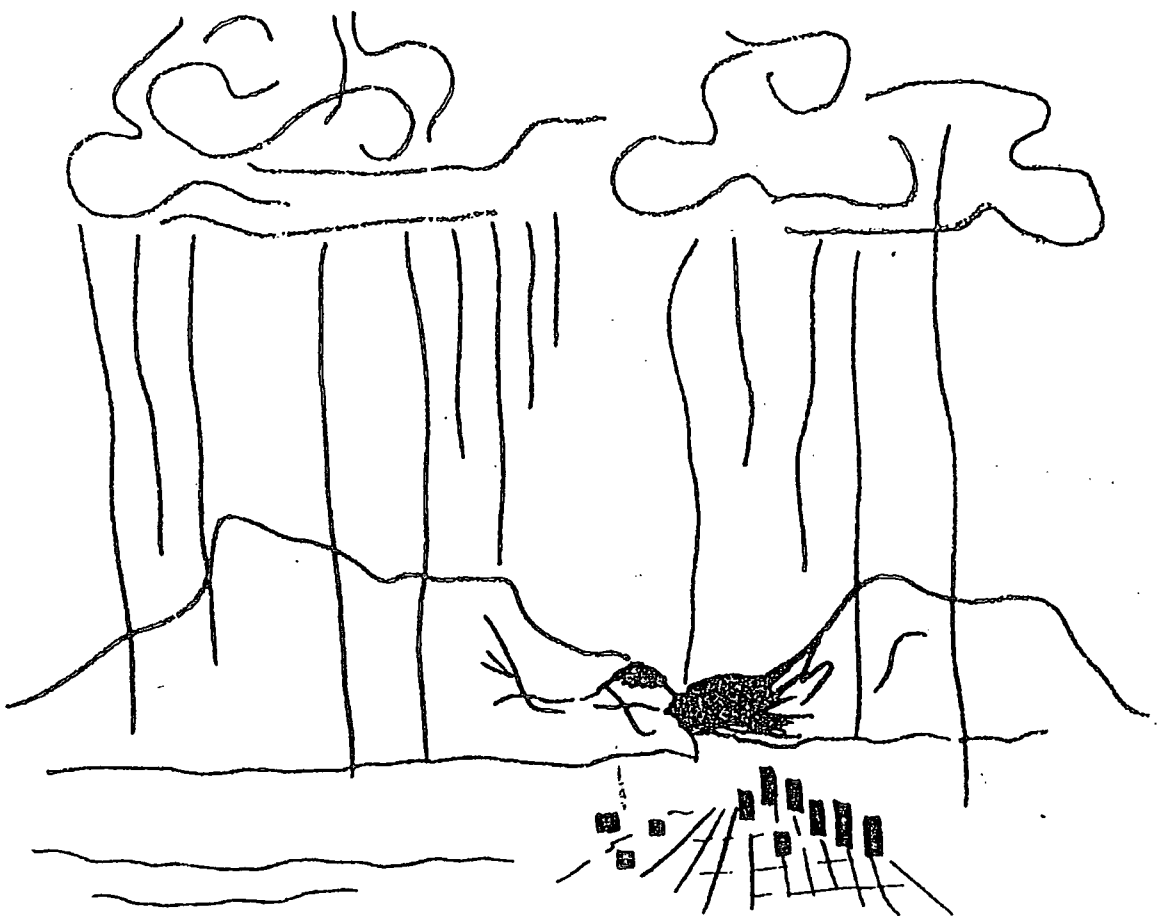


Activity 7 : JUST SUPPOSE

The picture overleaf is of a situation that will probably never happen. You will have to just suppose that it has happened. This will give you a chance to use your imagination to think out all of the other exciting things that would happen IF this situation were to come true.

In your imagination, just suppose that the situation were to happen. THEN think of all of the other things that would happen because of it. In other words, what would be the consequences? Make as many guesses as you can.

The improbable situation is - JUST SUPPOSE clouds had strings attached to them which hang down to earth. What would happen? List your ideas and guesses.



FIGURAL TEST EXAMPLES

Activity 1: Picture Construction

Below is a piece of coloured paper in the form of a curved shape. Think of a picture or an object which you can draw with this piece of paper as a part.

(The shape is of sticky paper .... and can be stuck anywhere on a sheet of paper)

Stick your shape on the page anywhere you want it. Then add lines with your pencil to make a picture.

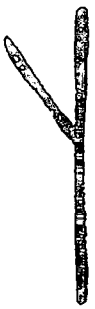
Try to think of a picture that no-one else will think of. Keep adding new ideas to your first idea to make it tell as interesting and exciting a story as you can.

When you have completed your picture, think up a name or title for it and write it at the bottom of the page in the space provided. Make your title as clever and unusual as possible. Use it to help tell your story.

Activity 2: Picture Completion

By adding lines to the incomplete figures on the next pages, you can sketch some interesting objects or pictures. Again, try to think of some picture or object that no-one else will think of. Try to make it tell as complete and as interesting a story as you can by adding to and building up your first idea. Make up an interesting title for each of your drawings and write it at the bottom of each block next to the number of the figure.

1. _____



2. _____

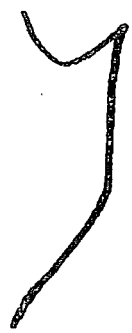
3. _____

4. _____

5. _____

6. _____

7. _____



8. _____

9. _____

10. _____

APPENDIX 2

TORRANCE TESTS OF CREATIVE THINKING:

SCORING PROCEDURE AND EXAMPLES OF CHILDREN'S WORK

SCORING PROCEDURE

This was carried out in accordance with the instructions set out in the Directions Manual and Scoring Guide published with the tests.

VERBAL TEST

In all seven activities, fluency is described as the total number of relevant responses, relevancy being defined in terms of the requirements of the tasks as set forth in the instructions. In other words, the fluency score for the Ask activity is the number of relevant questions the subject asked. Questions that can be answered merely by looking at the picture, however, are not counted. To continue the example of the Ask activity, one point for flexibility will be awarded for each category used in asking questions (the guide lists many possible categories e.g. costume, emotions, description of figure, ground surface, hat etc.) No credit is given if a category is repeated. For example, all of a subject's questions might be concerned with the physical description of the figure, the boy. In this case, the total flexibility score would be 1.

With regard to originality, the guide lists a series of responses with assigned weightings. The most frequent responses are assigned weights of zero. Less frequent ones listed score 1. Any answer which shows creative strength and is not listed should be assigned an originality score of 2.

Scoring for other activities follows similar procedures with detailed lists of responses and categories set out in the test manual.

