

**THE DEVELOPMENT OF THINKING  
IN  
EDUCATION**

**BY**

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## **ABSTRACT**

The desire to enhance the thinking skills of learners has become a worldwide phenomenon. This desire has been further reinforced by programmes developed specifically for this purpose. Developers of these thinking skills programmes have made various claims about the effectiveness of their programmes in teaching learners general skills of thinking that can be applied to any field of study. The thesis presents a comprehensive examination of the four most prominent programmes. The basis of the thesis is a critical discussion of the assumptions underpinning these programmes and the coherence of their claims. At the core of these assumptions is the idea that thinking can be taught and learned free from any context. The idea raises important conceptual and practical issues that demand attention if improvements in pupils' thinking are to be addressed.

## TABLE OF CONTENTS

<b>INTRODUCTION</b>	<b>8</b>
<b>PART ONE: ON TEACHING THINKING</b>	<b>24</b>
<b>CHAPTER 1</b>	
<b>WHAT IS THINKING?</b>	
1.1. What constitutes thinking?	25
1.2. Dewey on thinking	33
1.3. Ryle's conceptions of thinking	40
1.4. Comments on thinking	49
<b>CHAPTER 2</b>	
<b>TYPES OF THINKING</b>	
2.1. The complexity of thinking	54
2.2. Thinking by signs	55
2.3. Reasoning	56
2.3.1. Practical thinking	57
2.3.2. Theoretical thinking	58
2.4. Imagining	60
2.5. Contemplating	63
2.6. Notes on the complexity of thinking	66
<b>CHAPTER 3</b>	
<b>JUSTIFICATIONS FOR PROMOTING THINKING</b>	
3.1. Promoting thinking	68
3.2. Dewey on why teach thinking	69
3.3. Siegel's justification	73
3.4. An inclusive justification	79
<b>SUMMARY OF PART ONE</b>	<b>83</b>

**PART TWO: ON TEACHING THINKING PROGRAMMES** 85

**CHAPTER 4**

**PROPOSED FRAMEWORKS FOR TEACHING THINKING**

4.1. Ennis's framework for teaching thinking	88
4.2. McPeck's framework for teaching thinking	94
4.3. Which way for teaching thinking?	103

**CHAPTER 5**

**PHILOSOPHY FOR CHILDREN**

5.1. Why teach children philosophy?	105
5.2. Guiding children to philosophise	109
5.3. Issues in teaching children to philosophise	111
5.4. The effectiveness of Philosophy for Children	121
5.4.1. Shipman's final report	122
5.4.2. Iorin, Weinstein and Martin's evaluation	126
5.5. Notes on Philosophy for Children	130

**CHAPTER 6**

**CoRT THINKING PROGRAMME**

6.1. Grounds for the CoRT programme	132
6.2. The CoRT method	135
6.3. Theoretical difficulties with CoRT	139
6.4. Issues concerning the effectiveness of CoRT	145
6.4.1. Hunter-Grundin's evaluation of CoRT	152
6.4.2. Edwards on the CoRT programme	154
6.5. Summerising DeBono's CoRT programme	157

**CHAPTER 7****INSTRUMENTAL ENRICHMENT**

7.1. Feuerstein's Instrumental Enrichment (FIE)	159
7.2. The theoretical foundation of FIE	162
7.3. How FIE works	169
7.4. Comments on the effectiveness of FIE	173
7.4.1. Making up our minds	174
7.4.2. Can we teach intelligence?	177
7.5. Is FIE appropriate for all pupils?	181

**CHAPTER 8****COGNITIVE ACCELERATION THROUGH SCIENCE EDUCATION**

8.1. Rationale for the programme	185
8.2. Evaluating the impact of CASE	189
8.3. Remarks on CASE	197

**CHAPTER 9****THINKING SKILLS PROGRAMMES IN FORMAL EDUCATION**

9.1. The international perspective	202
9.2. Delivering thinking skills in UK schools	205
9.3. McGuinness's report on thinking skills	208
9.4. Preparation for life	217
9.5. Learning from the past	220
9.6. Practical issues concerning the programmes.	223
9.6.1. Evidence of Effectiveness	223
9.6.2. Demands on Teachers	225
9.6.3. Transferability	227

**CHAPTER 10****THE DEBATE ON GENERAL THINKING SKILLS**

10.1. Sources of the debate	229
10.2. The transferability of thinking skills	236
10.2.1. Transfer between closely related subjects	237
10.3. A defence of general thinking skills	248
10.4. The case against general thinking skills	252
10.5. Coming to terms with general thinking skills	255
10.6. Rethinking teaching thinking	265

<b>SUMMARY OF PART TWO</b>	267
----------------------------	-----

<b>PART THREE: ON THE DEVELOPMENT OF THINKING</b>	269
---	-----

**CHAPTER 11****THE NECESSITY OF KNOWLEDGE**

11.1. The concept of knowledge	270
11.1.1. Theoretical knowledge	274
11.1.2. Practical knowledge	278
11.2. The need for knowledge in thinking	281
11.2.1. Domain specificity of knowledge	290
11.2.1.1. Effective thinking in mathematics	293

**CHAPTER 12****THE IMPORTANCE OF COURAGE**

12.1. The dispositions in thinking	299
12.2. Defining courage	305
12.3. Why courage is important in thinking effectively	314
12.4. Can there be different kinds of courage in thinking?	319
12.5. Nurturing courage	322

**CHAPTER 13****EDUCATION FOR THINKING**

13.1. Promoting thinking	324
13.2. Supporting Sign-cognition	326
13.3. Encouraging Contemplative thinking	330
13.4. Enhancing Reasoning	333
13.5. Fostering the Imagination	336
13.6. The complexity of teaching thinking	340
13.7. The importance of teacher preparation	345

<b>SUMMARY OF PART THREE</b>	350
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<b>CONCLUSION</b>	351
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<b>BIBLIOGRAPHY</b>	367
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## INTRODUCTION

The desire to improve pupils' thinking has become a worldwide phenomenon. In the USA, for example, the Secretary's Commission on Achieving Necessary Skills (SCANS) framework is part of an official nation-wide effort to link education to the world at large (Marginson and O'Hanlon, 1993). The Commission created a list consisting of five workplace competencies and three foundation skills called 'Workplace know-how' which includes thinking skills. The Commission recommended that these workplace competencies and skills be made explicit at all levels of the nation's school system.

Similarly, in Australia the Finn Committee (Mayer, 1992) concluded that there are certain essential things which they termed 'employment-related key competencies' that all young people need to learn in their preparation for employment. In other words, these generic skills are seen to be at the crux of life-long learning to enhance pupils' flexibility and adaptability for effective participation in the changing patterns of work and work organisation. The Committee identified seven key competencies including thinking skills.



In the Chinese special region of Hong Kong the promotion of thinking skills has become a key factor in the development of their new curriculum framework.

The growing interest in teaching thinking skills in England has led to its inclusion in the new National Curriculum handbook for teachers (QCA,1999). It states that thinking skills are embedded in the curriculum, and presents the following as examples of such thinking skills:

*Information-processing skills.* It claims that these skills allow pupils to locate and collect relevant information, to sort, classify, sequence, compare and contrast, and to analyse part/whole relationships.

*Reasoning skills.* It states that these skills permit pupils to give reasons for opinions and actions, to draw inferences and make deductions, to use precise language to explain what they think, and to make judgments and decisions.

*Enquiry skills.* It highlights the importance of these skills in allowing pupils to ask relevant questions, to pose and define problems, to plan what to do and how to research, to predict outcomes and anticipate consequences, and to test conclusions and improve ideas.

*Creative thinking skills.* It maintains that with these skills pupils are able to generate and extend ideas, to suggest hypotheses, to apply imagination, and to look for alternative innovative outcomes.

*Evaluation skills.* According to the handbook these skills help pupils to evaluate information, judge the value of what they read, hear and do, develop criteria for judging the value of their own and others' work or ideas, and have confidence in their judgments.

The intention on the part of national governments to improve the thinking skills of their citizens has been supported by programmes developed specifically for the promotion of pupils' general thinking skills. Currently, there is a very large number of programmes claiming to improve learners' general thinking skills. These include the following:

- From the U.S.A - Structure of Intellect (SOI), Odyssey, Problem Solving and Comprehension, Logic, 'Strong' Critical Thinking, Philosophy for Children.
- From England - Somerset Thinking Skills Course, The Oxfordshire Skills Programme, LOGO, Cognitive Acceleration through Science Education (CASE),

Cognitive Acceleration through Mathematics Education (CAME).

- From Malta (but with English influence) - Cognitive Research Trust (CoRT),
- From Israel - Instrumental Enrichment.
- From Ireland - Activating Children's Thinking Skills (ACTS).

Policy makers often turn to these thinking skills programmes as a result of their keenness to improve the educational experience of learners. In England, for example, the McGuinness Report (1999) has played an influential role in the inclusion of thinking skills in the new National Curriculum. In 1998 the Department for Education and Employment (now known as the Department for Education and Skills) commissioned the report in order to review and evaluate research into thinking skills and related areas. The report specifically aimed to (1) analyse what is currently understood by the term "thinking skills" and their role in the learning process; (2) identify current approaches to developing children's thinking and to evaluate their effectiveness; (3) consider how teachers might be able to integrate thinking skills into their teaching both within subject areas and across the curriculum; (4) identify the role of ICT in promoting a positive approach to thinking skills; and (5) evaluate the general trend of current and future

research and how it might translate into classroom practice.

In the main the report recognised general thinking skills as a model for delivering thinking skills and highlighted a number of programmes, including Philosophy for Children (PFC), Cognitive Research Trust (CoRT), Instrumental Enrichment (FIE) and Cognitive Acceleration through Science Education (CASE) as examples of programmes delivering general thinking skills. The CASE programme, for instance, was highlighted as providing benefits to learners that could extend beyond academic attainment.

In view of the increasing recognition and use of these programmes in shaping educational policy there is a need for their critical review. It is the central aim of this thesis to provide this. It will concentrate on four of the most prominent programmes developed for teaching general thinking skills, as follows:

#### *Philosophy for Children (PFC)*

Matthew Lipman developed this programme in the early 1970s to address some of the problems (as he saw them) in the American educational system. The original idea for the creation of the programme resulted from Lipman's concern about the low level of thinking skills that students brought to his philosophy classes. For Lipman

the educational system produced so many unthinking people because it fails to address the conceptual needs of the child in a number of ways. For example, children are not taught to reason. Similarly, children are not shown how to apply logical skills to diverse subject matters. The alarming level of the American child's lack of reasoning, as Lipman observed, is a result of the child not being sufficiently encouraged to think for him or herself, be proud of his or her personal insights, and have a point of view that he or she can call his or her own. Lipman argues that the best way to resolve such an unproductive educational system is to be found in teaching children philosophy, as it is the best discipline to connect the various specific subjects. For Lipman, to engage children in philosophical discussions is, therefore, an aid in healing the 'general fragmentation' of their educational experience.

#### *Cognitive Research Trust (CoRT)*

Edward DeBono developed CoRT in the middle of the 1970s in order to address the inadequacies in teaching thinking within the British educational system. For DeBono, our productive thinking ability is based on the way that the brain and its various thought processes operate. DeBono's description of the unique way in which the brain works with working models and not by words forms the bedrock for the justification of his curriculum proposal as

presented in his CoRT programme. DeBono defends the need for his programme by arguing that the teaching of thinking is the teaching of perception. According to DeBono, a great deal can be accomplished in most ordinary thinking by 'directing attention' (i.e perception) before applying the processing stage of thinking which then involves logic. According to DeBono the teaching of logic has been wrongly taken for granted as the main approach to teaching thinking as a result of tradition based on the classics. So for DeBono, the ineffectiveness of the traditional subject matter of logic and other content subjects in teaching thinking forms an important part of his rationale for recommending his programme as the best way to teach thinking.

#### *Instrumental Enrichment (FIE)*

Reuven Feuerstein began work on this programme in the late 1940s as a result of his concern for the integration of young Jewish people from many deprived and often traumatised cultures in Europe, Asia and Africa into Israel. FIE is presented as a strategy for the restoration of cognitive structure in the retarded performer. At the core of this conception of a retarded cognitive performance, according to Feuerstein, is the phenomenon of cultural deprivation, defined as a "state of reduced cognitive modifiability of the individual in

response to direct exposure to sources of stimulation". Feuerstein's notion of cultural deprivation is directly determined by the lack of a mediated learning experience. This may arise as a result of parents not providing it in the early years of the child's cognitive development. Feuerstein believes that his Instrumental Enrichment programme based on the theory of mediated learning experience is capable of reversing the conditions of retarded cognitive performance as experienced by the culturally deprived. The programme is based on the fundamental idea that it is the learner rather than the material to be learned that should be modified. Feuerstein's belief that the human intellect is highly adaptable and modifiable at all ages and stages of development underpinned his entire approach to the development of the programme, which emerged from his theory of the relationship of early mediated learning experience and later cognitive competence.

#### *Cognitive Acceleration for Science Education (CASE)*

Philip Adey and Michael Shayer developed this programme at Kings College London in the middle of the 1980s. The need to address issues concerning the low academic standards in schools and colleges formed the basis for the development of CASE. It is a cognitive intervention programme based on a Piagetian approach. Its aim is to

accelerate pupils' cognitive development to the level of formal operational thinking such that they can engage successfully with the instructional objectives of the traditional curriculum. The intervention is set in the science curriculum and the materials are directed towards scientific-type thinking.

The thesis is arranged in three parts and Part Two focuses on the critical review of the four programmes. In this part each of the programmes is examined in turn, with a focus on their conceptual coherence and the evidence of their effectiveness (Chapters 5 to 8). Underpinning the critical discussions of the four programmes is the fundamental issue of the existence of general thinking skills and their transferability from one domain to another (Chapter 10). The thesis argues that the transfer of thinking skills is possible (or is to be expected) where the domains in question are closely related. For example, it is highly likely that mathematical thinking skills can be easily transferred to solving problems in physics or economics, but the same cannot be simply said about the use of such thinking skills in solving problems to do with personal relationships, for example, or in playing and winning a game of tennis. In spite of the fact that the existence of general thinking skills across the board is not logically impossible, there is no sufficient or good



empirical evidence for them. The thesis proposes that in order to alleviate the ongoing confusion as a result of the simplistic way in which the phrase 'general thinking skills' is often used, we resist the temptation to refer to thinking skills as being 'general'.

Other studies have also raised issues regarding the four programmes, but these studies have not provided such a comprehensive examination of all four programmes together as is presented in this thesis. It does so by offering a fuller and more fundamental account of the problems associated with these programmes. A central problem common to these programmes is their failure to take proper account of the nature of thinking in all its complexity. The thesis claims that one cannot properly evaluate arguments about thinking skills without the detailed consideration of the concept of thinking and its importance in education. It is to these issues that Part One of the thesis is devoted.

In describing thinking it is necessary that a general account be first provided. Any definition of thinking must highlight the fact that it involves intentionality and attention and the need for some relevant context. Such contexts play a part in the importance of the different types of thinking and hence in its complexity.

There are many types of thinking, as already indicated, and although these are not mutually exclusive they can be categorised as follows:

### *Reasoning*

In this type of thinking the focus is essentially on calculation and judgement. It involves trying to find what may produce the desired result based on largely trial and error. This type of thinking is subdivided into practical or theoretical reasoning. The practical in the main involves means and ends, in other words our ability to manage ourselves in the world of action. The theoretical is concerned with truth seeking, in other words it involves our ability to work with propositions.

### *Imagining*

This type of thinking highlights the varied ways in which the term 'imagination' can be used. The term is used in a popular way to refer to our capacity to conceive of what is not actually happening here and now. However, different uses of the term can be distinguished in imaging, imagining and imaginativeness. The different senses in which the term can be applied draw further attention to the complexity of thinking.

*Contemplation*

The motivation in contemplating is not concerned with solving problems as in reasoning or with the generating of new ways of viewing things as in imagining.

Contemplation is concerned with the intrinsic appreciation of what is under consideration.

*Sign-cognition*

This type of thinking is different from reasoning, imagining or contemplation in the sense that it is pre-verbal and pre-imaginal. The essence of sign-cognition is that it is a type of cognition by which something not immediately experienced is brought to the attention of the agent by means of a sign.

The notion of thinking is also complicated by the fact that it can be applied to activities involving overt physical action as well as to instances where only covert mental activity is sufficient. Thus appreciation of a piece of music is a covert mental activity since there is no way of observing what the thinker is thinking without the thinker's assistance. On the other hand thinking occurring in a physical activity such as the behaviour of a tennis player is arguably open to observation by an external agent.

The diverse ways in which the manifestations of thinking can occur draw attention to the fact that thinking involves the focusing of attention in ways that require references to particular contexts. Since it is not possible to know when and which specific types of thinking will be deployed, individual learners must be given the opportunities whenever possible to develop the various types of thinking and in various contexts.

The arguments in Part One demonstrate the complexity of thinking in its varied forms, and provide a backdrop against which it is not difficult to observe how the programmes present a simplistic and partial view of thinking and its promotion in education.

Notwithstanding the discussions in Part One and Part Two the thesis does not merely aim at critique. In Part Three the thesis also explores what positively is necessary to develop pupils' thinking. It does so by presenting factors that should be considered in the development of thinking. In this part of the thesis it is argued that because of the prerequisite of specific contexts in thinking, knowledge plays a clear and necessary role. For example, being able to think effectively in solving mathematical problems involves some knowledge of mathematics, and similarly, being able to play tennis involves some knowledge of how to play the game.

Having knowledge alone does not guarantee the effective application of thinking when the need arises and in such situations courage is of particular importance. To be able to think clearly and effectively where there are no easy or straightforward guidelines involves effort, determination, patience, and in most cases the willingness to take intellectual risks since there are no guarantees that one's thinking will necessarily end in some kind of effectiveness.

In education we are mainly interested in thinking that is generally understood in terms of thinking as an activity, that is, it is largely directed towards learning, problem solving and understanding.

Thinking can be said to be effective when it results in learning new things. In these situations the element of courage (which may be of different types) is important, for example, as in the determination and patience often demanded by the process of learning and understanding. In the case where knowledge and understanding come with ease courage may still be necessary when it comes to applying them. For example, the very well informed and clever scientist who is capable of constructing weapons of mass destruction needs some kind of courage, in order to resist coercion by individuals or governments to aid the manufacture of such products. Similarly, the politician who lacks no

knowledge and understanding of the right decisions that must be made and makes them in the face of personal cost requires some sort of courage.

In the context of the classroom, pupils may need to call upon courage of various kinds as they struggle to understand their work, challenge their peer groups, and try to overcome intimidation by their teachers. If pupils are to be supported to learn to think well, the promotion of courage in education must be seriously considered. In the literature on teaching general thinking skills the importance of courage and its allied dispositions in the promotion of thinking is largely neglected. For example, the four programmes presented in the thesis make no mention of them.

The last chapter in Part Three reinforces the arguments raised in Part One by its insistence that we cannot discuss the teaching of thinking simply in general terms but must be more specific in accordance with the type of thinking concerned. For example, if we are interested in developing the football playing skills of pupils then this may require that attention is paid to the enhancement of their sign-cognition among other things. Similarly, if we are interested in developing their artistic skills we focus on the development of their imagination (in more than one sense of the term) among other things. Providing favourable conditions for

such enhancement will involve a change in the culture of how teaching and learning are carried out as well as how teachers are viewed. Bringing about this change depends on our understanding of what thinking involves.

The final conclusion to the thesis highlights some of the broader issues associated with thinking and outlines from a non-simplistic position the arguments for its development in education. The conclusion brings to light reasons why policy-makers concerned with thinking skills in education must not be persuaded to settle for readymade solutions, which are often ill founded. Policies should be considered against the kind of broader background presented in this thesis. To this we now turn.

## **PART ONE**

### **ON TEACHING THINKING**

The ability to think is central to most of what we do and as a result generations of eminent philosophers have been interested in investigating its nature. The aim in Part One of the thesis is to provide the background for discussions of thinking skills programmes in Part Two.

The writings of Dewey and Ryle on thinking are of particular interest in this part of the thesis for two reasons. The first is that Dewey's conception of thinking has played an influential role in the discussion of thinking, with particular emphasis on its teaching in education. The second reason is that Ryle's conceptions of thinking highlight the complex nature of thinking and the difficulties in presenting a general model of it. Some of the ideas regarding thinking will be applied in the discussion of the justifications for its promotion in education in Chapter 3.



## CHAPTER 1

### WHAT IS THINKING?

#### 1.1. What constitutes thinking?

We are interested in determining what constitutes thinking so that we can be in a better position to discuss the current interest in the teaching of thinking as a subject. Some supporters of the teaching of thinking claim that there are certain general skills of thinking that can be taught in their own right. In order to discuss this claim it is essential that we begin by exploring what thinking entails.

In our daily lives we apply the notion of thinking mainly to say something about the kinds of mental activities that we engage in. Thinking about a dear one, about a mathematical problem, about life on Mars, about the existence of God, about a dream one has had, about what meal to cook for supper, about how to mend a leaking tap provide some examples of our day-to-day use of the notion. Although these examples are by no means complete they can serve as a starting point for our discussion of what thinking is. These examples highlight some features of thinking. Firstly, in all the different examples stated above thinking is about some X, secondly, thinking involves attention being focused on some X, thirdly, there seem to be different ways in which

attention is focused on the different X's.

If thinking as claimed above is an activity that involves the focusing of attention on some X then what is it that we focus on, in other words, what is it that engages our attention? Does thinking require an intentional object in every instance?

To intend an object is an abstract relation between a mental state and the object that is thought about (Searle, 1983). By this notion thoughts can be directed towards an intended object or objects. When I daydream about a pleasant holiday on an island paradise my thought is about an island paradise and the object of my intention is the island paradise. When I am engaged in solving a mathematical problem my object of intention is the mathematical problem. When I am thinking about the right train for my journey, my intentional object is the train.

An important idea regarding intentional objects is that they need not necessarily exist. We can believe in and search for a round square in which case our thought is about the non-existent round square. We can knowingly and deliberately imagine non-existent objects when we are day-dreaming in the same way as when we are trying to solve a real life problem. The ability to think and imagine whatever we like and project existent or non-existent intended objects for consideration distinguishes the thinking agent from mere mechanical things.

To intend an object presupposes the use of concepts in thinking. To think about something involves having an idea

(or some ideas) about that something. These ideas may be right or wrong, true or false, real or imaginary. When I think about how crowded the 7.55am London Bridge bound train may be as I walk to the railway station, I must have the notion of what a crowd is. When I think about a mathematical problem, I must have an idea what a mathematical problem is. One cannot think about a round table without knowing how to recognise roundness or table. The connection between concepts and having thoughts is that the acquisition of concepts is important in thinking.

The ability to use concepts and the directedness of thinking indicate some kind of awareness as already mentioned. To be aware is to be conscious of something. To think about X involves being conscious of that X. For example, to think about a memorable childhood experience involves being conscious of the experience. However, there are occasions when past experiences impress themselves on our thoughts with little effort on our part to recall such experiences. Nevertheless we become immediately conscious of such episodes when they enter our thoughts.

We cannot refuse to grant the strong links between consciousness, concepts and thinking. Does this mean that when we are thinking about something it is solely by the use of language? Are there other means by which thinking may be carried out?

Clearly, the use of language is important for thought because of the way in which it allows us to anchor the

extension of concepts (McGinn, 1982). For example, with regard to the concept of blueness, we have a good idea what range of the colour spectrum constitutes the extension of the concept of blueness. We may disagree on borderline cases, that is, whether violet embodies blueness. This is one way in which the concept gains much focus. Language allows us to agree on which cases are instances of blueness and which are not, and on what it is that makes the difference between being blue and not being blue. It also allows us to form complex and detailed logical links between concepts, for example, forming hierarchies of conceptual relationships. It is clear that the need for language is crucial for the efficient use and clarification of concepts and the communicating of our thoughts.

The argument in favour of the notion that thinking is possible in the absence of language was put forward by Price(1969) in his book *Thinking and Experience*. Price called this kind of thinking Sign-Cognition. For Price Sign-Cognition is a type of cognition in which something not immediately experienced is brought to the agent's awareness by means of a sign. Price argued that although Sign-Cognition is a pre-verbal and pre-imaginal form of cognition, it possesses the distinctive features of thinking as it is cognition in the absence of the object thought about, and is also liable to error. This form of thinking is very closely connected to feelings and practical behaviour. For example, when a footballer jumps in a certain way to make contact with

the ball when a corner-kick is taken and scores by heading the ball over the goalkeeper the footballer's instant movement is tied to the movement of the ball. Similarly, the pedestrian's excellent judgment in crossing a very busy road without a marked pedestrian crossing is wholly pre-verbal. Sign-cognition is closely bound up with action but in a sense different from mere reaction such as a knee-jerk. Whereas a knee-jerk does not refer to an intentional object but is purely a reflex action, sign-cognition on the other hand is an activity that involves an object upon which attention is focused. For example, the football player's instant movement involves focusing his attention on the movement of the ball.

So far what is beginning to emerge from our discussions is the complexity of the nature of thinking, which is often highlighted by philosophers in their considerations of the concept and what it involves. Kenny(1982) for example considers that the two essential properties of any act of thought or thinking are that it involves the possession of some content and a possessor of that content. In other words, for one to think of, say, the education secretary involves firstly, that what one is thinking of is the education secretary and not a basket of fruits, and secondly, that the thought is possessed by no other person but oneself. Hence in spite of the various properties that thoughts may have it is essential that not only should they be somebody's thoughts but they should also be thoughts of something. Kenny's analysis at once highlights some important points about the

concept. It underlines the subjective nature of thinking as it is predicated upon individual and personal experience. It also suggests that thinking involves something specific. These points will again be discussed later. Kenny provided further distinctions of the notion by arguing that we employ the word to 'think' in two different but related ways, that is, we sometimes talk of thinking *about* X and at other times as thinking *that* X. Thus in the first instance one may be thinking *about* traffic congestion in London and in the second instance one may be thinking *that* philosophy is a difficult subject. For Kenny thinking *that* philosophy is difficult presupposes thinking *about* philosophy, hence the two ways of viewing the notion are not mutually exclusive. The variety of ways in which the concept can be used is an important attribute in highlighting the complex nature of the concept.

White's(1967) analysis on the other hand tries to highlight two important characteristics of the concept of thinking. The first is the variety of different uses of the word 'think' and the second concerns the polymorphous nature of these different uses. The ambiguity of the word 'think' as observed by White can be drawn from the fact that it successfully covers several aspects of the workings of our intellect. For White, thinking can be used to:

i) Signify an activity. To think may be used to signify the engagement in one of several kinds of activities such as thinking over some past event, or dwelling in anticipation on something in the future or daydreaming about possibilities.

Equally, one's attention can be focused on one's actions or on some aspects of it. In yet another way one may be thinking about how to solve a problem and the solution may be something one is trying to remember, create or discover.

ii) Signify a result. Thinking in this case may not be to engage in any activity but to get hold of or receive a specific thought at a specific time. White puts it simply that for one to hit upon or be struck by a thought is for one to think of it. On the other hand to search for it is to be thinking. In this case no matter how little or long one takes thinking before one thinks of a result, to think of it does not itself take time.

iii) Signify the possession of an opinion. For White thinking as the possession of an opinion is different from thinking as an activity or as the reception of a specific thought. This difference becomes clearer when for instance we ask what someone thinks about a particular topic or issue. What we are asking for in this case is the opinions currently held by that person on the topic or issue being discussed.

iv) Signify the possession of a concept. Related to the use of 'think' in (iii) is its use to signify the possession of a concept. To possess the concept of a chair is to think of an item designed or arranged in a way that allows one to sit on it without falling over. To use this concept is to think of a particular example of a chair.

The last two related examples in which thinking signifies the possession of an opinion and of a concept

clearly overlap with Kenny's analysis of thinking discussed earlier. White's analysis demonstrates the numerous senses in which the word 'think' can be applied and in doing this White draws inspiration from Ryle. That is to say, the notion of thinking does not mark out some specific result, activity, state, possession or disposition of the thinker but instead it qualifies any one of these by relating it in certain ways to its circumstances. Further discussions of the polymorphousness of thinking will be considered later. However, what is clear from both Kenny and White's analysis is that thinking is an ambiguous and complicated concept.

Thinking is a highly complex phenomenon because it can be applied to activities involving overt physical action as well as to instances where only mental activity is sufficient. For example, thinking about God does not necessarily involve any physical action but instead it involves some sort of mental activity. Thinking involves the focusing of attention on some X, which can occur as a covert mental activity or as an overt physical activity. The point being made in maintaining that thinking in one sense could be understood as a covert mental activity is that in thinking silently, for example, much goes on that cannot be got at or explained by external observers. Thus appreciation of a piece of music is a covert mental activity since there is no way of observing what the thinker is thinking without the thinker's assistance. On the other hand thinking occurring as a physical activity such as the movement of the footballer in



the earlier example is in a sense open to observation by an external agent.

The clarification of what is meant by thinking has been of interest to other key philosophers. The work of John Dewey and Gilbert Ryle is of interest to our discussions particularly in connection with the debate on teaching general skills of thinking.

### **1.2. Dewey on thinking.**

In his book *How We Think*, Dewey begins by discussing what thinking is and in doing so identified three different senses in which thinking could be understood.

In the first sense, thinking could be understood as a stream or flow of uncontrolled ideas. The uncontrolled stream of ideas is automatic and unregulated. This kind of thinking may either be in the form of dreaming when we are asleep or in the form of day-dreams, reveries, castles built in the air when we are awake and attending to our day-to-day routines.

In the second sense, it could be understood as a

succession of mental pictures or imaginative episodes that have some coherence but are only flights of fancy and lead to no conclusion that can be substantiated outside the course of the images. In this case, thinking is the succession of such pictures.

In the third sense, thinking is practically synonymous with belief. For example, to say that 'I think it is going to rain this evening' or 'I think Denmark is colder than England' is equivalent to saying 'I believe so-and-so.' Thinking in this sense was discussed earlier in section 1.1

Dewey used these different senses in which thinking could be understood to highlight what he called 'reflective thinking'. This kind of thinking involves an intellectual and practical commitment to seeking evidence and justification for belief. He distinguished reflective thinking from the other kinds of thinking on a number of points as follows :

- a) Unlike thinking in the first sense, reflective thinking is a chain of thoughts that grow out of one another. They do not come and go in a 'medley'. They are linked together for a sustained movement to a common goal.
- b) Unlike thinking in the second sense, reflective thinking has a purpose beyond that afforded by agreeable mental pictures and images. It must tend to a conclusion that can be substantiated outside the course of the images.
- c) Unlike thinking in the third sense which is susceptible to prejudices, reflective thinking must involve an active, persistent and careful consideration of any belief in the

light of the grounds that support it and the further conclusions to which it tends.

Dewey summed up what he termed 'reflective thinking' as follows:

Reflective thinking, in distinction from other operations to which we apply the name of thought, involves (1) a state of doubt, hesitation, perplexity, mental difficulty, in which thinking originates, and (2) an act of searching, hunting, inquiring, to find material that will resolve the doubt, settle and dispose of the perplexity (p.12).

What is suggested by Dewey's remarks on reflective thinking is the high regard in which he held it. But how are we to view his conception of it? Having claimed that the origin of reflective thinking is some perplexity, confusion, doubt or difficulty, Dewey then went on to provide some way of tackling such perplexity, confusion, doubt or difficulty.

Dewey wrote:

Given a difficulty, the next step is suggestion of some way out – the formation of some tentative plan or project, the entertaining of some theory that will account for the peculiarities in question, the consideration of some solution to the problem (p.15).

Dewey's conception helped to provide a fertile ground upon which the present view that general skills of thinking can be taught has taken root. This point was clearly stated and endorsed by Lipman(1991) when he concluded that to many

supporters of thinking skills it was Dewey's emphasis on reflective thinking that provided the true foundation to the idea of thinking skills. In spite of Lipman's positive promotion it is still not clear to what extent Dewey's notion of thinking can be taken as the basis upon which the idea of general thinking skills can be built. There are difficulties with Dewey's analysis of thinking, some of which were highlighted by Bonnett(1995). For example, Bonnett argues that Dewey's five 'logically distinct steps' in 'the process of thinking' listed in *How We Think* as follows:

- 1) a felt difficulty;
- 2) its location and definition;
- 3) suggestion of possible solution;
- 4) development by reason of the bearings of the suggestions;
- 5) further observation or experiment leading to its acceptance or rejection;

present some degree of ambiguity since it is not clear whether Dewey is attempting to map out a logical pathway for the generation of ideas and solutions or is setting out a criterion for their justification. Bonnett points to a difficulty with the first of these. The degree of systematisation involved in thinking that Dewey seems to suppose is problematic because thinking does not necessarily proceed in such a systematic manner. This brings us back to the point about the complexity of thinking which will be discussed later.

As already indicated in section 1.1, thinking can be understood in terms of either a mental or physical activity. In other words, admiring a beautiful painting, trying to solve a difficult mathematical problem or playing tennis all involve thinking, but in each of these examples thinking takes on different characteristics.

In the case of admiring a beautiful painting this does not necessarily involve any state of doubt, hesitation or perplexity for which some sort of resolution is needed as suggested by Dewey. On the whole, admiring a beautiful painting invokes some sort of pleasantness, enjoyment or respect. Even if we consider the case where focusing attention on the painting invoke a sense of sadness, pity, bitterness, fear, anger. and so on, this does not greatly affect the claim that the kind of thinking involved in admiring (or not admiring) a painting has little to do with problem solving.

The kind of thinking involved in playing tennis, as discussed earlier, is closely tied to timing and action in ways that do not involve the presence of hesitation, doubt or perplexity. A tennis player returning a service must judge within split seconds the most likely direction which the ball is going to take and whether to stay rooted to the same spot and wait or move quickly towards the incoming ball while at the same time deciding on the appropriate technique (such as a backhand technique or any other) for returning the ball. In such circumstances being hesitant, or being in any doubt

or perplexity on the contrary can result in the ineffectiveness of the action being taken. The sort of thinking involved in playing tennis, as already indicated, does involve problem solving but a different sort of problem solving from the kind presented in Dewey's conception of thinking. This difference becomes clear as the thinking involved in tennis playing is brought into sharp focus with the kind of thinking involved in solving a troublesome mathematical problem.

The thinking involved in solving a difficult mathematical problem satisfies the conditions in Dewey's conception of reflective thinking which demands that:

1. A state of doubt, hesitation, perplexity and/or mental difficulty must exist.
2. There must exist an act of searching, hunting or inquiring that will resolve or settle the difficulty or perplexity.

It is not difficult to show that a troublesome mathematical problem clearly presents some perplexity, and in order to solve such a problem this would require a sustained search for the right solution. Tackling mathematical problems in the main involve dealing with propositions and solving problems, and since mathematical thinking satisfies the conditions of Dewey's conception of thinking, this suggests that 'reflective thinking' involves considering propositions.

Whereas mathematical thinking involves this, the thinking in playing tennis as indicated earlier does not, consequently Dewey's conception fails to account for such

thinking just as it fails to account for the thinking involved in admiring a painting. By not addressing the different kinds of thinking involved in these different kinds of activities, it is not clear whether Dewey was being selective on purpose. What is clear though is that Dewey focused on a particular kind of thinking which involves problem solving, and which he deemed to be the most important kind of thinking.