FIGURAL TEST

In order to score the figural tests, an understanding of the concepts of fluency, flexibility, originality and elaboration is required. Procedures are similar for all activities and once again the manual details lists, categories and assigned weightings where appropriate. For example, in the Picture Construction activity, the scoring guide for originality is based on the responses of 500 subjects. Scoring is accomplished on a scale ranging from zero to five according to frequency of occurrence in the 500 records analysed.

Responses occurring on five per cent or more of the records receive no credit (e.g. egg, man, teardrop). The titles are also evaluated on a scale ranging from zero to three on originality or cleverness according to criteria set out in the manual. In scoring elaboration, credit is given for each pertinent detail (idea) added to the original stimulus figure itself, to its boundaries and/or to the surrounding space. The basic response itself must be meaningful before elaboration has any worth or can be scored. One point is given for:

each essential detail of the total response,

colour (when it adds to the basic response),

deliberate shading or decoration when meant as such,

each major variation of design which is meaningful with reference to the total response, and

each elaboration in the title beyond the minimum description label.

Picture Construction is only scored for originality and elaboration. Other activities are scored for fluency and flexibility also. For example, in the Picture Completion task, the fluency score is obtained by counting the number of figures completed. The maximum score therefore is ten. The flexibility score is obtained by counting the number of different categories into which the responses fall. The scoring guide lists categories that will best fit approximately 99% of the responses given (e.g. aircraft, animals, body parts, buildings, clothing, eggs etc). New categories may be created for responses which cannot be classified into any of the categories listed.

EXAMPLES OF CHILDREN'S WORK AND SCORING

A : VERBAL TEST
Activity: Ask and Guess
Subject: E Group child (post-test)

B : VERBAL TEST
Activity: Ask and Guess
Subject: C Group child (post-test)

C : FIGURAL TEST
Activity: Picture Construction
Subjects: E group children (post-test)
2 samples

D : FIGURAL TEST
Activity: Picture Construction
Subjects: C group children (post-test)
2 samples

A.

Asking Questions.....

Write out all the questions you can think of about the picture.

What tpye of animal his he? (1)

What is he doing? (0) does he act? (

Does he look funny? (0) What tpye of ha

his he wearing

Is he stupid? (1)

Why his he

Can he read? (2) wearing shoes (1)

What does he eat? (1)

has he got a girlfriend? (1)

Can he sing? (2)

Can he dance? (2)

Can he swim? (2)

does he go to work? (2)

ow old his he? (2)

an he tell jokes? (2)

oes he live in a house? (1)

Score

Fluency : 17

Flexibility : 7

Originality : 24

(see scores in brackets)

Asking Questions.....

Write out all the questions you can think of about the picture.

	Fluency	Originality
Who is he?	1	0
Where dose he Live?	1	0
Is he an elf?	1	0
Is he father christmas?	1	2
Can he talk?	1	1
Is he musulle man?	1	2
Is he superman?	1	2
	7	7

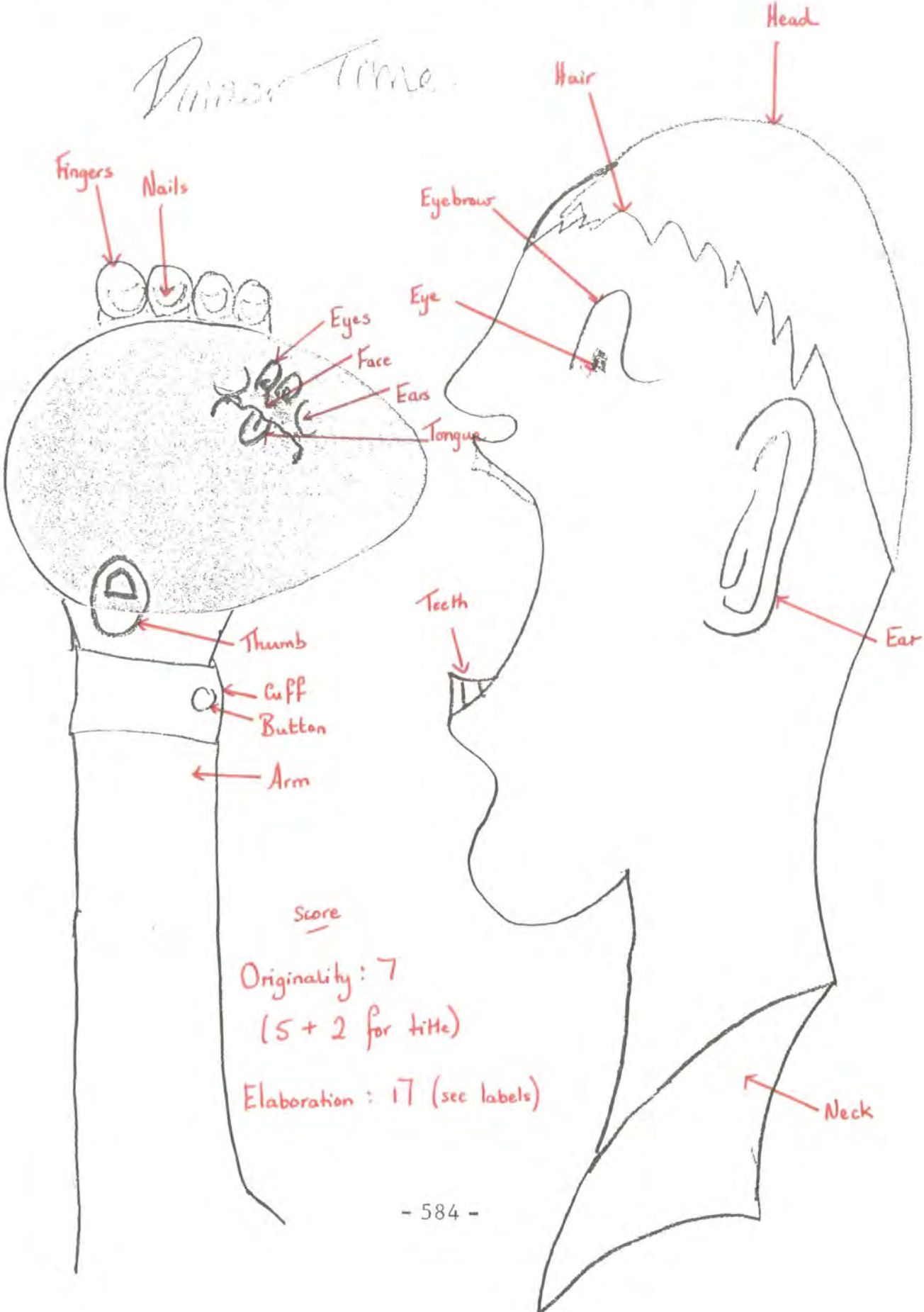
Score

Fluency : 7 = total number of responses

Flexibility : 2 = categories used

Originality : 7

PICTURE FROM A GREEN SHAPE....stick the shape on to this page (any way up) Use your pencil to draw on it or round it to turn it into a really exciting and interesting picture. Try and draw something that no one else will have thought of.