In order for us to gain some insight into Dewey's thinking about thinking we need to bear in mind that one of the key reasons for his distinctive conception of thinking was connected to his interest in providing a justification for teaching thinking, which, as already indicated, has undoubtedly influenced much of the effort that has gone into the recent attempts to teach thinking as a subject. It must be acknowledged that Dewey's conception of thinking provides an important framework for defining the kind of thinking that involves problem solving. It is not clear how Dewey's justification of reflective thinking as an educational aim takes into account the other types of thinking under discussion earlier. These different ways of thinking are all essential in different ways precisely because they play vital roles in different ways in our daily lives and as such are also of educational significance. Further discussion of the different ways of thinking will be undertaken in Chapter 2. We now turn to Gilbert Ryle's conceptions of thinking.

### **1.3. Ryle's conceptions of thinking.**

Ryle's work is relevant for our discussion on the development of thinking in education. Ryle's various formulations of thinking evolved over many years of sustained investigations. Ryle not only showed that thinking can be exhibited in overt behaviour, in other words, thinking is not necessarily done silently, but he also highlighted the very complex nature of thinking.

Ryle's main reason for developing his conceptions of thinking was to challenge the Cartesian view of thinking. This view held that thinking is primarily an activity of mind which is intrinsically a private, silent or internal operation. For Ryle, it is a mistaken idea that non-habitual, intelligent human behaviour is always guided by silent thought whose presence explains why the behaviour occurs and why it is intelligent. In Ryle's opinion this idea is untenable and leads to a vicious regress which occurs precisely because thinking is itself an activity that is done well or badly, intelligently or stupidly. Consequently, this would imply that the intelligent character of thinking requires explanation by further thinking, which in turn guides the first thinking and explains why it occurs, why it is intelligent, etc. Since this further thinking will itself be done intelligently or stupidly, it will also require explanation by a third line of thinking resulting in an



infinite regress.

Ryle produced some vivid examples to show that there is no need for any reference to interior or anterior acts of thinking as part of the explanation for most intellectual behaviour. For Ryle, what distinguishes sensible behaviour from silly behaviour "is not their parentage but their procedure", regardless of the performance being intellectual or practical. In his view, a performance may be regarded as intelligent, thoughtful or rational if it has a special procedure or manner. This procedure involves thinking what one is doing, and to think what one is doing means doing one thing and not two i.e thinking what one is doing and doing it. According to Ryle, in judging the quality of someone's performance we consider the abilities and leanings of which the performance was the person's overt actions. In doing so, we direct our inquiry into the capabilities, habits, skills, etc of the person. By far the most important clues by which we can reach a reasonable judgment of a person's performance are dependent on their sayings and doings.

In order to elucidate his point, Ryle used the example of a marksman scoring a bull's eye. In his attempt to score a bull's eye, the successive adjustments after each shot that the marksman makes as a result of wind conditions, target movement etc reveals the care, self-control, attention, etc. with which the shots are aimed and fired. Ryle maintained that the thinking of the marksman is contained in his actions. Similarly, he insisted that the boxer, the surgeon,

the poet, the salesman, etc. exhibit their thinking in the ways in which they conduct their performances themselves and not in the ways in which they consider prescriptions for conducting their performances.

By these illustrations, Ryle set the scene to introduce his idea of the concept of thinking. He argued that thinking is not something that is necessarily done silently since a purely overt calculation or deliberation can be viewed as a process of thinking and is just as useful as any other mode of thinking. Consequently, there is no point in always searching for hidden acts of thought. Ryle concluded that:

To say something significant, in awareness of its significance, is not to do two things, namely to say something aloud or in one's head and at the same time, or shortly before, to go through some other shadowy move. It is to do one thing with a certain drill and in a certain frame of mind, not by rote, chattily, reckless, histrionically, absent-mindedly, or deliriously, but on purpose, with a method, carefully, seriously and on the *qui vive*. Saying something in this specific frame of mind, whether aloud or in one's head, is thinking the thought (p.297).

In the above passage is presented the essence of Ryle's formulation of what thinking is. In general, Ryle argued in *The Concept of Mind* that thinking is doing something in a certain frame of mind, that is, with care, with a method, with seriousness, with attention, on purpose etc. This frame of mind for Ryle is not a second occurrence linked to some covert or mysterious goings on in the mind but a disposition

or propensity which has been activated and is displayed in the activity which one is engaged in.

Some of Ryle's account of thinking has some common characteristics with that presented by Price (discussed in section 1.1). In both cases Ryle and Price showed that thinking is closely tied to actions, However, Ryle differed in an important way from Price. Ryle used his example to argue the case that thinking is not purely a covert activity, whereas Price's main focus was that other animals do have the capacity to think and therefore thinking is not exclusive to human beings. In a similar way Ryle and Dewey (whose conception of thinking was discussed in section 1.2) were both keen to define general conceptions of thinking but differ in their views regarding what the constituents of thinking are. Although Dewey acknowledges the various ways in which the notion of thinking could be understood, his writing in *How We Think* suggests his commitment to the particular kind of thinking which he called reflective thinking. But Ryle on the other hand viewed thinking as a polymorphous concept that can be characterised in a variety of ways.

Ryle's account of thinking explains that Z is an example of thinking solely because Z stems from a disposition to do Z in a thoughtful way. But this explanation is not entirely convincing, for how does one know that the Z, say someone's humming a tune, stems from a disposition to hum that tune thoughtfully rather than from a disposition to hum the tune without any thought about it? One possible way that Ryle

could reply to this criticism is that the difference between a person X humming thoughtfully and a person Y humming thoughtlessly is revealed in the occurrent humming itself. In the case of X, the humming will show care, attention, seriousness, etc, by not being done while X is doing something else, or would include repetitions until the humming accurately follows some known tune. For Y this will not be the case.

Ryle's answer will still not silence his opponents for the one reason that if doing Z in a certain way is the thinking, then it is possible that a person, could be trained to do Z accurately and methodically, say, packing beer bottles into containers in such a way that the person now does it without thought. Nonetheless, on Ryle's account, if the packing is done in a manner which still reveals that it is done carefully, seriously, on purpose and with care although now automatically, it is still a case of thinking. But how can this be possible?

In general, it must be granted that not all thinking is done in an overt manner. A large proportion of one's pondering or deliberation is done covertly and consequently reference to silent thought is constantly made in order to account for activities that would otherwise remain inexplicable. For example, a mathematics student may answer a mathematical question after remaining in silent anguish for a short period; and the thinking behind the given answer may remain a stubborn question mark until the student outlines

the logic behind it. The same is true in countless other cases. A chess player may sit in silence for a long time before making a move and the intelligence of this move cannot be known until the player outlines the strategy behind it. These examples clearly weigh in favour of some sort of Cartesian conception of thinking. There are difficulties with Ryle's account as noted above. Further discussions of these difficulties across all the various conceptions of thinking put forward by Ryle are discussed by Sibley(1971).

The key point, however, that has evolved out of Ryle's struggle to clarify what thinking involves is the idea that the concept of thinking is polymorphous. Ryle wrote:

There is no general answer to the question 'What does thinking consist of?'  
There are hosts of widely different sorts of toilings and idlings, engaging in any one of which is thinking (p.261.Collected Papers Vol.2).

He then went on to say:

The word 'thinking' covers some activities which are attempts to reach the answers to questions, as well as others which are not; some activities in which there is scope for originality and insight, as well as others where there is not; some activities which incorporate ratiocination, as well as others which do not; some activities, like multiplication and translation, which require special training, as well as others, like reverie, which do not. To look for some common and peculiar ingredients of all thinking is like looking for an ingredient common and peculiar to cat's-cradle, hide-and-peek, billiards, snap and all other things which we call 'games' (p.297-298.Collected Papers Vol.2).

The nature of thinking is polymorphous because it encompasses both covert and overt activities as indicated in section 1.1. Although Ryle acknowledged the tendency for thinking to be covert he was determined to banish any hints or references to the Cartesian conception of thinking, which he called the 'official doctrine' originating mainly from Descartes's view that every human being has a body and mind. Ryle's determination to dismiss this doctrine was the motivating factor in his search to find a way to formulate his concept of thinking.

Our discussions in section 1.1 and in the earlier part of the present section suggest that not all thinking can be explained in terms of overt behaviour or in terms of dispositions that can be activated. For example, how is it possible for an external agent X to explain what is going on when agent Y is silently thinking about God or about the geometric properties of circles? Ryle tried to answer such questions by reformulating his notion of thinking as an adverbial verb.

For Ryle thinking as an adverbial verb covers doing practically anything provided it is done with care, patience, initiative, attention, interest and so on. According to Ryle, different kinds of thinking can be distinguished by observing whether what one is doing with care, patience, initiative, attention, interest and so on is dependent or detached from its surrounding circumstances. In the case of circumstance-

dependent thinking the thinking is closely linked to the circumstances in which one is immediately involved, as in many practical situations. For example, a tennis player, as in our example in section 1.1, is thinking implicitly within the actions that he performs such as his strokes, eye movement, arms and general body movement etc. By contrast, a person pondering, deliberating, reflecting, meditating, musing, or being pensive is also thinking in a typical detached manner as characterised by Rodin's *le Penseur*. For Ryle, to think should really be understood in all its senses as to do X attentively, carefully, vigilantly, and so on. Hence the X that the tennis player does intelligently is play tennis, and the X that *le Penseur* does intelligently is reflect. On the basis of Ryle's account, it is not difficult to observe the intelligence that the tennis player displays in playing tennis, but this is not the case with regard to *le Penseur*. In fact Ryle could not explain what *le Penseur* was doing fully in terms of an adverbial verb. Ryle wrote:

But now we come to what *le Penseur* is engaged in doing. For brevity I label what he is doing as 'reflecting', though the label does not naturally cover a good many of the things that *le Penseur* might be doing...(p.470 Collected Papers Vol.2).

Ryle is unable to say anything useful about what *le Penseur* is doing precisely because thinking in this case is covert. Although Ryle is fully aware of the covertness of *le*

*Penseur's* thinking, he was concerned about committing what he expressed as "the category-howler of Cartesianism or the category-howler of behaviourism".

Ryle's new formulation carries with it some difficulties, for example, a person under hypnosis playing piano with attention, intention and control would be thinking in Ryle's view, but this is certainly at odds with our intuition about the nature of thinking. Ryle might reply that in so far as the person under hypnosis is being commanded by an external agent this cannot be considered as a good example. But this answer will not be adequate since it does not indicate that the piano player is not playing with attention, intention and control. Another example might be that of a person who at night sleep walks to the kitchen, opens a cupboard to get a glass then goes to the refrigerator and brings out a bottle of milk and then carefully arranges these items on the dining table before going back to sleep. According to Ryle's formulation since this person is X-ing with attention, intention and control, he is thinking. But this example too is in sharp disagreement with our instincts about what thinking involves.

What is clear from the preceding discussion is the complexity of the notion of thinking. This is highlighted by the fact that Dewey's conception and Ryle's complex accounts of thinking do not completely explain what thinking is.

In contrast to Dewey, Ryle makes no value judgment on the different kinds of thinking although he also suggests an



active search by the agent. In the main the conceptions of thinking put forward by the two philosophers involve a mental or physical activity. These properties of thinking can be accounted for as indicated in section 1.1 if thinking is viewed as encompassing both mental and physical activities without necessarily accepting the whole of Cartesian metaphysics or the whole of behaviourism.

#### 1.4. Comments on Thinking

The discussions in the earlier sections have tried to present some of the important arguments that help our understanding of thinking. For example, Dewey's formulation highlights the close connection between thinking and problem solving but in spite of this, not all thinking is problem solving. Ryle's sophisticated considerations of thinking clearly demonstrate the many-sidedness of thinking. As already indicated, the work of the above philosophers demonstrates some of the difficulties in the conceptualisation of thinking.

What is it that makes thinking difficult to characterise? Is it possible to completely explain it in a general way? How should thinking be viewed in terms of its



teaching? Finding answers to these questions will be useful in illuminating further our view of thinking. Outlines of answers to these questions will be attempted in this concluding section.

Thinking is difficult to formulate because it is embedded in the diverse aspects of our existence. For example, it is central in our endeavour to find solutions to the vast number of problems that we encounter, and on the other hand it is key to the wonder we experience at the existence of the world. The kind of thinking that will be involved in contemplation is likely to be different in some way from that involved in solving problems. These examples highlight the multifacetedness of thinking. Thinking is multifaceted because it is the means by which we experience the world in all its diversity. All the activities that we engage in involve thinking in one form or another. These activities differ in ways that require different formulations of thinking. For example, playing football is a very different activity from reading a book but both involve thinking.

In view of the diverse ways in which the manifestations of thinking can occur is it possible to explain it in a general way? The earlier discussions indicated attention and intentionality as important features of thinking. Although these features appear to be general they do not get us very far in saying what thinking is without reference to the particular ways in which thinking occurs. What is becoming

clear is that beyond the importance of intentionality and attention in thinking further qualifications are needed in order to establish the type of thinking at issue. In view of the above discussion a definition of thinking can be provided as follows: *Thinking is a complex phenomenon that can occur as a mental or physical act, it involves intentionality and attention and requires particular contexts for its full description.*

If thinking is best explained by references to particular instances then this raises issues about how it can be taught as a subject. To teach and successfully learn a subject requires the acquisition of some specific skill(s) important in learning that subject. For example, the acquisition of mathematical skills involves knowing how to write and use mathematical symbols. At the very basic level a skill can be regarded as knowing how to perform some tasks proficiently, and such performances can be repeated and improved upon through training and practice. The ability to plane a piece of wood, juggle a number of balls, speak a language, play a musical instrument are all examples of the applications of skills that is, knowing how to do something through training and practice. On the other hand the ability to blink is not a skill, as this is not acquired through training and practice.

Skills differ from one context to another context (Barrow,1987) because what is involved in knowing how to do something differs in different contexts. For example, the

dribbling skills of a footballer are very different from the reading skills of a news reader because they involve different contexts.

Clearly having the appropriate mathematical skills, for instance, is important in thinking and solving mathematical problems. Similarly, having boxing skills is significant in thinking and boxing effectively. However, it is possible that one can have say mathematical skills but be unable to think highly effectively in solving mathematical problems and in a similar way have boxing skills but not be able to think and box effectively. What this indicates is that skills are important in thinking but the two are not necessarily the same. If thinking is not necessarily a skill then the question that needs to be answered is why are there differences among individuals with regard to the quality of their thinking? A possible answer to this question would involve the role of the personal qualities that individuals bring to bear on their thinking.

Thinking can be revealed in the performances of a skill as pointed out by Ryle and Price, but in addition to skills the ability to think effectively involves other factors such as perseverance, fortitude, dedication, patience and courage. These factors are in the main dispositional and will be discussed further in a later chapter. If thinking involves dispositions then it is not clear how it can be taught purely as a skill. The definition of thinking provided above suggests that since thinking requires particular contexts for

its full description, there are different types of thinking and this presents further difficulties about seeking to teach thinking as a subject.

Finally, a brief summary of this chapter. Section 1.1 focused on what constitutes thinking. The discussion showed that thinking generally involves intentionality and attention and the use of concepts. The discussion also indicated that although the use of language plays a key role in thinking, it is not a necessary condition for thinking. In section 1.2 the conception of thinking provided by Dewey, which is in the main formulated in terms of problem solving, was discussed. In section 1.3 Ryle's various notions of thinking were considered. Ryle's arguments highlighted the many-sidedness of thinking, thus making possible the consideration of thinking in the absence of verbal language. In the present section a definition of thinking independent of that presented by Dewey and Ryle is stated. This definition stresses the complexity of thinking and the need for specific contexts. We now turn to the discussion of the different types of thinking in the next chapter.

## CHAPTER 2

### TYPES OF THINKING

#### 2.1. The complexity of thinking

In Chapter 1 the discussion focused mainly on exploring what thinking involves and its inherent complexities. In this chapter further discussions of the complexities of thinking will be undertaken. Thinking can take place under two main guises, that is, as a controlled occurrence or as an uncontrolled occurrence. In the first case one's thinking is consciously directed and held in focus on whatever it is that one is thinking about, as for example, working on a mathematical problem. Thinking in this case generally occurs while we are awake and going about our daily matters. In the second case, one's thinking occurs beyond one's control or direction, in either a conscious or unconscious state, as for example in a day-dream while one is awake or in dreams while one is asleep. In both cases attention is directed as discussed earlier in Chapter 1 on to certain intentional objects, which are conceptualised in some way. Education generally is concerned with the promotion of the first type, so the second will be ignored henceforth.

Clearly there are different types of thinking, as

indicated in the earlier discussion in Chapter 1. We engage in these various types of thinking while we are awake and going about our daily affairs. For example we may be in deep contemplation or we may be engaged in intellectual reasoning or we may equally be making practical decisions and acting upon them. These various types of thinking will be described and discussed as contemplation, imagination, reasoning and sign-cognition (considering Price's argument). These different types of thinking are by no means mutually exclusive.

## **2.2. Thinking by Signs**

Price's theory of sign-cognition as discussed in Chapter 1 suggests that this kind of pre-verbal and pre-imaginal form of cognition is indeed a particular type of thinking. Although viewed as a primitive form of thinking that is mostly associated with animal behaviour, it is also present in some ways in human thinking and actions. Although Ryle did not explicitly refer to sign-cognition he may at least be sympathetic to Price's notion. Ryle's example of the fine adjustments that a marksman makes in scoring a bull's eye by taking into account certain signs such as wind direction

brings to mind Price's notion. If Ryle is right that thinking is in a sense contained in our actions and practical behaviour then sign-cognition forms an important kind of thinking not only in the field of sports but in the vital area of human communication.

### **2.3. Reasoning**

One source of confusion in our understanding of thinking is in the way in which 'thinking' is so readily substituted for 'reasoning'. In the broad sense reason comprises a great variety of procedures (Pole,1975), hence much of what we do in our daily lives and in education involves reasoning. Reasoning primarily aims at problem solving and this essentially involves finding ways to arrive at the truth or a solution. It is possible that this type of thinking is what Dewey's conception of thinking aims to capture. Reasoning in general can be viewed in two ways, practical and theoretical. However, this distinction does not imply that these are mutually exclusive because the answer to a practical question 'X or Y ought to be done' can also be represented as the answer to a theoretical problem in the form 'it is the case that X and Y ought to be done' (Edgley,1975).



### 2.3.1. Practical Reasoning

Practical reasoning deals with our ability to conduct ourselves in the world of action. This type of reasoning seeks to answer questions such as 'what is to be done?' For example, the life of any human being involves a constant process of adjustment and readjustment to the world that they find themselves surrounded by.

In the course of our passage through life we come across various things in the world, some of which we consume, some we build into other things, some we try to avoid, while others we simply ignore. Most of our reactions in dealing with the world around us in part are habitual. As a result our responses are almost automatic. However, situations often arise that require some deliberation and an appropriate response or decision. In such circumstances, one is engaged in practical reasoning. Sometimes the need for practical reasoning arises because a situation calls into operation two conflicting desires or persuasions. Let us take the example of a conscientious student settling down to complete a long overdue assignment. No sooner does she settle down to work than a friend unexpectedly arrives offering her a free ticket to a one-off musical performance by her most favourite composer. The desire to perform these distinct acts arises; yet the two are such that performing one will inevitably prevent the performance of the other. Nevertheless, some decision will have to be made regarding what to do. In this

case, to arrive at any decision will involve practical reasoning.

Similarly, finding one's way around unfamiliar places depends on how well one plans and follows what one must do in order not to get lost. Practical thinking in the main is about means and ends, and it is in this way that it differs from theoretical thinking.

### **2.3.2. Theoretical Reasoning**

Theoretical reasoning involves our capacity to operate from and with propositions. Theoretical reasoning seeks to answer the question 'what is the case?' For example, suppose we were on an expedition in a country where it has been reported that highly poisonous chemicals escaping from local industrial plants have contaminated lakes and other waterways, and we only discovered much too late that we had no water as thirst made its presence felt. Suppose we came upon a stream; instinctively, our thirst might urge us to drink. However, the recent accident regarding the contamination in the area might prompt us not to do so. On the other hand, we may believe that no other source of water is likely to be found. What should we do? It is easy to see that we might be able to solve that practical problem if we could find out whether the

stream is indeed polluted. Accordingly, we can 'translate' that practical problem into a different problem, at which point we might ask – 'is the stream before us polluted?' Here, the practical question concerning 'How shall we attain so and so?' has led to the theoretical question 'By what means shall we understand so and so?' By moving from a practical question to a truth seeking question, the problem then becomes a problem concerning the character or nature of some item in the world about us and the kind of reasoning that is involved in arriving at a conclusion is theoretical since the problem no longer concerns what we do, although solving it may help us solve the practical problem.

In both cases of reasoning, the focus is essentially on calculation and judgement. The general idea involves trying to 'fit together' what may yield the desired result based largely on trial and error. In this case, the motivation is generally guided by 'does it follow?' questions, or 'what is to be done?' questions. Reasoning, as we shall observe in the next sub-section diverges, in some important ways from imagining.

#### 2.4. Imagining

The word 'imagination' originates from the Latin word 'imago' meaning an image or representation. It is through this Latin meaning that the term imagination is generally held to be the power of forming mental images or considering things which are not present to the senses. For example, imagining oneself enjoying a lovely sunny day at the seaside, imagining the powdery sand-dunes of the Sahara desert, imagining the delicious smell of Sunday roast with potatoes and gravy, imagining the wonderful smell of lavender in the fields of Provence, imagining the music of John Coltrane, imagining the noise of a barking dog. The usage of the term in these and similar examples refers only to the capacity of the person in question to conceive of what is not actually happening here and now.

The popular usage of the term as a faculty or distinct part of the mind formed the basis for the traditional conception of imagination as articulated in the philosophical writings of David Hume(1711-76) and Immanuel Kant(1724-1804). Hume's view on the imagination had its greatest development in Kant's *Critique of Pure Reason*. But, in spite of the importance Kant gave to the imagination his view of it still remained as a faculty for forming images.

In view of the varied ways in which the term has been accounted for by modern philosophers such as Sartre,

Wittgenstein and Ryle, Scruton(1974) suggested that as a starting point for a more positive account of the imagination we could begin by separating two strands in the use of the notion. The first strand is predicative, in the sense that the way the notion is used for example, when we talk of **A** imagining **X**, or **A** seeing **X** as **Y**, or **A** forming an image of **X** and so on, predicate an activity of **A**. The second strand is adverbial and this comes out in the way we talk of **A** doing **Y** imaginatively. The popular phrase 'use your imagination' captures the adverbial sense of imagination whereby one is urged to apply one's imagination in accomplishing a practical task or gaining a particular piece of information or knowledge and in this sense the imagination qualifies a further activity. In doing **Y** imaginatively the imaginativeness of **A** is highlighted by the novelty or originality involved in **A**'s consideration or approach. Scruton's suggestion highlights an important point about the different senses in which the word can be used.

The ambiguity of the term formed a significant point in Passmore's (1980) discussion on the cultivation of the imagination. Passmore's consideration is very similar to Scruton's since Passmore also brings out the different uses of the word by distinguishing between imaging, imagining and imaginativeness.

Imaging involves the capacity to form images, in other words it is the ability to summon an image of an object or experience in the absence of the object or experience that

one is imaging. A number of examples of this kind of imaging were given at the beginning of this section and as indicated it is by far the most popular usage of the word.

We often recall or conjure up images when we visualise but this, argues Passmore, is different from supposing (imagining) because it is the minimum requirement for supposing that we go beyond anything that we have actually observed or experienced. Supposing involves the consideration of alternatives as, for example, considering what it would be like to live in a world without conflict. Considering the various possibilities that such a world might hold requires much more than say merely having a picture or an image of the globe.

To use the word in the sense of imaginativeness refers to the way in which we use our imagination. By exercising our imaginativeness, says Passmore, we may discover that how we ordinarily consider things to be is not how they actually are, and in order to be imaginative primarily requires an original or new manner of considering things. On this point Barrow(1988) argued that the essence of imaginativeness lies neither in one's tendency to think the abstract nor in one's preoccupation with imaginary things, but rather in the quality of one's conceiving whether about real or imaginary ideas or situations.

The different senses in which the word can be applied highlight the complexity of the notion of thinking. Imaginativeness, for example, differs from sign-cognition and

reasoning in the sense that it is not entirely concerned with problem solving, although the solving of a problem may result from it. What is of significance is that not only should one focus on the object under consideration but one should attempt to go beyond the obvious or come up with a new way of approaching the object under consideration. The significance of imaginativeness in education will be discussed further, but as we shall observe in the next section this type of thinking differs in some ways from contemplation.

## **2.5. Contemplating**

In the Concise Oxford Dictionary 'to contemplate' is defined as to gaze upon, or view mentally. Gazing upon or viewing something mentally requires attention and focus on the object of contemplation whatever that may be. In order to illuminate this particular type of thinking, let us contrast it with reasoning.

Reasoning, as indicated earlier, fundamentally aims at problem solving for it is concerned mainly with finding solutions. The motivation in contemplating on the other hand is largely intrinsic, that is, it is not particularly

concerned with problem-solving but rather with the appreciation of beauty, of the sublime, of the universe, of God, of evil etc. In art, for example, appreciating say, Leonardo Da Vinci's Madonna or Pablo Picasso's nude figures involves the understanding and acknowledgement of a number of aspects presented within the paintings such as:

- a) The harmonic precision of the paintings
- b) The genius of the painters as exhibited in their work
- c) The struggle and perseverance of the painters in producing such masterpieces.

Similarly, in mathematics, contemplation is not a matter of finding a proof to a mathematical theorem but instead, it dwells on the beauty of the proof itself. In philosophy, contemplation can be thought of as a goal of analysis as indicated with particular reference to Wittgenstein(1998) that:

A main source of our failure to understand is that we do not command a clear view of the use of our words (Part1,122).

Therefore, in philosophy one aim is to establish an order in our knowledge of the use of language which will produce absolute clarity regarding its use, and the contemplative here will be the person who commands a clear overall view of the use of language.

In his writings Aristotle regards the activity of thinking which is contemplative(theoretike) as the highest



kind of human excellence and in this respect it is firmly connected to things divine. Hardie(1980) notes that there is an explicit religious flavour in the language in which Aristotle speaks of the contemplative life and the worship of God.

One of the most famous discussions of the contemplative life is in Thomas Aquinas's *Summa Theologiae*. For Aquinas, the contemplative life is the contemplation of God's truth. It is in essence a life of mental activity that can be identified with the love of God, moving us to gaze on his beauty. Aquinas considers beauty (as consisting in clarity and due proportion) as an essential feature of the contemplative life

In discussing the actual nature of contemplation, Aquinas asks whether there are many acts or only one single act of contemplation. His answer is that there is only one culminating act of contemplating and that is the contemplation of God's truth. However, there are several activities such as the grasp of axioms and the deduction of conclusions which prepare the way. From our discussion above the act of contemplating involves a particular way of thinking which is different from imagining. Whereas in imagining one tries, for example, to generate new ways of approaching the object of one's attention and in reasoning or sign-cognition one seeks solutions to problems, in contemplating on the other hand one only seeks to understand and acknowledge what is understood.

## 2.6. Notes on the complexity of thinking

In order to present an adequate view of the notion of thinking, the complex nature of thinking must be acknowledged. The discussions in the previous sections have highlighted the various types of thinking in order to demonstrate the complexity of the notion. These different types of thinking do not, however, in any way suggest that thinking can only occur as one of these types. In fact to think in any manner involves various combinations of these different types of thinking. Trying to solve a problem involves reasoning but this can be in combination with imaginativeness to produce the desired result, for example, breaking the German secret communication code during the second world war required a concentrated effort in reasoning but the success of the mission also depended on imaginativeness of the code-breakers in the process of breaking the code.

Similarly, the imaginativeness of the architect in designing a building depends on some reasoning to do with finding solutions to problems associated with the design of the building. The football player may depend on sign-cognition to score goals but needs reasoning to be at the right spot for the ball. The contemplation of the philosopher may well depend on being able to reason and suppose. These examples indicate the very close connections between the

various types of thinking, which are in the main due to the dependency of the various types of thinking on intentional objects.

In this present chapter the discussion has focused on the different types of thinking in order to further support the argument made in Chapter 1 that the nature of thinking is complex. In section 2.2 the focus was on sign-cognition as a type of thinking that is pre-verbal and pre-imaginal. It is tied to timing and involves the appropriate response to signs. In section 2.3 reasoning as a particular type of thinking was discussed. This type of thinking can be subdivided into practical and theoretical reasoning but this does not imply that the two are mutually exclusive. In section 2.4 the different uses of the word "imagination" were discussed, which further highlighted the complexity of thinking in general. In section 2.5 the discussion considered contemplation as a type of thinking that is not necessarily concerned with problem solving. Let us now turn to Chapter 3 for a consideration of the justifications for promoting thinking.

## **CHAPTER 3**

### **JUSTIFICATIONS FOR PROMOTING THINKING**

#### **3.1. Promoting thinking**

As human beings we are constantly engaged in thinking in diverse ways. Our need for survival and well-being and our desire to protect and guide our children provide prime examples. However, it is not uncommon that our thinking at times is less than effective. We all calculate, but not all with equal accuracy; we all imagine, but not all with equal clarity or originality; we all contemplate but not all with equal depth. Thus the challenge is to find reasons to support the need for improving the effectiveness of our thinking.

The discussion in this chapter will therefore focus on the justifications for promoting thinking, beginning with those presented by John Dewey and Harvey Siegel. The justifications provided by the two philosophers have been selected for consideration because of their significance in supporting the promotion of thinking in education.

### 3.2. Dewey on why teach thinking

The view that the teaching of thinking can be developed without reference to any specific subject content received its classic expression in the work of John Dewey. In his book '*How we think*' Dewey explained why reflective thinking must be made an educational aim. He began by stating three reasons, which in his view form the fundamental justification for teaching thinking.

Firstly, he declared that thinking frees us from impulsive and routine activity and enables us to plan and direct our activities with a conscious aim. In other words thinking enables us to act in a deliberate and intentional manner. Dewey argued that:

By putting the consequences of different ways and lines of action before the mind, it enables us to know what we are about when we act. It converts action that is merely appetitive, blind, and impulsive into intelligent action (p.17).

Secondly, thinking, according to Dewey, makes possible systematic inventions and preparations towards any future eventualities. That is, by thought man is able to develop and set up artificial signs and inventions to alert him in advance of any unpleasantness and help him find dependable ways to avoid such mishaps.

Thirdly, Dewey regards the value inherent in thinking as the richness and depth that it adds to meanings. These values

according to Dewey:

make the difference between a truly human and rational life and the existence lived by those animals that are immersed in sensation and appetite. Beyond a somewhat narrow limit, enforced by the necessities of life, the values that have been described do not, however, automatically realize themselves. For anything approaching their adequate realization, thought needs careful and attentive educational direction (p22).

For Dewey, the ability to engage in reflective thinking grants physical events and objects a deeply meaningful character and value.

Dewey's justification is very relevant for promoting thinking but what remains problematic is the adequacy of the kind of thinking that the justification is meant to support. As already discussed in Chapter 1, to be an effective thinker for Dewey is to engage predominantly in reflective thinking, which in general involves an intellectual commitment to the search for evidence for belief. Dewey maintained that:

The two limits of every unit of thinking are a perplexed, troubled, or confused situation at the beginning and a cleared-up, unified resolved situation at the close (p106).

Thus the central point in Dewey's view of the development of a person's thinking is that the mind should be sensitive to finding appropriate methods or solutions to resolve problems encountered by the person. The difficulty with this

formulation, as already pointed out earlier, is that it is not clear how it accounts for the other types of thinking, if at all, as it focuses mainly on problem solving. For instance, it excludes such thinking as contemplation. But as indicated in Chapter 2, to talk about thinking as Dewey does purely in terms of problem solving can only lead to a very narrow characterisation of thinking which is inadequate with regard to the generality of the justification being sought. It is a fact that much of our everyday existence is dominated by problem solving but there are certain activities we engage in that have nothing to do with problem solving but do however contribute to the enhancement of our existence. For instance, listening to the uplifting music of Charlie Parker or Tchaikovsky, or meditating on the beauty of the human figure or on the wisdom in the New Testament Bible.

Dewey could argue that he is aware of the importance of the various types of thinking but he is particularly interested in the promotion of problem solving. This clarification however will still not do because it overlooks the connectedness of the various types of thinking as already highlighted in the earlier part of this chapter and in Chapter 1. Solving problems involves reasoning to a large degree but it can also involve the other types of thinking, for example imaginativeness.

In spite of this limitation of Dewey's notion of thinking (since he views thinking as always beginning with a perplexed or troubled situation and terminating with a

solution), his reasons for the justification of teaching thinking appear to embrace the various types of thinking. The first reason, which is about the conversion of our action from being blind, appetitive and impulsive to being intelligent action, depends on the use of the various types of thinking including imagining and contemplation. The second reason concerns the importance of thinking in finding solutions to the numerous problems that besiege us and this reason, like the first, again highlights the use of the different types of thinking in solving problems. The third reason brings to light the importance of contemplation in deepening our understanding of ourselves, and the world around us. In giving these reasons it is not clear whether Dewey is seeking a justification specifically of problem solving or of thinking in general. If it is problem solving, then it is problematic how Dewey's third reason supports this.

The justification provided by Dewey, as already indicated, is highly relevant to the promotion of thinking as a whole but what is problematic is the type of thinking that Dewey presents as a model of what thinking generally is. It is important that any justification for teaching thinking acknowledges the various types of thinking. Thus it is essential that an adequate conception of thinking which involves the various types of thinking is provided and this brings us back to the notion of thinking considered earlier in Chapter 1 as a complex mental phenomenon, which can be



manifested as a mental or physical act and more importantly requires specific contexts. Whereas Dewey's justification is mainly in terms of problem solving, Siegel's justification considers the moral, political and economic aspects of teaching thinking. To these reasons we now turn.

### **3.3. Siegel's justification**

The argument that reasoning is fundamental to our thinking and therefore must form the basis for the promotion of thinking in education has been argued by some philosophers (Ennis, 1964) but has received its finest presentation in Siegel's (1988) book *Educating Reason*. Siegel's justification is mainly in terms of critical thinking, which he defined as "the reasoned assessment of statements". Siegel gives four major reasons why teaching thinking should be an educational ideal.

The first reason is grounded in the Kantian principle of respect for persons. Siegel argues that according to Kant, in all our actions and dealings with persons we must take care to treat them as ends and not as means. That is, we must not grant our interests and concerns any higher priority than the interests and concerns of other persons. Siegel draws strength

from Kant to point out that, as teachers it is our moral duty to treat students as well as others with respect. Since students have the right to question, and seek reasons, explanations and justifications, teachers must teach in such a way as to treat students with respect by recognising and honouring these rights.