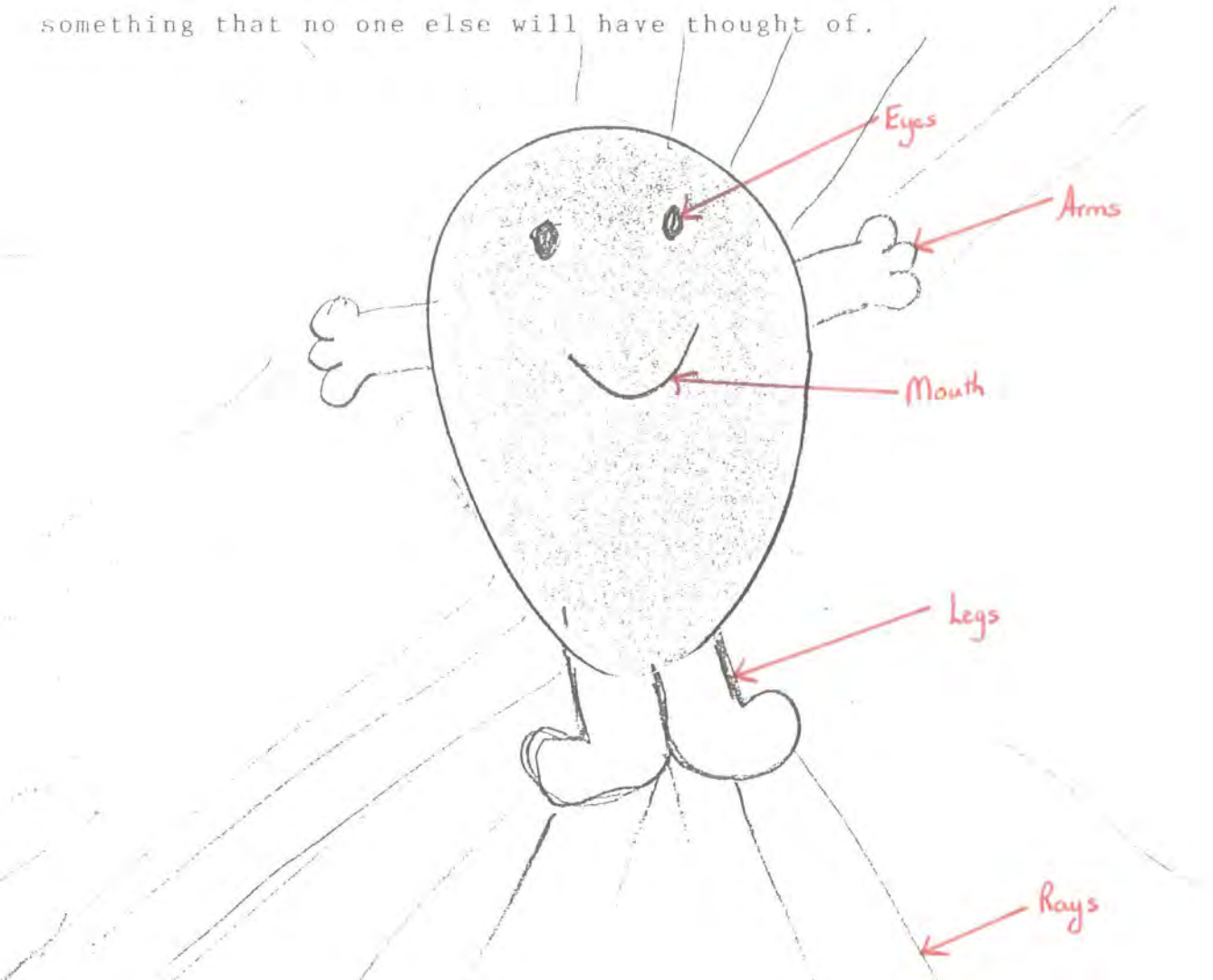


Score

Originality : 7
(5 + 2 for title)

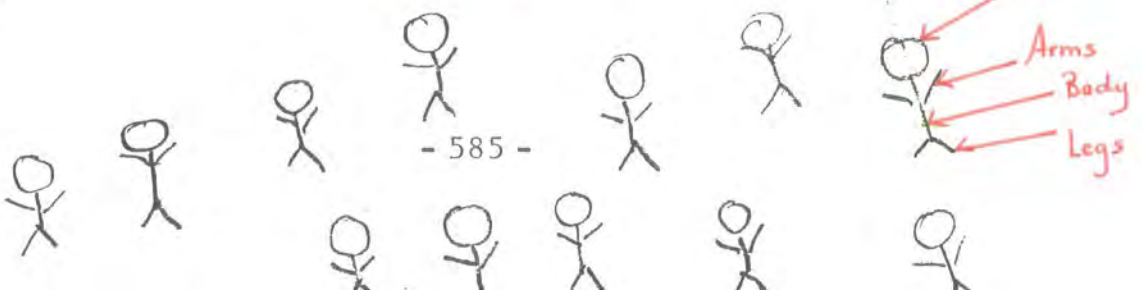
Elaboration : 17 (see labels)

PICTURE FROM A GREEN SHAPE....stick the shape on to this page (any way up) Use your pencil to draw on it or round it to turn it into a really exciting and interesting picture. Try and draw something that no one else will have thought of.



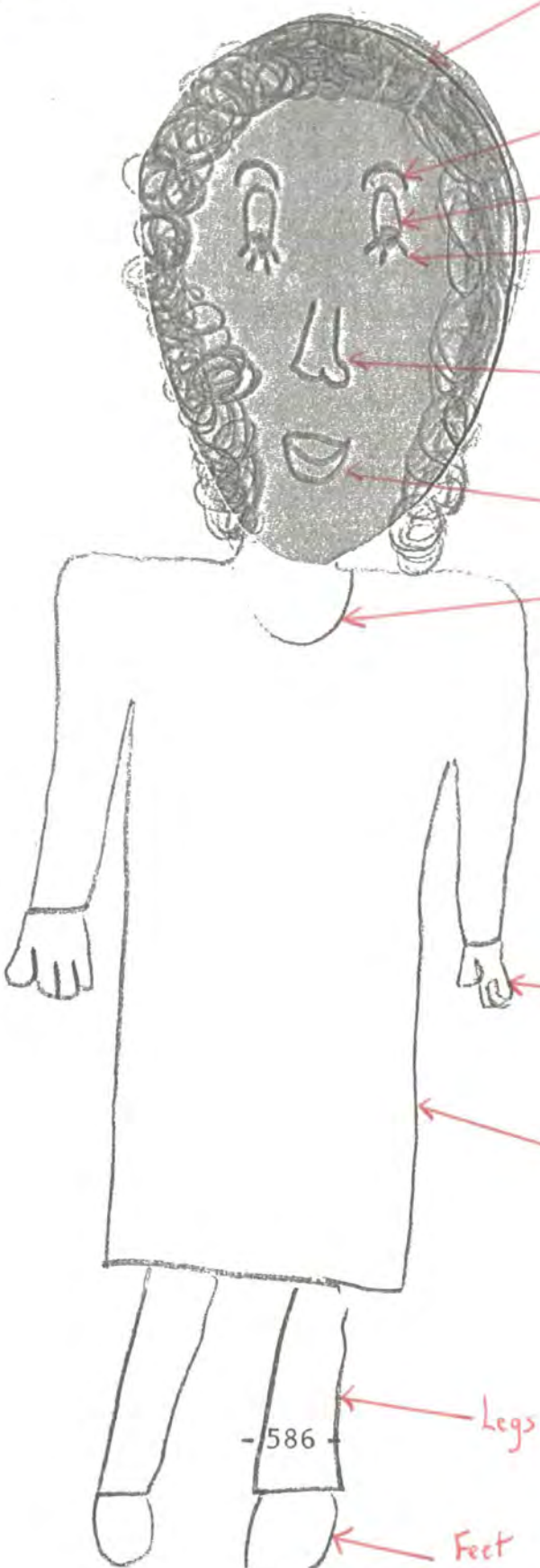
THE SUN.

Score
Originality : 4
Elaboration : 9
(see labels)



PICTURE FROM A GREEN SHAPE....stick the shape on to this page (any way up) Use your pencil to draw on it or round it to turn it into a really exciting and interesting picture. Try and draw something that no one else will have thought of.

This is a girl



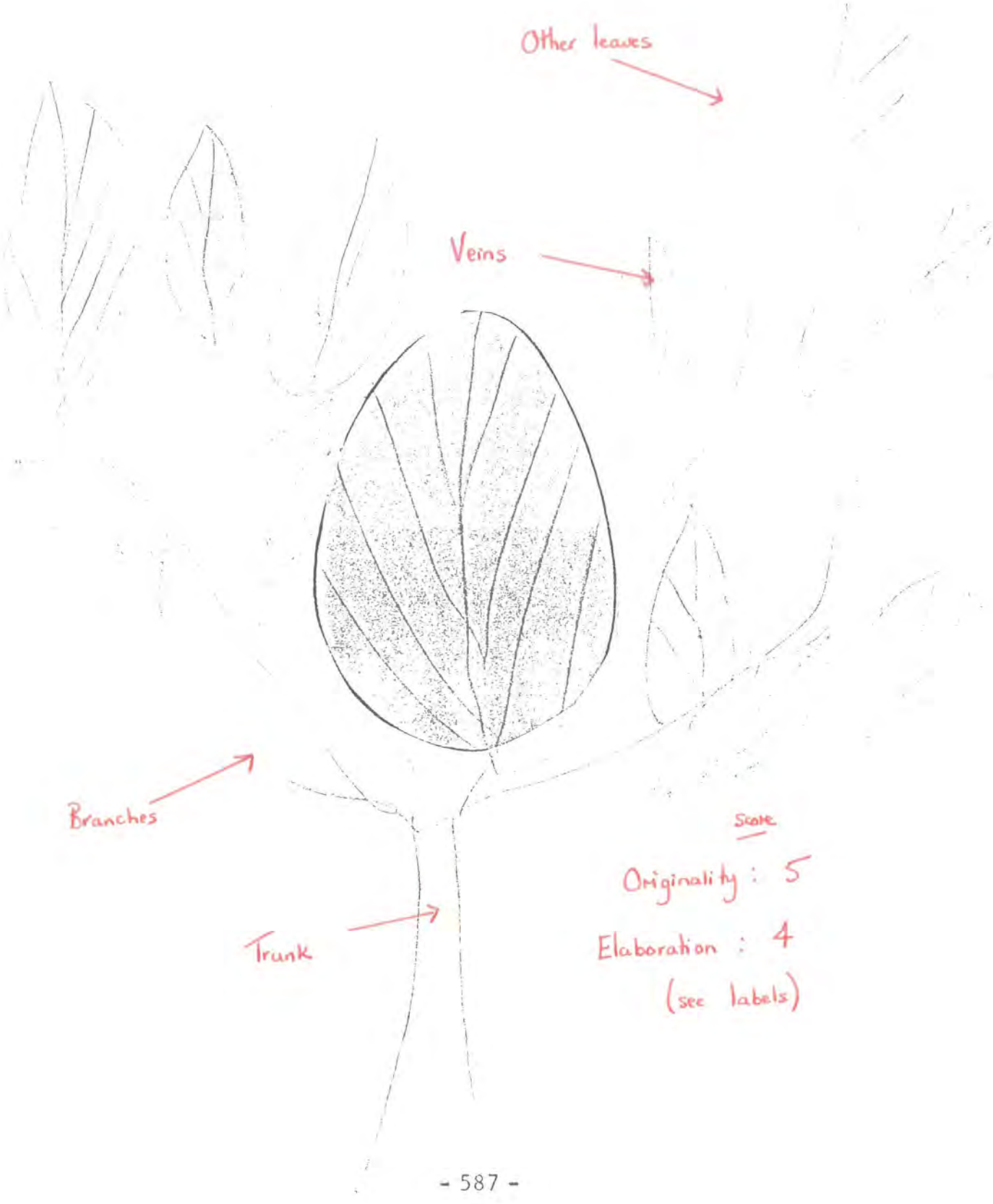
score

Originality : 2

Elaboration : 11

(see labels)

PICTURE FROM A GREEN SHAPE....stick the shape on to this page (any way up) Use your pencil to draw on it or round it to turn it into a really exciting and interesting picture. Try and draw something that no one else will have thought of.