The second reason is to do with preparing students for self-sufficiency and adulthood. Siegel argues this is a fundamental obligation to children for without proper education, children could not competently manage their lives as many opportunities would be closed to them due to lack of education. Consequently we must strive to educate and empower them by organising their educational activities towards the development of their critical thinking. Thus this justification is in accordance with our obligation to prepare children for adult life by educating them in a manner that maximises their independence and self-sufficiency.

Initiation into rational traditions provides a third reason for the justification of critical thinking as an educational ideal. According to Siegel, critical thinking acknowledges two important factors; the first is fostering in students the attitudes and dispositions that encourage the seeking of well-grounded reasons for judgement, belief or action, and the second is the understanding and appreciation of the role of reasons in rational endeavour. Siegel argues that if education involves initiation into rational traditions then teaching critical thinking should be an educational ideal as it

provides opportunities for the evaluation of reason which is considered important to the successful initiation into these traditions.

Finally, Siegel believes that critical thinking cannot be separated from democratic living, for a true democratic society requires a critical thinker. He pointed out that:

If the democratic citizen is not a critical thinker, she is significantly hampered in her ability to contribute helpfully to public life. Democracies rely for their health and well-being on the intelligence of their citizens (p.60).

The political implications for teaching critical thinking, according to Siegel, cannot be withheld insofar as we are committed to the democratic ideal.

Implicit in Siegel's justification, which is predominantly in terms of critical thinking, is the notion that firstly thinking is all to do with reasoning, and secondly that there are certain general principles that can be applied across different contexts. Siegel's notion of thinking is very close to Dewey's in the sense that they both focus on reasoning in their discussions and justifications of thinking. But, as already discussed in the previous section, the connectedness of the various types of thinking needs to be adequately accounted for in any discussion of thinking. In other words, focussing predominantly on a particular type of thinking as the basis for the justification of teaching thinking may lead to inadequate provision for the promotion of thinking.

Siegel's 'reasons conception of critical thinking' states that "to be a critical thinker is to be appropriately moved by reasons". For Siegel the term 'critical thinking' must be understood to include both a set of 'principles' and the inclination to use these 'principles' in other words, the inclination to be 'appropriately moved by reason'. Furthermore, Siegel argues that both components of critical thinking are equally important.

Let us consider the set of 'principles' that Siegel claims to be of importance for the engagement in critical thinking. For Siegel,

the critical thinker must have a good understanding of, and the ability to utilize, principles governing the assessment of reason. There are at least two types of such principles: subject-specific principles which govern the assessment of particular sorts of reasons in particular contexts; and subject-neutral, general principles which apply across a wide variety of contexts and types of reason (p.34).

It is not too difficult to ascertain what Siegel means here by "subject-specific principles". On the other hand, however, it is difficult to account for "subject-neutral principles". Although Siegel makes the effort to show that these include "virtually all" that is presented in informal logic texts and in Ennis's list of proficiencies (and these will be discussed in the next chapter), still this is not enough to claim the truth of the complete generality of such principles. It is precisely the existence of these putative principles that is

the central issue in the ongoing debate on the subject of teaching general thinking skills to be discussed in Chapter 10. Siegel's claim that critical thinking manifests itself in both subject-specific and subject-neutral ways is an attempt to resolve the difficulty presented by the idea that there are such general principles. But this claim does not in any significant way resolve these difficulties. Let us for now leave these issues and very briefly state the second component of the conception.

The second component involves 'the critical attitude or critical spirit'. This aspect according to Siegel is to do with having the willingness, the desire and the disposition (to be discussed later) to base one's judgement and action on reason; i.e, "to do reason assessment" and be guided by the outcome of such assessment. This outline of Siegel's conception provides the basis for his justifications.

In view of the relevance of the different types of thinking discussed in the previous chapters it is not clear how Siegel accounts for these in his conception of critical thinking. True, they do have some relevance in the justifications provided by Siegel. For example, the ability to consider alternative situations is relevant in the first major reason, which is tied to the Kantian principle of respect for persons. We are more likely to treat other persons as ends and not merely as means if we are able to imagine ourselves in their situation.

Preparing pupils for self-sufficiency and adulthood, as

Siegel rightly argues, is fundamental in their education but focusing primarily on critical thinking may not yield the desired results. Preparing to be a self-sufficient adult requires a vast array of skills, which embraces not only critical thinking but also some of the various types of thinking already discussed.

Being able to think critically and clearly can be considered necessary in the initiation of pupil into rational traditions. But the initiation of pupils into rational traditions also involves thinking such as imagining and contemplation for example, but it is not clear how Siegel accounts for these types of thinking.

Similarly, our commitment to the democratic ideal requires that pupils learn to think in various ways that enable them to fully participate in the democratic process within the society. In this case as in the previous cases pupils will need to rely on an array of skills and ways of thinking and communicating that enriches their being able to think critically in the manner expressed by Siegel. For instance sign-cognition can be useful in reading body language, which is an important part of communication and social participation.

In spite of the difficulties in Siegel's conception of thinking his justification highlights the importance of thinking and its promotion in education.

### 3.4. An inclusive justification

The justifications provided by Dewey and Siegel are important arguments for the promotion of thinking but the conceptions of thinking (and the ensuing methods for their promotion) that their justifications appear to support are problematic. What is required is a justification that takes into account all the various types of thinking. Therefore, the reasons that will be offered for promoting thinking will be in terms of the importance of the various types of thinking in our daily existence.

In Chapter 1 a definition of thinking was provided as involving intentionality and attention and requiring particular contexts. In view of this definition, the promotion of thinking in education must be pursued because it provides an important means by which we focus attention on the things that matter in our lives, for example, in problem solving, communicating, appreciating and valuing not only our lives but that of others and the things that we engage in as well as others that we do not. The importance of thinking in our understanding of a problem, finding a suitable solution to a problem, developing excellent listening skills, taking care of our lives and showing consideration for others is clearly undeniable.

Both Dewey and Siegel have already highlighted the importance of thinking in problem solving. However, in addition to reasoning, the importance and relevance of the

various types of thinking which Dewey and Siegel did not specifically refer to cannot be discounted. For example, the use of sign-cognition can result in the resolution of some practical problems, that is, it could form part of the basis for avoiding or resolving a conflict or deciding whom to trust. Imaginativeness, as already indicated, is an important type of thinking in problem solving however, it may not be required where the problem to be solved requires the application of a well defined method to reach a solution as in the case of changing a flat car tyre. The importance of imaginativeness becomes clear where a novel method or solution to a problem is needed, as in the case of finding a solution to the current crisis in the National Health Service. Although contemplation has little to do directly with the resolution of a problem, it can be a source from which guidance and direction can be drawn for seeking a solution.

Being able to communicate plays a large role in our lives and thinking is central to how we engage in it. We are able to communicate with others by sharing our thoughts in various ways. Wittgenstein's argument on private language highlights the important connection between thinking and the shared concepts that bind a community together. The key point in Wittgenstein's argument is that our thinking is dependent on the use of concepts that are publicly accessible by members of our community and not by the use of inaccessible private language. If thinking is accessible and



shared by members of a community, this underlines its significance in how the community develops and thrives. In what ways do the various types of thinking aid communication? Reasoning is clearly important in learning, understanding and applying concepts that are vital for the flourishing of the community. Using a language, for example, requires reasoning but it also requires the ability to imagine. Spoken and written languages are very important means of communicating but equally important is body language, which does not necessarily depend on either speech or text as a means for communicating. It is possible that sign-cognition is important in the understanding of body language. Although contemplation is not directly involved in communicating, it can be a source of guidance in how we engage in it, and this brings us to the importance of contemplation.

In the case where thinking is directed towards finding solutions to problems, the description of the kind of thinking involved will include some kind of searching or trying to resolve the problem in question. On the other hand the thinking involved in wonder does not focus on searching for, or trying to find solutions to problems but instead it focuses on the acknowledgement of some idea(s) or object(s), which one does not yet fully understand (Hepburn, 1984). For example, to think of creation, the vastness of the universe and the possibility of beings living on another planet is very different from thinking about ways to build a spacecraft since the former is not concerned with solving a problem but

the latter is so directed. Contemplation is not directly involved in either finding solutions to problems or communicating but it is a vital source from which we can appreciate and value ourselves and others and the things that engage us. The rapid technological, scientific and cultural developments and their corresponding issues concerning how we live and cope in the new millennium continue to pose a threat to the meaning and value of our lives. For example, the effects of globalisation and the cycle of economic growth and ruin, developments in human cloning and the recent terrorist attacks on democracy bring to the forefront the need for the promotion of contemplation. It is the point where activity comes to rest and provides the spring from which the meaning and increasing worth of many actions and directions originate (Buchmann and Floden, 1993). In his *Summa Theologiae* Aquinas maintains that the contemplative life guides the active life, therefore when detached from contemplation the active life would be severed from its source of value. However, in spite of its potential value in guiding the decisions that we make, contemplation is valuable above all for its own sake as in the contemplation of nature or beauty.

The interconnectedness of the various types of thinking and their importance in assisting us to maintain our material and spiritual well-being provide adequate justification for their promotion in education.

## **SUMMARY OF PART ONE**

In bringing Part One of the thesis to a conclusion it is important to restate some of the key points. In Chapter 1 an attempt was made to highlight the main constituents of thinking. Views put forward by Dewey and Ryle concerning the nature of thinking were discussed and the conclusion drawn from these discussions was that the nature of thinking is highly complex and for that reason it can occur in either a mental or physical activity.

In Chapter 2 the different types of thinking formed the basis for the discussion in order to further support the claim about the complexity of the nature of thinking. These different types of thinking all contribute in different ways to the effectiveness of our thoughts and therefore it is essential that they are all valued.

Chapter 3 considered the justification for the promotion of thinking, which involved the discussion of arguments presented by Dewey and Siegel. The fact that thinking can be understood in a variety of ways as well as in terms of both mental and physical activity means that any justification for the teaching of thinking must take these complexities into account. The justifications provided by Dewey and Siegel lay important foundations in terms of the reasons why thinking must be promoted in education, and if we consider thinking as having a highly complicated and diverse nature then this may

lead to a firmer foundation upon which the teaching and learning of thinking can be promoted.

The discussion in Part Two of the thesis to which we now turn will focus on some of the methods proposed for the teaching of thinking as a general skill and on whether these methods yield satisfactory results.

## **PART TWO**

### **ON TEACHING THINKING PROGRAMMES**

The notion that there are general skills of thinking that can be taught as a curriculum subject has led to the development of a variety of special programmes to teach such skills popularly known as General Thinking Skills (GTS).

The explosion of interest in the idea of teaching general thinking skills is world-wide. In America alone there are over one hundred programmes engaged in the teaching of thinking (Nisbet,1991). Programmes from around the world include Structure of Intellect (SOI), Odyssey, Problem Solving and Comprehension (Sternberg and Bhana,1986); Logic, 'Strong' Critical Thinking, Philosophy for Children, Instrumental Enrichment, Somerset Thinking Skills Course, The Oxfordshire Skills Programme (Coles and Robinson,1991); LOGO, Cognitive Research Trust (CoRT), Cognitive Acceleration through Science Education (CASE), Cognitive Acceleration through Mathematics Education (CAME), Activating Children's Thinking Skills(ACTS) (McGuinness,1999; Wilson,2000).

These programmes have been developed specifically to put into practice the idea that thinking can be taught as a subject across the entire age and ability range. In this part of the thesis the following four programmes will be examined in detail:

1. Philosophy for children
2. CoRT Thinking Programme
3. Instrumental Enrichment
4. CASE

As will become clear in the proceeding chapters these four programmes have been chosen for two reasons.

- a) Their recognition in various discussions pertaining to the teaching of thinking. Over the past two decades these programmes in various ways have dominated the discussions on thinking skills programmes. Writers such as McPeck (1981), Baron and Sternberg (1987), Coles and Robinson (1991), Fisher (1992) McGuiness (1999), Wilson (2000) have provided discussions at various levels on all or some of these programmes. On the other hand the programmes outside the above four appear to have very little attention focused on them in the discussions of writers (other than originators of programmes) on the topic. Current or comprehensive discussions of programmes not included in the above four are not readily available (if at all they exist), as for example, Structure of Intelligence (SOI).
- b) The evidence that has been provided for the effectiveness of these programmes in enhancing the thinking skills of participants. These four programmes have well documented and easily available studies regarding their effectiveness and some of these will be examined in Chapters 5,6,7 and 8. However the same cannot be easily said about programmes outside these four.

The influence of the four programmes is clear in a number of ways. For example, the Philosophy for Children programme is highly regarded in North and South America, Europe and Australia (McGuinness, 1999). Similarly, programmes such as Somerset Thinking Skills Course and Oxfordshire Skills programme have emerged from Instrumental Enrichment (Coles and Robinson, 1991). The CoRT programme is well established in the area of creative thinking. In Britain CASE is admired as a programme that enhances pupils' thinking skills.

As society changes and our body of knowledge increases it becomes necessary for our educational system to take into account the growing body of knowledge by finding the most productive methods to disseminate it. These programmes in their various ways claim to offer novel insights particularly in getting learners to improve their thinking. If this is true, then education in general stands to gain. However, the situation is far from conclusive as we look at what each of these programmes has to offer.

In this part of the thesis the basic structure of these four programmes will be highlighted after the theoretical frameworks for teaching thinking have been discussed in Chapter 4. The last two chapters in this part will focus on arguments for and against teaching thinking skills.

## CHAPTER 4

### PROPOSED FRAMEWORKS FOR TEACHING THINKING

#### 4.1. Ennis's framework for teaching thinking.

The proposal to teach the 'correct assessment of statements' or 'critical thinking' as a body of general thinking skills(GTS) has been considered by some philosophers to be the best way forward if education for the promotion of thinking is to be pursued as a desired goal. In contributing to the attempts to achieve this goal, Robert Ennis proposed a working definition to clarify and strengthen the theoretical framework for further development of the teaching of thinking.

In his celebrated paper 'A concept of Critical Thinking' published in 1962, Ennis took up the challenge to develop a conceptual framework for teaching how to think critically. In the introduction to the paper, Ennis noted that although there have been a number of efforts aimed at the teaching of critical thinking, a major improvement was still needed. Ennis wrote:

But even in education such efforts have for the most part been deficient in an important respect: they have not been based on a comprehensive and detailed



examination of what is involved in making judgement about the worth of statements or answers to problems (p.82).

For Ennis the efforts in the field of education concerned with teaching critical thinking have not produced an explicit and comprehensive consideration of what is involved in judging statements to a desirable degree. For this reason Ennis suggested a theoretical framework in the form of a concept as a basis for research in the teaching and testing for critical thinking. He provided this concept by arguing that:

*As a root notion critical thinking is taken to be the correct assessing of statements. Since there are various kinds of statements, various relations between statements and their grounds, and various stages in the process of assessment, we can expect that there will be various ways of going wrong when one attempts to think critically (p.83).*

In order to avoid what he expressed as "pitfalls" in assessment, Ennis suggested a list of the following twelve specific aspects of thinking critically:

- 1) Grasping the meaning of a statement
- 2) Judging whether there is ambiguity in a line of reasoning.
- 3) Judging whether certain statements contradict each other.
- 4) Judging whether a conclusion follows necessarily.
- 5) Judging whether a statement is specific enough.
- 6) Judging whether a statement is actually the application of

a certain principle.

7) Judging whether an observation statement is reliable.

8) Judging whether an inductive conclusion is warranted.

9) Judging whether the problem has been identified.

10) Judging whether something is an assumption.

11) Judging whether a definition is adequate.

12) Judging whether a statement made by an alleged authority is acceptable.

Ennis hoped that by the provision of the above list future development based on a sound theoretical framework could be established for teaching and testing critical thinking as a general skill.

The influence of Ennis's work in the realm of teaching thinking cannot be denied however the conception as proposed by Ennis presents difficulties since it focuses strictly on one's ability to correctly evaluate certain kinds of statements. If thinking critically merely involves the evaluation of statements then it is difficult to understand how it can be related to the critical thinking involved, for example, in playing football or in producing a piece of painting. In these as well as in other kinds of activities knowledge plays a key role, but Ennis says nothing explicit about the place of knowledge in thinking critically. The importance of appropriate knowledge in painting or playing football means that successful engagement in these activities involves much more than the mere assessment or judgment of statements. It is arguable that implicit in Ennis's

conception is the assumption that his list offers all the essential knowledge that one would need to think critically: in other words by merely knowing how to apply his list it is possible to think critically in any subject. But this leaves out, for example, the kind of thinking that is tied to action.

It is not clear why Ennis gives no substantial justification for the view that critical thinking is of such great importance, though a possible reason could be linked back to Dewey. Dewey's views on thinking have been influential in shaping Ennis's conception since both can be said to view thinking mainly as problem solving, but whereas Dewey's writing is suggestive of some list of skills Ennis goes further in providing such a list. Another problem with Ennis's list is that there is no guarantee that learning these skills will necessarily lead to the higher development of one's critical thinking abilities since knowledge and dispositions are also involved in thinking critically as already indicated.

However, according to Ennis's view, one is a critical thinker if one has the necessary skills or proficiencies as laid out above for the proper evaluation of statements. What Ennis failed to take into account is the manner by which a particular outcome is pursued. For Ennis, critical thinking purely involves the imparting of the essential skill as formulated. Ennis makes this very clear by referring to the named twelve aspects as specific ways to avoid "pitfalls" in

one's assessment of statements. However, this attempt to list all the ways to avoid "pitfalls", as indicated by McPeck(1981), is akin to a hypothetical attempt to list all the possible ways to avoid an accident. Given that in such situations there is an infinite number of ways of getting things wrong, such lists are destined to fail. As already discussed in Chapter 1, the complex nature of thinking means that any attempt to define it in any manner that does not acknowledge its multifacetedness is condemned to fail. Consequently to talk about thinking purely in terms of statements as offered by Ennis is bound to lead to an undesirable result.

Ever since the conception under consideration appeared, Ennis has become aware of the inherent difficulties and in his later work has attempted to revise and strengthen his original conception to include a set of dispositional conditions for critical thinking. By this revised conception, a critical thinker, then, has both the skills necessary for the correct assessment of statements and also the dispositions to put those skills into action in statement assessing activities.

Although Ennis's addition to the original conception is an improvement, this addition does not overcome the difficult problem of providing an unproblematic conception of thinking critically. In fact what Ennis yet again provides is a list to follow. On this issue, Siegel(1988) observed that:

What Ennis's conception amounts to is actually a highly complex list of proficiencies coupled with the simple admonition to exercise the proficiencies. In this way, while Ennis's view is to be praised for its recognition of the importance of utilization of skills, the tendency to utilize critical thinking skills is under-analyzed and under-attended to in Ennis's work (p7).

The flaw in Ennis's conception as already mentioned could be related to the fact that the multifacetedness of thinking, which is a crucial aspect to be considered in any notion of thinking, remains unaccounted for by Ennis. Nevertheless Ennis's effort to provide a framework has contributed to a vigorous debate on what form, if any, the conception of critical thinking should take.

We now turn to John McPeck, whose work provided an important and challenging contribution to the debate on the teaching of critical thinking.

#### 4.2. McPeck's framework for teaching thinking

The most systematic and challenging critique of the general skills of critical thinking tradition was put forward by John McPeck in his two books *Critical Thinking and Education* (1981) and *Teaching Critical Thinking* (1990).

John McPeck presented his major ideas on the theoretical structures of critical thinking in *Critical Thinking and Education*. In this book McPeck clearly argued that thinking is always thinking about X (meaning something - for example, some problem, activity or subject area). Adding the adjective 'critical' to the phrase 'thinking about X' results in the description of how something is thought about without describing that something. Therefore in isolation from a particular subject it makes no sense to talk about critical thinking as a subject. For McPeck, critical thinking is subject specific and what counts as critical thinking differs from subject to subject, consequently there are no general thinking skills(GTS) that can be applied across different fields of study. It is not difficult to observe the major difference between McPeck and Ennis in the sense that Ennis views critical thinking as solely to do with statements, but for McPeck on the other hand critical thinking is not always about statements but is involved in phenomena more generally. The claim of the subject specificity of critical thinking draws McPeck closer to Ryle's position on thinking in that

similarities can be drawn between McPeck and Ryle about the idea that thinking is a polymorphous notion. That is, it cannot be acquired as a set of skills divorced from specific activities. But this is precisely the opposite of what Ennis is seeking to establish in the sense that thinking can be taught as a set of skills independent of any specific activity. This distinction is instrumental in creating a divide between Ryle and McPeck on the one hand and Dewey and Ennis on the other. This divide as will become clearer runs through much of the discussion on the teaching of thinking.

McPeck maintained that critical thinking always manifests itself in connection with some identifiable activity or subject area and never in isolation, and that learning to think critically to a large extent involves learning to know when to question something, and what sort of questions to ask. McPeck expressed his conception of what critical thinking is, in the following paragraph:

In short, critical thinking does not consist in merely raising questions, as many questions are straightforward request for information. Nor does it involve indiscriminate scepticism, for that would ultimately be self-defeating, since it leads to an infinite regress. Rather, it is the appropriate use of *reflective scepticism* within the problem area under consideration. And knowing how and when to apply this reflective scepticism effectively requires, among other things, knowing something about the field in question. Thus we may say of someone that he is a critical thinker about X if he has the propensity and skill to engage in X (be it mathematics, politics or mountain climbing) with reflective scepticism. There is, moreover, no reason to believe that a person

who thinks critically in one area will be able to do so in another area. The transfer of training skills cannot be assumed of critical thinking but must be established in each case by empirical tests. Calling to witness such notorious cases as distinguished logicians with no idea for whom to vote, nor why, it is fair to postulate that no one can think critically about everything, as there are no Renaissance men in this age of specialised knowledge (p7).

The core meaning, then, of critical thinking put forward above is to do with the skills to engage in an activity with reflective scepticism; however, the purpose of this scepticism according to McPeck is not to be disagreeable, but to advance progress towards the resolution of a problem. For McPeck this notion of reflective scepticism is necessarily linked with specific areas of expertise and knowledge. For it is knowledge and information from within the field or problem area that provides the main ingredient that renders any putative solutions possible. So for example, critical thinking about an historical question requires the skills of an historian; similarly, critical thinking about a scientific question requires the knowledge and skills of a scientist. An important conclusion that can be drawn is that since there are no general skills that can be applied in all fields there is no reason to expect transfer of critical thinking from one domain to another domain. In arguing against teaching critical thinking as a separate subject from such a standpoint, many would agree with McPeck that the real issue with uncritical students is rather a lack of general education in the broad traditional sense.



A key point that McPeck clearly makes is that he does not wish to be understood as being entirely against the development of critical thinkers. Indeed, he is very much in favour of improving critical thinking, but his disagreement is largely concerned with how to teach it. McPeck's interest in developing critical thinkers is evident in his keenness to find a solution to the problem concerning what kind of knowledge will have the most transfer. The solution to this problem has always been the desire of all who are concerned with developing critical thinkers.

For McPeck a rich and powerful way to develop critical thinking is through a liberal education. That is, through the rational perspective which comes from a well-informed study of natural and social sciences, together with mathematics, history, literature and art. In defence of the liberal educational system in his book *Teaching Critical Thinking*, McPeck argued that the shortcomings of our liberal educational system must not blind us to its potential role in the development of critical thinking. However, he acknowledged the need for some improvement of the system. He expressed his position as follows:

One of the most pervasive shortcomings of the way that the traditional disciplines are taught is that they present their material in such a way that its facts and methods are regarded as nonproblematic. It is as though the foundation of these disciplines was chiselled out of epistemic bedrock, and all one needs is what the so-called facts are, and how to use its methods for finding more of them. Mastery of these disciplines is often measured in terms

of how many "facts" one has learned, and how proficient one has become in using its "method." Both of these are regarded by teachers and students alike as more or less sacrosanct. The all-too-frequent result of such teaching is that we produce technicians at X and specialists of Y with hardly an educated soul among them. A plausible solution to this problem is to make the philosophy of X and the philosophy of Y an integral part of what it means to "learn X" or to "learn Y." Thus, the philosophy of natural science would be as much a part of science education as Newton's laws. And the insights of the philosophy of history should be as much a part of learning history as the details of the Monroe Doctrine. If I may use a few personal examples, individuals like R.G.Collingwood, Michael Oakeshott, and William Dray might be said to have contributed as much to the study of history as did Samuel Eliot Morrison or Henry Steele Commager. Similarly, points could be made about the philosophy of art, mathematics, and social science. It should be clear that the philosophy-of approach should not be considered a mere topping-up exercise for the otherwise well-socialized specialist in these disciplines. Rather, the problematic nature of the putative facts and methods should be consciously woven into the fabric of its courses, even at the undergraduate level. In doing so, we would be providing students with the major prerequisites for being critical thinkers (p16-17).

The philosophy-of approach clearly forms the hub of McPeck's framework for teaching critical thinking.

The economy of this approach can be easily understood in that it seeks to build on the best of what we already have within the liberal education system. This highlights further differences between McPeck and Ennis. Whereas Ennis bases his idea of teaching critical thinking on a list of proficiencies, McPeck on the other hand rejects this idea by

arguing that teaching such thinking can only be done through specific subjects and activities. However, there are issues in seeking to teach exclusively for critical thinking through the traditional subjects. These issues will be discussed later.

McPeck's contribution to the debate on teaching generalised thinking skills is important because until McPeck's objections, the putative reasons given in support of critical thinking in particular and thinking in general were not subjected to such detailed analysis.

A possible cause of the lack of thorough analysis of the general notion of teaching thinking could be traced back to Dewey's work on the subject in *'How we think'*. Dewey's ideas formed the conceptual cornerstone for the present proliferation of work in support of teaching thinking. However, as discussed earlier in Chapter 1, Dewey's conception of thinking is by no means unproblematic. Consequently, the confusion generated in Dewey's notion continues to plague the present, spreading through the work of proponents of generalisable thinking skills. As we shall see, problematic issues surrounding this notion have been neglected by proponents of general thinking skills.

McPeck deserves acknowledgement for challenging the notion of teaching general thinking skills. However, is he entirely right in the approach that he adopts? Does his approach deal adequately with the issues concerning the enhancement of thinking?

One of the problems inherent in McPeck's argument that "Thinking is always thinking about X" is, as indicated by Andrews(1990), that McPeck is not very clear about what he means by the "X" in his claim. For Andrews, McPeck's vagueness and lack of clarity can be detected in the various statements that he makes. For example, when McPeck states that:

Thinking is always thinking about X, and that X can never be 'everything in general' but must always be something in particular (p4).

The in-built vagueness here is that McPeck offers no criteria for identifying that "something in particular" in the statement above. Although McPeck offers a number of ways of characterising "X", that is, sometimes as a problem, other times as an activity or a subject area, for Andrews this is unsatisfactory: McPeck's claim can only be successful if he is able to provide the criteria for the application of the phrase "something in particular". Andrews argues further that what McPeck takes for granted as unproblematic in referring to "X" in his claim by various terms such as 'problem', 'pertinent field', 'problem area', 'activity' and so on, is in fact problematic. The point Andrews is making is that McPeck's view is hard to pin down as soon as he tries to cash out that abstract schema. Consequently McPeck's ambiguity leaves one without any clear standards to identify the 'activities' (etc) that he refers to.

Another problem concerns McPeck's argument that there are no general thinking skills and as such (critical) thinking must be established on the "appropriate use of reflective scepticism" within specific contexts. McPeck's framework is presented in terms of the philosophy of specific subjects but to apply philosophical thinking to all subjects as suggested by McPeck is to be committed to the generality of such thinking. Philosophical thinking generally involves the acquisition of certain skills such as the ability to consider alternative views and the presentation of logical arguments. As a result, to consider any philosophical discussion must include the deployment of such thinking skills. If McPeck views such thinking skills (which he does) as an important part of studying the curriculum subjects offered in liberal education then he must be admitting the generality of such thinking skills. But McPeck's opposition to any kind of generality of thinking brings the contradiction in his approach into sharp focus.

Although McPeck makes no mention of sports, they are a valuable part of any broad-based liberal system of education, and as such the kinds of thinking involved in science, literature, history and so on may not necessarily be the same as those involved in sports, considering the importance of sign-cognition in sports. It is therefore not clear how the philosophy-of approach can be applied in the context of sports activities. It is difficult to account for how the ability to present logical arguments, for example, can

enhance the effectiveness of thought required in the practical performances that define most sporting activities.

To think philosophically involves the combination of the various types of thinking discussed in Chapter 1 such as reasoning, imagining and contemplating, and these types of thinking in important ways involve certain kinds of dispositions such as patience, persistence and courage for example (to be discussed in Part Three). In spite of the importance of such dispositions McPeck does not sufficiently draw attention to them.

Given the difficulties highlighted in the various conceptual frameworks discussed so far how are we to proceed?

### 4.3. Which way for teaching thinking?

In the light of the problems highlighted in the preceding discussions, what is the best possible way forward? It is obvious firstly, that there are opposing conceptions and theoretical frameworks for what thinking is and how it can be taught, and secondly, that these conceptions and frameworks are by no means unproblematic. It cannot be denied that the body of work generated by the debate on the existence of general thinking skills and how these skills (if they do indeed exist) might be taught is valuable in deepening our general understanding of what teaching thinking might involve.

It is wrong to assume that the only way to improve and sharpen the way we think is by creating special courses to teach general thinking skills. The view that will be argued for in this thesis is that the improvement of students' thinking does not necessarily require a new subject but rather an improvement in the teaching and learning of the curriculum subjects. These improvements can be made by searching for the major factors that influence effective thinking and incorporating these in innovative methods to enhance the teaching and learning of the curriculum subjects. These factors influencing effective thinking will be discussed later.

What makes the idea of teaching thinking skills so

bewitching is the promise of the transferability of assumed general thinking skills across all the different subjects. Without this the argument for teaching thinking is effectively redundant. The main case against teaching and learning thinking through the curriculum subjects is that they fail to yield maximum transferability from one curriculum subject to another and for that reason students fail to think more effectively. Yet there is no conclusive evidence to show that thinking skills programmes yield maximum transferability for participants.

In order to provide a detailed view of what is involved in the teaching of thinking we now turn to some of the major programmes that have been specially developed for teaching skills thought to be general to thinking.



## **CHAPTER 5**

### **PHILOSOPHY FOR CHILDREN**

#### **5.1. Why teach children philosophy?**

Philosophy for Children was developed in America by Matthew Lipman to address some of the congenital problems in the American educational system, as he believed it to be the case.

The original idea for the creation of the programme resulted from Lipman's concern for the low level of thinking skills that students brought to the college where he taught philosophy. For Lipman the educational system produces so many unthinking people because it fails to address the conceptual needs of the child in a number of ways. For example, children are not taught to reason similarly, children are not shown how to apply logical skills to diverse subject matters. For Lipman the alarming level of the American child's lack of reasoning is a direct result of the child's not being sufficiently encouraged to think for him or herself, to be able to form independent judgements and be proud of his or her personal insights and a point of view that he or she can call his or her own.

According to Lipman(1977), one of the main causes for

the production of unthinking people is to be found in the American educational system as it is. He explained it as follows:

One of the major problems in the practice of education today is the lack of unification of the child's educational experience. What the child encounters is a series of disconnected, specialized presentations. If it is language arts that follows mathematics in the morning program, the child can see no connection between them, nor can he or she see a connection between language arts and the social studies that follow, or a connection between social studies and physical science.

This splintering of the school day reflects the general fragmentation of experience, whether in school or out, which characterizes modern life. However, it is also due to the enormous increase in the factual dimension of human knowledge, for insofar as education involves a transmission of information to the child, it must be simplified and schematized by specialists. The result is that each discipline tends to become self-contained, and loses track of its connection with the totality of human knowledge, in an effort simply to present a bare outline of that particular field (p6,7).

Lipman argues that the surest way to resolve such an unproductive educational system is to be found in teaching children philosophy. According to Lipman philosophy is the natural discipline to reconnect the various specific subjects (as it is traditionally concerned with the inter-relationships among the different intellectual disciplines). So to engage children in philosophical discussions is, in a sense, an aid in healing the 'general fragmentation' of their

experience. Consequently, the best approach is to teach thinking through the rigours of philosophical discussions.

For Lipman, if education is about teaching young people to improve their thinking then it should be offered as a course of study and the child should begin early, as soon as he or she enters school.

In setting out how thinking is to be taught, Lipman listed over thirty skills which children should learn. A key skill and the first on this list is entitled 'Formulating concepts precisely'. For example, to explore the concept of friendship, Lipman suggested a host of questions to generate discussions these included the following

- a) Do people have to be the same age to be friends?
- b) Can people be friends and still not like each other very much?
- c) Is it ever possible for friends to lie for one another?

Lipman believes that children who are encouraged to think and speak logically are most likely to develop into more thoughtful, more reflective, more considerate and reasonable individuals. Consequently, the aim of his program is to provide conceptual enrichment through the improvement of skills in comprehension, analysis and problem-solving. According to Lipman, most of these skills and the disposition to use them are learned best through language in a sort of 'community of inquiry' where children engage in dialogue as a cooperative venture.

Lipman concluded that the best way to teach children to think is to engage them in philosophical discussions based on stories. For Lipman, the fictional form is the best way to acquaint them with the complex facts of the world. Thus began the very first production of a special short novel for children by Lipman(1974) entitled '*Harry Stotlemeier's Discovery*'. The story draws upon Aristotelian logic in areas such as contradiction and categorical syllogisms in addition to relational and propositional logics. These logics however, are dealt with in an informal way.

## 5.2. Guiding children to philosophise

The primary aim of the programme is to bring about the development of reflective and reasonable American citizens by means of the novel as text. The second is by discussion method to aim at transforming the classroom into a community of inquiry. All this involves the use of comprehensive instructional manuals and the establishment of rigorous teacher education seminars flexible enough to be used by any target group.

Lipman's novel *Harry Stottlemeier's Discovery* formed the cornerstone of the entire programme. It begins with the story of a thoughtful little boy Harry making a mistake in class one day. Through that mistake various discoveries unfold as he ponders over the reasons for his mistake. The novel comprises seventeen chapters and as the story develops other characters are introduced and more questions of logic are raised. Harry, Lisa and the rest of the characters begin to think about various logical statements and begin to apply their findings to situations both inside and outside the classroom, coming to realise the importance of defining their words in precise ways.

The novel and other such stories form the foundation not only for the engagement of children in philosophical discussion but also for training and preparing potential teachers of the programme. In addition to the novel there is

an instructional manual for establishing connections between philosophy and other school subjects that children study. The instructional manual is designed to introduce and then provide a gloss on the main concepts as they emerge in the course of the discussions.

The method for teaching children philosophy is based predominantly on discussion, that is, on talking and thinking things out. According to Lipman, the conditions for a productive philosophical discussion within the programme require first of all that the teacher must not only be knowledgeable in philosophy, but also must know how to introduce this knowledge at the appropriate times in ways that support the child's own struggle for understanding. Secondly, the prevailing condition in the classroom must demonstrate a commitment to philosophical inquiry, avoidance of the indoctrination of children, respect for children's opinion etc.

The teacher, whilst making sure that the conditions stated above exist in the classroom, must at the same time assist the child to master the rules of logical inference, and the necessary etiquette of classroom discussion in order to develop philosophically. The teacher is urged to

- a) maintain relevance by steering the discussions in the appropriate direction;
- b) help the child learn to ask questions and maintain interest by being a questioning teacher;
- c) help the child to develop an openness such that they are

eager to replace ineffective answers with more effective ones;

e) develop the ability to listen to the child verbally and non-verbally.