Scale

Originality : 5

Elaboration : 4

(see labels)

APPENDIX 3

TORRANCE TESTS OF CREATIVE THINKING:

TABLES OF TEST RESULTS

TORRANCE PRE-TEST RESULTS (RAW DATA)

TABLE 7 SCHOOL E1

	PRE-TEST								
	FIGURAL					VERBAL			
CHILD	Flu	Fle	O	El	T	Flu	Fle	O	T
1	16	12	15	1	44	16	8	2	26
2	11	13	20	10	54	17	8	4	29
3	14	11	14	7	46	7	5	4	16
4	19	11	22	12	64	17	6	5	28
5	14	10	13	6	43	19	8	6	33
6	16	13	12	5	46	10	5	0	15
7	17	15	30	11	73	13	8	9	30
8	12	9	11	0	32	12	7	5	24
9	10	9	15	4	38	14	6	0	20
10	25	17	16	5	63	27	14	9	50
11	12	10	19	5	46	10	6	1	17
12	10	7	12	4	33	17	9	5	31
13	20	14	15	8	57	23	14	11	48
14	8	6	13	7	34	26	8	5	39
15	7	6	8	18	39	14	8	4	26
16	18	13	16	3	50	9	6	4	19
17	10	6	12	8	36	12	6	4	22
18	11	9	14	3	37	3	2	0	5
19	7	7	7	2	23	7	3	3	13
20	13	10	17	2	42	8	4	2	14
21	12	8	18	0	38	6	3	2	11
22	15	12	22	9	58	14	8	5	27
23	14	11	8	3	36	3	2	0	5
24	14	12	19	4	49	8	4	0	12
25	15	15	10	2	42	6	4	0	10
26	14	11	23	1	49	8	4	2	14
TOTAL					1172				584
MEAN					45.07				22.46

Flu = Fluency Fle = Flexibility O = Originality
El = Elaboration T = Total

TORRANCE PRE-TEST RESULTS (RAW DATA)

TABLE 8 SCHOOL E2

	PRE-TEST								
	FIGURAL					VERBAL			
CHILD	Flu	Fle	O	El	T	Flu	Fle	O	T
1	11	10	7	3	31	8	6	2	16
2	17	12	16	4	49	21	9	7	37
3	22	12	22	3	59	23	7	3	33
4	21	13	23	5	62	27	8	4	39
5	3	3	4	6	16	14	7	2	23
6	5	5	13	1	24	24	12	10	46
7	15	8	11	14	48	24	9	7	40
8	10	8	10	2	30	16	7	3	26
9	10	6	5	5	26	18	8	5	31
10	11	9	14	6	40	26	8	5	39
11	24	18	23	8	73	25	13	7	45
12	12	10	10	6	38	12	7	1	20
13	7	5	4	1	17	18	5	4	27
14	31	21	21	12	85	32	9	8	49
15	37	29	33	11	110	20	11	12	43
16	15	13	20	10	58	35	11	11	57
17	14	12	12	10	48	22	11	5	38
18	16	13	12	2	43	27	9	5	41
19	13	10	10	6	39	17	7	4	28
20	14	12	10	6	42	23	10	6	39
21	28	16	15	3	62	8	5	1	14
22	17	12	14	4	47	14	7	6	27
23	28	20	23	5	76	21	9	3	33
24	24	17	20	6	67	18	8	2	28
25	14	7	6	9	36	7	4	1	12
26	22	15	26	8	71	28	10	13	51
27	25	16	31	5	77	16	9	3	28
28	17	12	8	6	43	1	1	0	2
29	30	25	30	10	95	2	2	3	7
30	12	10	9	0	31	1	1	0	2
31	5	3	3	9	20	1	1	0	2
32	9	7	9	4	29	7	4	0	11
33	17	11	16	10	54	20	8	6	34
TOTAL					1646				968
MEAN					49.88				29.33

Flu = Fluency Fle = Flexibility O = Originality
El = Elaboration T = Total

TORRANCE PRE-TEST RESULTS (RAW DATA)

TABLE 9 SCHOOL E3

PRE-TEST									
	FIGURAL					VERBAL			
CHILD	Flu	Fle	O	El	T	Flu	Fle	O	T
1	28	17	29	0	74	18	6	5	29
2	22	16	18	4	60	20	4	1	25
3	21	14	22	3	60	21	4	1	26
4	14	12	13	5	44	11	4	2	17
5	12	12	11	2	37	18	10	4	32
6	11	10	17	4	42	21	7	4	32
7	18	14	17	6	55	25	11	5	41
8	13	11	22	3	49	22	11	5	38
9	16	11	22	10	59	10	4	1	15
10	26	18	24	9	77	26	9	2	37
11	20	15	21	6	62	24	9	3	36
12	22	15	24	7	68	18	7	5	30
13	**27**	**20**	**28**	**4**	**79**	**19**	**8**	**5**	**32**
14	9	8	9	2	28	10	3	3	16
15	17	13	17	2	49	16	8	6	30
16	22	17	15	4	58	15	4	2	21
17	18	15	24	5	62	9	5	2	16
18	34	18	30	4	86	23	10	8	41
19	28	20	21	8	77	15	3	0	18
20	22	14	25	9	70	12	6	2	20
21	20	16	31	8	75	24	7	4	35
22	16	9	21	8	54	24	8	6	38
23	14	12	15	8	49	12	5	1	18
24	20	15	23	6	64	24	7	0	31
25	22	13	19	5	59	24	8	5	37
26	30	17	23	3	73	31	9	6	46
27	20	11	19	10	60	36	12	10	58
28	24	14	21	9	68	25	8	4	37
29	22	16	16	6	60	30	10	6	46
30	14	10	16	5	45	18	6	5	29
31	16	8	12	11	47	27	8	6	41
TOTAL					1850				968
MEAN					59.68				31.22

Flu = Fluency Fle = Flexibility O = Originality
El = Elaboration T = Total

TORRANCE PRE-TEST RESULTS (RAW DATA)

TABLE 10 SCHOOL C1

PRE-TEST									
	FIGURAL					VERBAL			
CHILD	Flu	Fle	O	El	T	Flu	Fle	O	T
1	12	10	12	4	38	11	4	2	17
2	21	17	21	3	62	31	17	14	62
3	15	13	26	15	69	18	11	6	35
4	21	18	16	10	65	15	9	5	29
5	10	9	11	2	32	14	7	3	24
6	6	5	13	12	36	6	5	2	13
7	17	15	19	6	57	41	19	22	82
8	16	15	23	7	61	21	12	6	39
9	13	12	19	8	52	17	14	10	41
10	17	14	20	7	58	8	5	0	13
11	12	11	11	6	40	16	12	4	32
12	11	9	20	9	49	17	8	10	35
13	20	19	25	9	73	25	13	11	49
14	18	15	26	5	64	21	13	9	43
15	11	10	14	7	42	13	6	2	21
16	16	13	18	20	67	22	9	7	38
17	16	14	27	10	67	20	10	6	36
18	11	10	14	8	43	3	3	1	7
19	11	9	14	16	50	9	6	5	20
20	14	11	23	10	58	4	4	2	10
21	19	17	33	6	75	17	12	6	35
22	11	9	20	5	45	7	6	4	17
23	8	8	13	4	33	15	9	7	31
24	15	13	19	8	55	4	3	0	7
25	13	11	20	6	50	5	5	5	15
26	8	8	11	6	33	4	4	2	10
27	11	11	10	5	37	7	5	3	15
TOTAL					1411				776
MEAN					52.26				28.74

Flu = Fluency Fle = Flexibility O = Originality
El = Elaboration T = Total

TORRANCE PRE-TEST RESULTS (RAW DATA)

TABLE 11 SCHOOL C2

PRE-TEST									
	FIGURAL					VERBAL			
CHILD	Flu	Fle	O	El	T	Flu	Fle	O	T
1	10	7	14	11	42	21	14	15	50
2	18	12	17	15	62	24	11	7	42
3	15	13	21	4	53	29	12	7	48
4	11	8	12	7	38	19	9	13	41
5	8	7	13	10	38	55	12	10	77
6	13	11	12	15	51	33	13	11	57
7	10	8	12	11	41	18	6	1	25
8	28	21	27	14	90	10	4	2	16
9	40	33	30	12	115	12	6	4	22
10	9	8	13	8	38	21	7	9	37
11	20	19	22	11	72	33	12	9	54
12	12	10	13	16	51	15	9	5	29
13	17	16	23	10	66	17	10	5	32
14	16	13	25	14	68	33	14	12	59
15	12	9	13	8	42	14	6	5	25
16	5	3	4	3	15	13	4	4	21
17	8	8	10	6	32	18	5	5	28
18	18	16	27	14	75	29	6	5	40
19	23	17	26	18	84	10	5	0	15
20	13	12	19	5	49	19	9	10	38
21	14	8	7	6	35	11	7	6	24
22	16	12	15	6	49	17	10	14	41
23	13	6	12	15	46	11	5	2	18
24	13	9	14	7	43	13	6	3	22
25	10	7	8	5	30	5	2	0	7
26	9	8	12	2	31	12	8	6	26
27	7	6	11	8	32	9	4	3	16
28	19	17	30	11	77	13	9	2	24
29	25	21	28	12	86	14	6	7	27
TOTAL					1551				961
MEAN					53.48				33.14

Flu = Fluency Fle = Flexibility O = Originality
El = Elaboration T = Total

TORRANCE PRE-TEST RESULTS (RAW DATA)

TABLE 12 SCHOOL C3

PRE-TEST									
	FIGURAL					VERBAL			
CHILD	Flu	Fle	O	El	T	Flu	Fle	O	T
1	36	28	37	6	107	30	8	6	44
2	12	10	17	5	44	24	13	11	48
3	13	11	14	4	42	17	7	4	28
4	12	10	7	7	36	24	12	6	42
5	15	10	5	4	34	19	10	7	36
6	18	13	23	10	64	19	9	8	36
7	18	12	10	5	45	39	14	4	57
8	38	27	39	10	114	37	13	5	55
9	13	10	12	6	41	35	14	3	52
10	13	10	15	3	41	36	14	8	58
11	20	15	17	7	59	23	10	7	40
12	28	17	26	6	77	47	14	10	71
13	40	27	22	9	98	28	12	5	45
14	37	25	18	8	88	30	12	5	47
15	24	16	14	7	61	21	10	4	35
16	24	17	12	5	58	27	11	5	43
17	15	10	17	9	51	5	4	0	9
18	22	17	17	3	59	19	11	5	35
19	7	7	11	7	32	8	6	2	16
20	18	14	28	11	71	14	7	8	29
21	23	17	25	10	75	19	11	8	38
22	10	8	10	6	34	13	5	3	21
23	26	19	28	10	83	22	10	7	39
24	11	9	7	8	35	5	3	0	8
25	4	4	7	2	17	1	1	0	2
26	11	9	20	4	44	1	1	0	2
27	13	10	5	3	31	7	6	1	14
28	15	8	5	3	31	17	8	5	30
29	16	13	11	7	47	10	4	1	15
30	11	7	18	11	47	5	4	2	11
31	17	15	9	5	46	18	7	5	30
32	30	10	14	5	59	23	10	7	40
TOTAL					1771				1076
MEAN					55.34				33.62

Flu = Fluency Fle = Flexibility O = Originality
El = Elaboration T = Total

TORRANCE POST-TEST RESULTS AND PRE-POST TEST SCORE DIFFERENCES (RAW DATA)

TABLE 13

SCHOOL E1

	POST-TEST									PRE/POST TEST DIFFERENCES	
	FIGURAL					VERBAL					
CHILD	Flu	Fle	O	El	T	Flu	Fle	O	T	FIGURAL	VERBAL
1	39	26	53	13	131	63	33	29	125	+ 87	+ 99
2	38	30	66	58	192	42	27	29	98	+138	+ 69
3	21	16	44	60	141	51	30	33	114	+ 95	+ 98
4	36	27	62	45	170	43	26	30	99	+106	+ 71
5	40	24	57	30	151	48	29	26	103	+108	+ 70
6	26	20	40	28	114	40	19	22	81	+ 68	+ 66
7	19	15	41	65	140	43	30	37	110	+ 67	+ 80
8	28	21	43	29	121	47	26	27	100	+ 89	+ 76
9	40	21	30	19	110	80	42	36	158	+ 72	+138
10	40	26	56	29	151	54	28	27	109	+ 88	+ 59
11	31	24	37	42	134	31	23	18	72	+ 88	+ 55
12	40	26	37	17	120	54	32	23	109	+ 87	+ 78
13	30	20	48	44	142	44	27	50	121	+ 85	+ 73
14	38	21	51	18	128	92	47	41	180	+ 94	+141
15	28	21	36	29	114	42	22	17	81	+ 75	+ 55
16	40	27	52	15	134	48	26	12	86	+ 84	+ 67
17	40	26	58	24	148	85	52	53	190	+112	+168
18	40	30	77	36	183	103	60	63	226	+146	+221
19	21	14	25	13	73	15	13	2	30	+ 50	+ 90
20	37	23	47	16	123	31	14	15	60	+ 81	+ 46
21	32	19	28	15	94	24	22	17	63	+ 56	+ 52
22	33	22	53	37	145	62	38	44	144	+ 87	+117
23	19	14	25	10	68	30	18	6	54	+ 32	+ 49
24	21	18	29	15	83	30	17	16	63	+ 34	+ 51
25	40	29	48	40	157	58	29	41	128	+115	+ 83
26	40	30	59	24	153	51	22	24	97	+104	+ 83
TOTAL					3420				2801		
MEAN					131.54				107.73		

Flu = Fluency Fle = Flexibility O = Originality
El = Elaboration T = Total

TORRANCE POST-TEST RESULTS AND PRE-POST TEST SCORE DIFFERENCES (RAW DATA)