These conditions and many others form the underlying ideas guiding how children are to be taught philosophy. Since the introduction of the programme, Lipman and his followers have produced a large body of evidence in support of the effectiveness of the programme in improving the child's reasoning ability. The evidence will be examined in the next section.

### **5.3. Issues in teaching children philosophy**

It is clear from the preceding section that proponents of the Philosophy for Children programme present a forceful case for teaching children thinking through philosophy. It is their belief that through this programme children can be taught critical thinking in its rudimentary form, hence critical thinking ought to be introduced to children as early as possible. Although the literature on philosophy for children provides numerous claims of children successfully engaging in philosophising, this position is by no means unproblematic as there are difficulties to be accounted for by the programme.

The arguments against teaching philosophy to children can indeed be traced back to some of the writings of Plato. In Book 7 of the *Republic*, Plato points out the dangers of introducing philosophy to the young. He wrote:

And there is one great precaution you can take, which is to stop their getting a taste of them too young. You must have noticed how young men, after their first taste of argument, are contradicting people just for the fun of it; they imitate those whom they hear cross-examining each other, and themselves cross-examine other people, like puppies who love to pull and tear at anyone within reach(p352-353).

He then goes on to state the consequences as follows:

So when they've proved a lot of people wrong and been proved wrong often themselves, they soon slip into the belief that nothing they believed before was true; with the result that they discredit themselves and the whole business of philosophy in the eyes of the world (p353).

For Plato, the whole business of philosophy is of such great importance that it requires persons of steady and disciplined characters to engage in its discussion. Plato's writing thus suggests that the practice of philosophy depends on resources that youth do not yet have but can come to have through the development of their conceptual sophistication among other things.

Attempts by commentators to locate Lipman's programme within a theoretical framework tend to refer to the



intellectual development of children as suggested by Jean Piaget in his theory of developmental stages. The central point in Piaget's model is that children before the age of 12 years do not yet possess the mental capacity for the kind of abstract thinking that philosophy demands.

In the main Piaget's notion of 'development' is defined in terms of biological organisms and their ability to flourish under favourable conditions. The notion of biological development carries with it the idea of some predetermined beginning and final limiting state towards which an organism advances. This notion can easily be applied to the physical growth of plants from a seed to a fully grown specimen but it is difficult to ascertain how it can be applied, for example, to reasoning since ideas of what counts as maturity of reasoning are very different. As pointed out by White(1992), some of the difficulties with the application of Piagetian notion to intellectual development suggest that the notion of stages of philosophical development is not wholly unproblematic. All the same the power of Piaget's ideas about the intellectual development of the child continues to persist.

The implication of Piaget's theory that a child is not capable of abstract hypothetical thinking until he/she has reached the stage of formal operational thought at around 12 years of age constituted a huge obstacle for the Philosophy for Children programme, in the sense that the main target group of the programme falls below Piaget's recommended age

of the children to be engaged in such studies. The influence of Piaget's work in the world of education has led proponents of the programme to attempt to secure its credibility by providing what they consider to be compelling arguments backed by evidence for teaching children philosophy. In response to Piaget's formulations, Lipman(1982) and Matthews(1980) attempted to identify weaknesses in the theory by criticising Piaget's research technique.

For Lipman, Piaget's model is based mainly on descriptive and hardly on pedagogical studies and for that reason it is erroneous. Lipman argues that Piaget has not provided conclusive evidence to show that children under 12 years of age cannot generally think in an abstract way. But Lipman on the other hand provides very little evidence beyond his own experiments to substantiate his claim that children below the age of 12 years old can and do engage in philosophy.

Similarly, the weakness in Piaget's model as identified by Matthews is that Piaget excluded unusual responses given by children from his data, by dismissing them as mere fancying. For Matthews, it is precisely these unusual responses which are more likely to be the result of honest philosophical speculation. Matthews cites examples of discussions with children from both Piaget's work and his own experiments to support his claim that children do indeed philosophise. However, Matthews also provides very little evidence beyond his experiments to support his claim.

Lipman and Matthews's inability to present conclusive evidence in support of their claim that very young children do engage in philosophising is clearly one of the difficulties facing the philosophy for children programme.

A further potential source of difficulty for the programme is to do with the assumption that children are interested in philosophy and therefore should be taught philosophy at least in its rudimentary form. We are told by Lipman that the programme came into being as a result of the poor level of thinking that college students demonstrated in his philosophy classes. The initial impulse, then, was to find ways to improve the philosophical thinking of students before they entered college, presumably to do philosophy. Similarly, Matthews's interest in promoting the programme originated from his concern about how to teach introductory courses in philosophy to his college students.

It is indeed clear from both cases that the initial impetus for the development and promotion of the programme was a yearning to improve the philosophical thinking of potential pre-college students interested in pursuing the subject. If the programme is meant to operate within clearly defined boundaries, promoting philosophy among select groups of interested students wishing to pursue the subject further, then there is no case to be made. But, in its present form, what is unclear and problematic about the programme is the argument that children do philosophise hence all children should be taught philosophy, as well as the subsequent drive

to introduce all children of school-going age to the programme. Clearly this raises a problem since not all children might be interested in pursuing a college education in philosophy.

What can we say about Lipman's objective in seeking to teach children philosophy? As already mentioned, Lipman's objective in developing his programme was specifically for the improvement of the philosophical thinking of new college students intending to study philosophy. But much of Lipman's writing on the development of his programme makes no mention of this initial objective. Instead Lipman writes about teaching philosophy to all children of school-going age. This lack of consistency between Lipman's initial objective and his subsequent writing on teaching children philosophy is important in highlighting some of the issues associated with the programme. In his writing quoted earlier in section 5.1 Lipman offers a different objective for the promotion of the programme: helping children to reconnect the various specific disciplines. Later on Lipman(1986) again claims that the programme meets the two objectives of systematically and significantly strengthening higher order thinking skills, and the building of conceptual skills together with the intensification and enrichment of students' awareness of their heritage. In view of the diverse objectives that Lipman claims Philosophy for Children satisfies what can be said about the programme is that it raises questions about what exactly Lipman is aiming to achieve. It is clear that

Lipman's original goal for the creation of his programme, which was to improve the thinking of undergraduate students of philosophy, was taken over by other considerations and objectives as Lipman embarked on the development of the programme.

Suppose Lipman's aim in teaching children philosophy is to produce effective and well-rounded thinkers, that is, thinkers who are autonomous, courageous and compassionate, is it sufficient to do so by teaching purely reasoning skills as suggested by the programme? It is appropriate for such thinkers to have skills in reasoning, as this is useful in thinking independently and so contributing to the development of autonomy. However, reasoning alone does not necessarily lead to such thinkers becoming courageous or compassionate as well because these are dispositional qualities and therefore cannot be gained by mere theoretical considerations as in the case of gaining skills in logic (Ryle,1972). As already mentioned Philosophy for Children is based on novels written by Lipman and these novels are the sole texts for the philosophical engagement of children. If Lipman's aim is to develop thinkers as indicated above it is not clear how this can be done by the use of his texts alone. Thinking, as has been repeatedly indicated, is a multifaceted concept and as such the ability to think effectively embraces among other factors various types of thinking which are not accounted for by the programme.

The lack of agreement or correspondence between the

initial motivation for the programme and its development has led Lipman and his followers to argue that philosophy is to do with reasoning and that since one of the aims of educating democratic citizens is to improve their reasoning, philosophy should be taught to all as early as possible during their education. This however will not do, since in taking such position Lipman and his followers conflate reasoning and philosophising. As indicated by White(1992), it is indeed often the case that a child learning to use a newly acquired concept may ask various pertinent and searching questions in order to fully understand how to reason around the concept or apply the concept. However, this is entirely different from the main concerns of philosophers, in the sense that the interest of philosophers revolves round the criteria for the application of concepts. The crucial difference here is that, while the remarks and comments made by children may be directed at learning how to use a concept, for example, the concept of goodness, philosophers, on the other hand, have no difficulty using this concept but are rather interested in the higher theoretical implications of the concept. The indication in this case is that the children and the philosophers are thinking about different things and are doing so by using different concepts. In other words the intentional objects on which they focus their attention are in the main different.

It is not too difficult to show that only a minority of individuals display a deep interest and commitment to the

subject of philosophy, and one of the reasons for this is the fact that the road to philosophy is undeniably long and certainly arduous. In the end, there are no set rules by which one can be guided. Consequently, it is important that a good and thorough intellectual preparation (although this may still not be adequate) is undergone before embarking on a philosophical journey. This preparation is meant to include the knowledge acquired through liberal education as we know it.

However, according to Lipman(1977), not having adequate background knowledge is unimportant for engaging in philosophy. He argues that:

The amount of information or knowledge children acquire is less essential to their philosophical education than the development of their intellectual judgement (p.83).

This may well be the case, but it is difficult to envisage how far one can go on any philosophical journey without adequate background knowledge to inform one's intellectual judgement. Furthermore, it is not clear whether Lipman is implying that it is not useful to be acquainted with important and relevant knowledge that other philosophers, past and present, have contributed to general ongoing philosophical debates. In learning to philosophise, surely, to be acquainted with the findings of other philosophers must contribute in some way to one's own intellectual development.

If this is so, then it is not clear why Lipman is playing down the amount of knowledge that children learn to acquire. One possible clue may be that taking such a position allows the Philosophy for Children programme the opportunity to assume an important position, since the programme is opposed to a content specific teaching method.

If we are to equip children through education for a better future then we should make sure, first of all, that they are as much as possible well-informed and well-grounded in the traditions offered in liberal education. The possession of relevant knowledge is certainly beneficial to one's effectiveness in thinking and this implies that some time must first be spent on acquiring much basic knowledge and information. This position highlights McPeck's point that teaching children philosophy should be done at a later stage of the child's education.

Finally, the fact that Lipman and his followers write and publish the main journal promoting the programme suggests that it is highly likely that their own interest in promoting the programme as a successful method for teaching thinking may lead to the possibility of bias in the kinds of reports that they present in their journal. In other words it is difficult to envisage how they can maintain impartiality in the publication of reports on the success of the programme worldwide.

Between the period of 1993 and 1994 the Institute for the Advancement of Philosophy for Children(IAPC) highlighted



seven case studies as demonstrating the effectiveness of the programme (published on IAPC website,2002) ([www.montclair.edu/pages/iapc/home.html](http://www.montclair.edu/pages/iapc/home.html)). All the case studies were based on an earlier evaluation by Shipman which will be one of the two empirical studies on the effectiveness of the programme to be discussed in the next section.

#### **5.4. The effectiveness of Philosophy for Children**

Proponents of Philosophy for Children have made claims in favour of the effectiveness of the programme in improving the reasoning skills of pupils. As an important part of establishing such claims numerous studies have been conducted in support of the programme. Lipman(1986) cited fourteen quantitative studies examining the effectiveness of its implementation upon various aspects of children's thinking ability and academic performance. The Philosophy for Children programme views the improvement of reasoning skills as its most basic function consequently most of the studies were concerned with the programme's impact upon reasoning ability. Two of the quantitative studies that will be discussed in detail are of particular interest because they are follow-up studies on previously conducted studies.

#### **5.4.1. Shipman's final report**

Shipman's (1983) study attempted to replicate an earlier evaluation of the Philosophy for Children programme for pupils in two New Jersey (USA) schools. The main aim of the study was to establish that the programme improves school children's reasoning abilities. The measures used in the study included tasks assessing both formal and informal reasoning skills developed in cooperation with Lipman. The study lasted over one academic year and a large part of the tasks employed in the study consisted of reasoning problems in a multiple choice format covering over 23 different areas of logic such as inference, definition, induction and informal fallacies. A crucial part of the study was that pretest and posttest were administered and their calculated means were used to draw important conclusions about the efficacy of the programme. It is upon these test results that the Philosophy for Children programme is claimed to be effective in improving reasoning skills. But can such results be accepted? The study in general raises a number of issues such that it is problematic to view it as providing a conclusive evidence of the effectiveness of the programme. The study assumes that:

1. Children can and do philosophise.
2. To philosophise is tantamount to reasoning.
3. The excellence of one's reasoning can be established

purely by administering tests in multiple-choice formats. Some of the problems with assumption (1) and assumption (2) have already been discussed in the earlier sections of this chapter. For instance, the claim that children can and do philosophise (assumption (1)) underpins some of the main arguments for the programme presented by Lipman and Matthews, but what is lacking is substantial evidence to support this assumption.

The difficulty with assumption (2) is that to equate philosophising to reasoning is to fail to distinguish the subtle differences between the two. The essence of reasoning is directed mainly towards finding solutions to practical or theoretical problems such as in the following examples:

- (a) Making a final decision to choose one commodity out of many by calculating and comparing how much tax one is required to pay on the different available commodities;
- (b) Calculating the rise in sea level as a result of global warming.

Although philosophising on the other hand does depend on reasoning, it also involves contemplation as it is not necessarily concerned with merely seeking solutions to problems though solutions to problems may arise in the course of philosophising. It is in the main concerned with understanding the nature of things by considering and meditating on the various alternative points of views by which things can be understood. Example (a) given above on reasoning can be transformed into an example of

philosophising when one begins to consider say the nature of the numbers used in the calculation and whether they truly exist regardless of how we represent them.

Assumption (3) raises issues about the appropriateness of multiple-choice tests as the basis for determining the quality of a person's reasoning. Reasoning, as already discussed in Chapter 2, can be viewed as a practical or theoretical activity, and it was indicated that practical reasoning concerns our ability to conduct ourselves in the world of action, which can be distinguished from (theoretical reason) our capacity to operate from and with propositions. This division, however, does not suggest mutual exclusivity therefore any attempt to determine a person's quality of reasoning must account for both distinctions. In this case it is difficult to ascertain how the use of multiple-choice tests can be adequately applied in determining one's practical reasoning ability, even though multiple-choice tests may be useful in finding out something about theoretical reasoning. Indeed it is not at all clear why multiple-choice test format was used and how such tests can provide generalisable results.

One possible reason for Shipman's use of a multiple-choice test is that it provides an unproblematic method for the data generated by the study to be subjected to various mathematical techniques in order to lend it some level of authority. But applying such a format to reasoning may only be reliable within highly specific contexts such as in

solving mathematical problems. Consequently it is inappropriate to generalise such results to cover all kinds of reasoning. In fact in this study the reasoning problems provided were highly specific since these were tailored to the contents of the programme - which in turn leads to further issues relating to the effects of researcher interest on the study.

The interest of the researchers raises important issues. For example, the fact that Lipman designed most of the test materials used in the study means that an element of bias cannot be excluded. Before the study began, teachers with considerable interest in the programme were selected and given special training in how to teach the programme. Thus the possibility that these teachers are more likely to behave differently as a result of being treated differently cannot be ignored, but these issues were not accounted for. The study relied on pretest and posttest as the key indicators for the success of the programme, but this raises questions about the possibility of teachers teaching to the test. The study did not address important issues relating to fundamental assumptions and the effects of teacher and researcher interests. There is thus a major problem in generalising the study to a much larger population.

#### 5.4.2. Iorio, Weinstein and Martin's evaluation

Iorio, Weinstein and Martin's (1984) study is similar to Shipman's study in its attempt to demonstrate the efficacy of the Philosophy for Children programme by elaborating on an earlier study carried out in a number of schools in New York City. The study was carried out over one academic year. One of the objectives was to measure and compare the gains in reasoning skills among elementary school pupils. The main findings were based on pretests and posttests administered to participants at particular stages of the study. The latter involved among others a criterion-referenced reasoning test derived from Lipman's test model. The test, according to the researchers, is based on "some twenty definable thinking skills" covering both formal and informal reasoning skills including syllogism, induction, detecting assumption and ambiguity, evaluating reasons, etc. Teachers were selected on the recommendation of their principals based on guidelines supplied by the researchers. The selected teachers were given special training in guiding philosophical discussions with on-going support during the period of the project. At the end of the academic year the researchers produced statistical results to support their claim about the efficacy of the programme. From these results they concluded that:

First, Philosophy for Children has a significant effect on raising pupils'

level of critical thinking, where critical thinking is measured by a test that includes the performance of abstract inferences and the evaluation of arguments. Second, critical thinking skills are generalized from a basis in classroom discussion and text readings that are not specifically tailored to the cognitive skills tested (p.34).

The assumptions underpinning Iorio, Weinstein and Martin's research are very similar to those upon which Shipman's study is based, consequently it is open to the same problems highlighted in Shipman's work. Iorio, Weinstein and Martin's study highlights, however, further issues in connection with the use of criterion-referenced reasoning test.

Criterion referencing is a way of defining what is required prior to testing candidates and then judging the performance of the candidates against those criteria. This way of defining what a particular test must involve aims to achieve the selection of those candidates who deserve to pass regardless of the performance of other candidates involved in the test. For example, the award of a swimming certificate can be viewed as a criterion-referenced testing. To be awarded a swimming certificate the criterion might be that one is able to swim a certain distance over a given time. Similarly the test involved in securing a driving licence can also be viewed as criterion-referenced since it defines certain actions that have to be competently executed, and in this case, too, passing does not depend on how many people passed earlier.