TABLE 14

SCHOOL E2

	POST-TEST									PRE/POST TEST DIFFERENCES	
	FIGURAL					VERBAL					
CHILD	Flu	Fle	O	El	T	Flu	Fle	O	T	FIGURAL	VERBAL
1	28	23	54	16	121	35	18	5	58	+ 90	+ 42
2	15	13	30	25	83	39	22	19	80	+ 34	+ 43
3	25	21	37	18	101	34	18	11	63	+ 42	+ 30
4	38	26	37	16	117	39	19	18	76	+ 55	+ 37
5	9	8	13	15	45	30	17	13	60	+ 29	+ 37
6	13	13	20	32	78	41	17	24	82	+ 54	+ 36
7	28	21	31	29	109	40	34	12	86	+ 61	+ 46
8	13	11	20	15	59	35	20	8	63	+ 29	+ 37
9	17	12	29	32	90	50	34	27	111	+ 64	+ 80
10	10	10	25	28	73	49	29	40	118	+ 33	+ 79
11	20	15	32	20	87	38	25	35	98	+ 14	+ 53
12	16	14	21	27	78	31	21	18	70	+ 40	+ 50
13	14	14	22	22	72	40	19	25	84	+ 55	+ 57
14	40	21	56	42	159	112	52	68	232	+ 74	+183
15	40	30	49	19	138	48	19	17	84	+ 28	+ 41
16	23	20	45	30	118	52	31	43	126	+ 60	+ 69
17	14	11	22	37	84	41	24	32	97	+ 36	+ 59
18	16	12	30	18	76	43	24	33	100	+ 33	+ 59
19	23	19	29	16	87	41	18	14	73	+ 48	+ 45
20	20	19	43	31	113	46	17	22	85	+ 71	+ 46
21	28	20	41	19	108	25	12	2	39	+ 46	+ 25
22	14	12	27	34	87	49	26	24	99	+ 40	+ 92
23	24	22	45	26	117	46	28	45	119	+ 41	+ 86
24	31	15	38	57	135	46	30	15	91	+ 68	+ 63
25	29	30	49	18	126	41	18	8	67	+ 90	+ 55
26	40	29	48	31	148	51	30	41	122	+ 77	+ 71
27	18	13	39	56	126	50	35	49	134	+ 49	+106
28	16	14	18	10	58	2	2	0	4	+ 15	+ 2
29	24	21	42	17	104	21	11	8	40	+ 9	+ 33
30	15	15	26	12	68	21	13	2	36	+ 37	+ 34
31	13	12	20	25	70	2	0	0	2	+ 50	0
32	15	14	33	11	73	23	13	5	41	+ 44	+ 30
33	19	16	33	24	92	45	21	21	87	+ 38	+ 53
TOTAL					3200				2727		
MEAN					96.97				82.64		

Flu = Fluency Fle = Flexibility O = Originality
El = Elaboration T = Total

TORRANCE POST-TEST RESULTS AND PRE-POST TEST SCORE DIFFERENCES (RAW DATA)

TABLE 15

SCHOOL E3

	POST-TEST									PRE/POST TEST DIFFERENCES	
	FIGURAL					VERBAL					
CHILD	Flu	Fle	O	El	T	Flu	Fle	O	T	FIGURAL	VERBAL
1	30	20	43	14	107	47	26	18	91	+ 33	+ 62
2	40	30	73	32	175	59	30	38	127	+115	+102
3	30	23	43	22	118	55	31	29	115	+ 58	+ 89
4	32	21	54	17	124	45	29	36	110	+ 80	+ 93
5	33	28	47	12	120	68	43	55	166	+ 83	+134
6	27	18	29	22	96	39	26	18	83	+ 54	+ 51
7	26	18	40	30	114	49	23	25	97	+ 59	+ 56
8	30	22	44	21	117	55	30	32	117	+ 68	+ 79
9	40	23	61	28	152	78	39	51	168	+ 93	+153
10	40	27	57	23	147	66	32	29	127	+ 70	+ 90
11	40	31	66	20	157	88	42	43	173	+ 95	+137
12	39	27	63	30	159	64	33	38	135	+ 91	+105
13	40	29	48	14	131	75	29	25	129	+ 52	+ 97
14	36	21	50	14	121	56	29	33	118	+ 93	+102
15	35	21	46	19	121	65	37	38	140	+ 72	+110
16	35	21	48	26	130	51	27	19	97	+ 72	+ 76
17	36	19	34	31	120	17	9	9	35	+ 59	+ 19
18	40	30	39	19	128	64	34	29	127	+ 42	+ 86
19	34	21	49	17	121	58	30	33	121	+ 44	+103
20	28	15	52	63	158	70	36	27	133	+ 88	+113
21	40	30	57	15	142	42	22	16	80	+ 67	+ 45
22	40	26	65	27	158	49	30	21	100	+104	+ 62
23	18	17	39	37	111	44	29	36	109	+ 62	+ 91
24	40	31	61	21	153	112	56	45	213	+ 89	+182
25	18	14	31	10	73	45	21	15	81	+ 14	+ 44
26	40	28	61	27	156	96	45	29	170	+ 83	+124
27	40	28	62	31	161	70	37	39	146	+101	+ 88
28	27	21	38	40	126	42	25	21	88	+ 58	+ 51
29	40	30	60	26	156	93	43	42	178	+ 96	+132
30	40	26	45	13	124	45	21	14	80	+ 79	+ 51
31	40	27	66	36	169	77	30	41	148	+122	+107
TOTAL					4145				3901		
MEAN					133.71				125.83		

Flu = Fluency Fle = Flexibility O = Originality
El = Elaboration T = Total

TORRANCE POST-TEST RESULTS AND PRE-POST TEST SCORE DIFFERENCES (RAW DATA)

TABLE 16

SCHOOL C1

	POST-TEST									PRE/POST TEST DIFFERENCES	
	FIGURAL					VERBAL					
CHILD	Flu	Fle	O	El	T	Flu	Fle	O	T	FIGURAL	VERBAL
1	13	13	16	6	48	14	7	2	23	+ 10	+ 6
2	11	11	19	6	47	12	7	1	20	- 15	- 42
3	7	7	8	13	35	10	8	1	19	- 34	- 16
4	22	18	33	15	88	20	11	5	36	+ 23	+ 7
5	10	8	9	3	30	6	4	2	12	- 2	- 12
6	9	5	3	5	22	6	3	0	9	- 14	- 4
7	18	14	27	11	70	38	28	17	83	+ 13	+ 1
8	13	11	16	7	47	10	5	5	20	- 14	- 19
9	18	20	20	10	68	18	15	10	43	+ 16	+ 2
10	15	12	11	5	43	14	10	2	26	- 15	+ 13
11	16	16	27	16	75	31	15	9	55	+ 35	+ 23
12	15	13	21	11	60	12	11	8	31	+ 11	- 4
13	23	15	24	8	70	27	19	14	60	- 3	+ 11
14	11	10	15	17	53	14	10	0	24	- 11	- 19
15	11	9	16	15	51	24	14	8	46	+ 9	+ 25
16	17	14	27	12	70	35	23	9	67	+ 3	+ 29
17	27	22	40	10	99	29	17	5	51	+ 32	+ 15
18	8	8	10	6	32	8	6	0	14	- 11	+ 7
19	11	8	17	12	48	13	11	4	28	- 2	+ 8
20	12	10	18	12	52	9	4	0	13	- 6	+ 3
21	12	12	13	7	44	11	6	0	17	- 31	- 18
22	15	13	10	6	44	0	0	0	0	- 1	- 17
23	18	10	12	3	43	16	7	3	26	+ 10	- 5
24	15	10	10	5	40	6	6	0	12	- 15	+ 5
25	20	16	21	9	66	18	11	4	33	+ 16	+ 18
26	7	7	12	5	31	5	4	0	9	- 2	- 1
27	20	13	20	13	66	9	8	1	18	+ 29	+ 3
TOTAL					1442				795		
MEAN					53.41				29.44		

Flu = Fluency Fle = Flexibility O = Originality
El = Elaboration T = Total

TORRANCE POST-TEST RESULTS AND PRE-POST TEST SCORE DIFFERENCES (RAW DATA)

TABLE 17

SCHOOL C2

	POST-TEST									PRE/POST TEST DIFFERENCES	
	FIGURAL					VERBAL					
CHILD	Flu	Fle	O	El	T	Flu	Fle	O	T	FIGURAL	VERBAL
1	8	8	18	12	46	19	14	18	51	+ 4	+ 1
2	23	15	27	30	95	15	7	1	23	+ 33	- 19
3	16	13	28	8	65	26	15	7	48	+ 12	0
4	9	9	19	24	61	17	14	6	37	+ 23	- 4
5	15	12	21	14	61	17	14	6	37	+ 23	- 4
6	16	16	24	21	77	23	13	4	40	+ 26	- 17
7	11	10	22	14	57	21	11	5	37	+ 16	+ 12
8	11	11	11	5	38	19	14	4	37	- 52	+ 21
9	31	16	22	11	80	21	13	4	38	- 35	+ 16
10	18	14	24	17	73	24	19	8	51	+ 35	+ 14
11	14	13	21	16	64	26	20	7	53	- 8	- 1
12	16	13	21	20	70	24	16	1	41	+ 19	+ 12
13	8	8	8	3	27	8	3	0	11	- 39	- 21
14	16	13	18	17	64	27	18	6	51	- 4	- 8
15	10	10	12	18	50	17	12	3	32	+ 8	+ 7
16	10	8	18	17	53	18	8	8	34	+ 38	+ 13
17	18	17	23	17	75	17	13	0	30	+ 43	+ 2
18	17	15	28	23	83	25	10	3	38	+ 8	- 2
19	12	12	17	12	53	20	14	2	36	- 31	+ 21
20	14	10	13	17	54	18	12	9	39	+ 5	+ 1
21	14	13	24	9	60	12	10	1	23	+ 25	- 1
22	12	12	22	12	58	22	11	3	36	+ 9	- 5
23	14	12	12	5	43	16	9	7	32	- 3	+ 14
24	14	11	16	7	48	20	8	3	31	+ 5	+ 9
25	8	7	12	14	41	11	8	0	19	+ 11	+ 12
26	12	11	15	16	54	6	5	0	11	+ 23	- 15
27	18	14	22	16	70	18	10	2	30	+ 38	+ 24
28	12	11	12	16	51	19	13	2	34	- 26	+ 10
29	19	17	30	23	89	36	21	14	71	+ 3	+ 44
TOTAL					1761				1079		
MEAN					60.72				37.21		

Flu = Fluency Fle = Flexibility O = Originality
El = Elaboration T = Total

TORRANCE POST-TEST RESULTS AND PRE-POST TEST SCORE DIFFERENCES (RAW DATA)

TABLE 18

SCHOOL C3

	POST-TEST									PRE/POST TEST DIFFERENCES	
	FIGURAL					VERBAL					
CHILD	Flu	Fle	O	El	T	Flu	Fle	O	T	FIGURAL	VERBAL
1	25	14	27	12	78	28	13	15	56	- 29	+ 12
2	16	14	18	7	55	33	15	6	56	+ 11	+ 6
3	13	12	16	4	45	15	10	3	28	+ 3	0
4	12	11	9	5	37	24	12	4	40	+ 1	- 2
5	7	7	8	2	24	20	14	2	36	- 10	0
6	24	14	25	7	70	24	13	3	40	+ 6	+ 4
7	26	15	22	8	71	36	19	11	66	+ 26	+ 9
8	30	27	32	18	107	25	15	4	44	- 7	- 9
9	14	12	16	3	45	24	13	0	37	+ 4	- 15
10	17	11	21	7	56	25	12	7	44	+ 15	- 14
11	22	16	21	10	69	25	12	9	46	+ 10	+ 6
12	21	17	22	10	70	34	17	11	62	- 7	- 9
13	14	11	18	6	49	26	11	4	41	- 49	- 4
14	22	14	26	5	67	40	16	5	61	- 21	+ 14
15	22	16	22	8	68	27	14	6	47	+ 7	+ 12
16	26	16	22	10	74	27	16	9	52	+ 16	+ 9
17	6	6	7	5	24	4	3	0	7	- 27	- 2
18	23	19	21	5	68	22	18	9	49	+ 9	+ 14
19	11	11	12	5	39	19	9	0	28	+ 7	+ 12
20	23	15	27	18	83	25	8	11	44	+ 12	+ 15
21	16	14	23	10	63	37	18	9	64	- 12	+ 26
22	12	10	10	9	41	20	11	1	32	+ 7	+ 11
23	6	5	10	8	29	22	10	2	34	- 54	- 5
24	16	14	15	6	51	12	8	0	20	+ 16	+ 12
25	0	0	2	2	4	1	1	0	2	- 13	0
26	3	3	2	3	11	16	8	0	24	- 33	+ 22
27	12	10	13	2	37	5	4	1	10	+ 6	- 4
28	23	12	12	5	52	22	11	4	37	+ 21	+ 7
29	12	7	25	17	61	26	13	6	45	+ 14	+ 30
30	14	11	18	12	55	13	7	0	20	+ 8	+ 9
31	13	11	15	4	43	7	6	1	14	- 3	- 16
32	26	14	26	11	77	25	17	11	53	+ 18	+ 13
TOTAL					1723				1237		
MEAN					53.84				38.66		

Flu = Fluency Fle = Flexibility O = Originality
El = Elaboration T = Total