The difficulty presented by criterion referencing is that defining exactly what is required is very problematic. For example, if we take the criterion for a successful swim as the ability to float from point A to point B without any aid, then it is difficult to distinguish what constitutes an excellent swim from an average one. Trying to define such detail is by no means easy. In view of the difficulties associated with criterion referencing it is not clear how Iorio, Weinstein and Martin graded the test results in their study. In fact they made no mention of such problems but instead proceeded to the application of statistical methods to their data. Failure to consider problems of such importance can only misrepresent the conclusions of the study. Before further comments are made about the conclusions of the study, it is important to comment on the selection and training process of the teachers involved in it. As already mentioned, teachers were selected on the recommendations of their principals as teachers who have a commitment not only to philosophical discussion but also to general scholarship and self-improvement. These qualities, however, must not be viewed as being only relevant to the Philosophy for Children programme; they are in fact useful in any provision of quality education. In other words, teachers selected on that basis in any educational enterprise are likely to aid pupils' learning. The in-service training provided throughout the study is also an important element in producing motivational effects among those teachers receiving such training, and



this also must not be viewed as specific to the programme. In view of these observations it is possible that the perceived results of the study may not necessarily be due to the effectiveness of the programme. To return to the conclusions of the study, references to critical thinking were made but it is not clear whether the researchers view reasoning as identical to critical thinking. No direct answer was given to the main objective of the study, which was to compare the gains in reasoning among pupils. Instead, the conclusions noted by the researchers were expressed in terms of critical thinking, but as already indicated this was not previously mentioned in the study. Therefore making such claims can only lead to confusion about the effectiveness of the programme.

### 5.5. Notes on Philosophy for Children

The two empirical studies discussed in section 5.4 above highlight an important point about the Philosophy for Children programme. The good educational practice required by the programme is not unique to it. In education the effects of having highly skilled teachers who are interested and dedicated to the promotion of learning among their pupils, which is conducted through discussion in highly favourable conditions, is more than likely to produce positive results regardless of the teaching programme employed. Consequently to claim that the programme is effective in raising the reasoning skills of pupils due to the good educational practice demanded by it is to overlook the positive effects of good practice outside the confines of the programme. More importantly, these studies do not demonstrate conclusively that excluding all other factors the Philosophy for Children programme improves pupils' reasoning abilities.

The Philosophy for Children programme draws heavily on reading and discussion of text, but it does not clearly highlight the importance of the development of the basic prerequisite skills that pupils need in order to engage fully in the activities offered by the programme. If the latter assumes that pupils already possess the basic prerequisite skills in reading, listening, speaking sensibly etc, then it is not clear how the programme can be successfully applied

across all age and ability ranges. It is precisely these prerequisite skills that Feuerstein's Instrumental Enrichment programme, for instance, aims to develop, and these will be discussed later.

While the very essence of Lipman's programme is the reading of specific texts, the use of such specified texts is restricted in DeBono's CoRT programme to which we now turn.

## CHAPTER 6

### CoRT THINKING PROGRAMME

#### 6.1. Grounds for the CoRT programme

The CoRT programme was developed by Edward DeBono to address the presumed inadequacies in teaching thinking within the British educational system.

The large number of books written by Edward DeBono on the topic of teaching thinking confirms his commitment to teaching thinking as a subject in its own right. Throughout DeBono's work are various arguments objecting to the traditional academic approach to knowledge. DeBono claims that, as a result of the insistence on debating skills over imaginative skills, the traditional semantic approach to thinking has corrupted our productive thinking ability. According to DeBono, the semantic approach came about as a result of the preoccupation of the medieval ecclesiastical authorities with the meanings of words and concepts. In his book *Teaching Thinking* DeBono expressed this as follows:

Our academic institutions, probably because they were established by the ecclesiastical authorities have much too great a respect for semantic thinking. There is also a more practical reason for this reverence. A person who directs his thinking at words rather than at what they describe always feels in control

of the situation. There is no further data that he would like to have, his data can never be shown to be wrong or insufficient. So an academic sitting in an academic tower never need descend to examine the vagueness of the real world where complete data are impossible. Instead he examines the semantic consistency of the argument, the words themselves rather than the thoughts which the words so imperfectly convey. This leads to logic-chopping, nit-picking and all the metaphysical gymnastics that result. It is easy and it is done (p38).

Consistent with this treatise is the fact that his learning materials consist mainly of diagrams and pictures with brief comments where necessary.

According to DeBono, our productive thinking ability is based on the way that the brain and its various thought processes operate. DeBono's description of the unique way in which the brain works with working models and not by words forms the bedrock for the justification of his curriculum proposal as presented in his CoRT programme.

DeBono justifies the need for his programme by arguing that the teaching of thinking is the teaching of perception (i.e methods of discovery). According to DeBono, a great deal can be accomplished in most ordinary thinking by 'directing attention' (i.e perception) before going into the processing stage of thinking which then involves logic. For DeBono the teaching of logic has been erroneously taken for granted as the main approach to teaching thinking as a result of the classics tradition and in particular, the way St.Thomas Aquinas 'repackaged' Aristotle, which then filtered through

to the educational system then under the control of the church.

So for DeBono, the ineffectiveness of the traditional subject matter of logic in particular and other content subjects in general in teaching thinking forms an important part of his rationale for recommending the CoRT programme as the best way of doing this.

Another important reason for rejecting content subjects as vehicles for the development of thinking is that thinking through subjects is incapable of encouraging the transferability of thinking across different problem situations. DeBono concluded in *Teaching Thinking* that:

Learning the rules of thinking does not develop a practical skill in thinking. Using thinking in particular situations develops thinking skills in those situations, but not a transferable skill in thinking. Skill has to be person-centred, not situation-centred. The dilemma is that it is usually possible to teach only situation-centred skills. You train a person to behave in a certain way in a certain situation. The way out of the dilemma is to create situations that are *themselves* transferable. We call such situations *tools*. A person is trained in the tool situation. He learns how to cope with the tool. The tool and his skill in using it can now be transferred to new situations. It does not in the least matter whether the tool is strictly necessary or not. An unnecessary tool can still act as a transfer device (p.108).

Consequently, the CoRT programme is an attempt to rectify the inadequacies in the traditional methods of getting students to think. CoRT stands for Cognitive Research Trust. Its

programme consists of a number of strategies for generating ideas that DeBono calls 'attention-directing tools'

## **6.2. The CoRT method**

The CoRT programme is made up of six sections, each of which consists of ten lessons. A section is designed to cover one term's work. In other words, the programme is designed to be completed in one academic year. Each of the sections covers one general aspect of thinking as follows:

- 1) Breadth
- 2) Organisation
- 3) Interaction
- 4) Creativity
- 5) Information and Feeling
- 6) Action

Within this general structure of headings, each lesson covers one process, which is crystallized into a definite tool for attention directing. Each section is accompanied by a distinct handbook for the teacher and notes on each lesson for each pupil. According to DeBono, the CoRT lessons are used to teach children as young as five and as old as IBM

executives.

DeBono's 'attention directing tools' are the vehicles by which a student is taught to see a problem before attempting to give an answer or solution. These tools then form the basis for the development of general thinking skills. The first CoRT tool is called PMI which stands for Plus - the good things about an idea, why you like it.

Minus - the bad things about an idea, why you don't like it.

Interesting - what you find interesting about an idea.

The tool is used in such a way that instead of deciding you like or dislike an idea or something, you do a PMI.

To acquire this tool students are first given an artificial problem by the teacher, for example, "What do you think of the suggestion that everyone should wear a badge showing his or her mood?". Three minutes are allowed for the whole PMI exercise. One minute is spent considering the plus factors, one minute is spent considering the minus factors and the final minute is spent considering the interesting factors. The point of the exercise is to understand and practice PMI as a thinking procedure so that it becomes sufficiently crystallised in the mind for transfer to other problem-solving or thinking situations.

Other similar thinking tools suggested by DeBono include:



CAF (consider all factors). This tool is useful when you have to choose or make a decision since there are always many factors to consider. Unless one is careful, some factors will easily escape notice and decisions that seemed right at the time eventually turn out to be wrong. This tool simply notes all possible factors to be considered in decision-making. For example, do a CAF on buying a computer.

C&S (consequences and sequel). This tool is useful in thinking about the consequences of a possible action. For example, what might happen if ...schools are closed for a year.

AGO (aims, goals, objectives). We often do things as a reaction to a situation or out of habit, because everyone else is doing it. This tool helps us to be aware that human actions often have a purpose, that the human world is not entirely random. For example, do an AGO for a library.

FIP (first important priorities). This tool helps to decide which ideas are the most important once they have been generated. For example what do you want from your next holiday?

APC (alternatives, possibilities, choices). There are often more alternative possibilities in deciding what to do than one first thinks and in many cases the most obvious choice is not the best one. This tool then helps us to consider alternatives. For example, what alternatives do you have if your best friend is a racist?

OPV (other point of view). Everyone thinks differently and therefore looks at the same situation from their personal points of view. What this tool does is help us to consider other viewpoints.

Throughout the programme, the material is tightly structured with detailed teaching notes which teachers are instructed to follow. Each pupil is given a leaflet with the outline of the process that forms the basis of that particular lesson. The process itself is mainly geared towards something to do or something to look at, since they are all attention-directors of one kind or the other. It is suggested in the teacher's handbook that during the lessons the visual symbols should be used as often as possible in order to emphasise the nature of the process at each stage.

All of the CoRT thinking tools mentioned earlier form the foundation for the entire structure of DeBono's programme based on a formula that is designed to emphasis the process of thinking. The successful student of this method, according to DeBono, should be able to use these crystallised skills on nearly all practical problems.

### 6.3. Theoretical difficulties with CoRT

The basic idea behind the CoRT exercises is to get away from content by creating artificial scenarios so that the operations can become transferable tools.

Although the programme appears to have a practical appeal, one of its major problems is that it seems to lack a coherent theoretical framework. This problem is serious especially when DeBono is arguing so strongly for the programme to be included as a subject. This should lead one to expect a very clear idea of what constitutes thinking to emerge in his work. To this end, DeBono attempts to produce a theoretical framework to underpin his CoRT programme. However, the results of his efforts in his numerous books on teaching thinking are pervaded by a variety of vague definitions of thinking. In his book, the *Mechanism of Mind* DeBono wrote:

The brain is a system in which things happen according to the system. What happens in the brain is information. And the way it happens is thinking (p17-18).

What DeBono seems to suggest is that thinking is essentially to do with the way information is processed. This notion of thinking is again highlighted further on in the book where another definition is given as follows:

Attention flow is a very important part of information-processing, and probably the basis of learning. Attention flow is also thinking (p155).

If thinking is equivalent to attention flow and the flow of attention is a very important part of information processing, then for DeBono thinking is all to do with information processing. Explaining what thinking is in terms of information processing simply reduces thinking to the inputting and outputting of information. The essence of this view of thinking can be located in the doctrine of the nature of mind sometimes called functionalism.

The central idea of this doctrine is that mental states are individuated by their causal roles, in other words mental states can be defined in terms of their typical patterns of cause and effect. One of the implications of this doctrine is that any system, regardless of what it is made of, can have mental states if only it exhibits the right causal relationship between its inputs, its internal functioning and its outputs. Functionalism basically treats the mind as a sort of container in which a variety of causal relationships occur, and in doing so it fails to account for some of the qualitative aspects of mental states. For example, having a pain involves certain qualitative experience that cannot be captured by merely describing the pain in terms of its causal relationships. The issues facing functionalism are part of an ongoing debate on the nature of mind mentioned in Chapter 1. Searle(1994) outlined some of the persisting

misconceptions in a detailed discussion of the nature of mind. The arguments presented by Searle however will not be pursued in this dissertation since it is specifically concerned with the teaching of direct thinking as offered by DeBono.

If DeBono is indeed presenting his view of thinking in terms of functionalism then the problems associated with such a theory of mind stand to undermine his position. But the fact is that DeBono does not provide any substantial argument in support of his conception of thinking, and instead continued to put forward various definitions of thinking in his later writings. In his book *Teaching Thinking* DeBono wrote:

A microscope is a device to enlarge our vision. Thinking is a device to enlarge our perception (p20).

It is not at all clear in which way DeBono is seeking to compare thinking with a microscope. If he is viewing thinking merely as a physical tool then he needs to indicate precisely how thinking can be viewed as such. On the other hand if he is referring to the similarities between thinking and physical devices, particularly in how they operate, then it is important that he shows how the product of thinking and that of physical devices can be compared. DeBono provided no detailed discussion of his position but declared instead that:

In this book thinking will be regarded as a sort of internal vision which we direct at experience in order to explore, understand and enlarge it (p32).

By regarding thinking as an "internal vision" as well as a "device" DeBono adds confusion to an already difficult situation of getting a clearer idea of what his main view of thinking really is. Having some sort of vision can be considered as having a sort of image or picture, but this is different from having a visual device, which is essentially an entity. Whereas a visual device is an entity, vision on the other hand cannot be so described. For example, a visual device such as a microscope is an entity, but visualising the colour blue is not an entity. DeBono yet again provides no argument in support of his position but instead further confusion ensues after another definition is issued as follows:

The definition which will be used here is this: 'Thinking is the deliberate exploration of experience for a purpose' (p32).

But how are we to view 'thinking' in DeBono's latest definition of thinking? Are we to take it as meaning a 'device' or an 'internal vision'? In spite of the fact that some of DeBono's claims can be located within the functionalist view of the mind, the lack of clarity in his writing highlights the incoherence in his theoretical

position, and for this reason DeBono's position differs significantly from the positions of both Lipman and Feuerstein.

Although there are problems with Lipman's ideas, discussed in Chapter 5, his theoretical position is based on the nature of philosophical thinking for which he presented supporting arguments. In a similar way Feuerstein's programme is based on a distinct and coherent psychological theory, which will be discussed later in Chapter 7. The vagueness in DeBono's definitions and theoretical position is in a way not surprising since DeBono appears to want to distance himself from the use of logic.

As a result of his abandonment of logic for symbols and diagrams, DeBono is left with the extremely difficult situation of providing a consistent theoretical framework for his programme. The inadequacies of his definitions as presented in his framework make it very difficult to ascertain whether his programme delivers the skills of thinking directly when it is not clear what he means by thinking. DeBono even undermined his own definitions by attempting to avoid the whole issue when he wrote in *Teaching Thinking* that:

It is best not to have any misconceptions and to let the intangible subject of thinking gel into something definite and usable in the course of this book  
(p17).

It is not surprising, therefore, that DeBono attempts to

trivialise the difficulties surrounding the notion of thinking, since these difficulties are hard to get to grips with and have plagued philosophers such as Dewey and Ryle.

DeBono's difficulties in providing a tangible definition of thinking have some impact on how we are to view the effectiveness of the activities that his programme offers. To this issue we now turn.



#### 6.4. Issues concerning the effectiveness of CoRT

In spite of the unresolved theoretical difficulties, DeBono believes as a result of over 25 years of teaching the method in both education and the business world that his CoRT method is the most productive method in teaching thinking.

According to DeBono, all CoRT tools are designed to heighten the process of thinking rather than the content of thinking. Therefore, the successful student of the programme should be able to use the tools on all practical and theoretical matters. However, in order to do this, the use of the tools must be taught in isolation from any content. DeBono believes that the use of specific subject matter generally associated with the familiar teaching of traditional subjects such as mathematics, physics, chemistry, history, literature etc actually hinders the development of thinking. DeBono put it as follows in *Teaching Thinking*:

If a person is thinking about something then surely he is learning how to think.' Unfortunately this is not true. A geography teacher would claim that in learning geography a pupil would be forced to think. A history teacher and a science teacher would make the same claim. All would be right. The question is whether thinking about something develops any transferable skill in thinking. In 'content' subjects, the momentum of the subject is usually such that little attention can be paid to the actual process. Exhortations to 'think about it' or to consider 'what these things imply' merely ask the pupil to delve more deeply into his knowledge and find the right answer. In a content subject you cannot really think ahead of the content, because your speculation must always

be inferior to the actual facts. There is comparatively little scope for thinking except for the hindsight variety: 'Now you can see that this happened because of that and that...' When teachers appear to lead the thinking of their pupils towards a new insight the pupils' responses are usually so tightly shaped that it is more a matter of guessing what the teacher wants said next than of thinking the matter through. This is no fault of the teacher. It is the nature of content subjects that is at fault. Content is much more interesting than the thinking process. A pupil knows that with a little knowledge and a lot of thinking he will not do as well as the pupil who has a lot of knowledge and only a little thinking (p.104).

It is difficult to ascertain what DeBono means here by 'There is comparatively little scope for thinking'. In spite of this, it is clear that in promoting the CoRT programme as the best method for the direct teaching of thinking, DeBono regards traditional 'content subjects' as not necessary in developing the ability to think. However the discussions in Chapters 1 and 2 show that to disregard the importance of context in thinking (as a direct result of the object-relatedness of thinking) is to deny the necessity of intentional objects in thinking. This seems to be involved in DeBono's rejection of 'thinking about something' in the passage quoted. The main content in DeBono's CoRT programme is based on imaginary scenarios so that the operations become transferable tools. As far as can be judged, we are to understand the thinking involved in the engagement of such imaginary scenarios as not requiring intentional objects.

Although the role of group work and discussions is

recognised in this programme, nonetheless the teaching approach seems to be more consistent with rote learning of prescribed techniques than the exploration of ideas, with the teacher acting more as an instructor than a sensitive facilitator (Blagg,1991). It is interesting to note that this is one of the aspects of the traditional content subjects that ironically DeBono criticised. The rigid way in which the lessons are presented creates virtually no space within the CoRT programme for pupils to learn to take on responsibility for their own learning and problem solving.

The pace at which the CoRT lessons should progress is of great importance, and to this end teachers are instructed by DeBono(1976) in the handbook for teachers to keep up a very brisk pace of presentation and questioning as follows:

It is extremely important that the lessons be run at a brisk, crisp pace. The lessons are not general discussion sessions. They are designed to practise specific thinking skills. There is no need to say all there is to say about a subject or to follow every interesting idea that emerges. Attention should be kept firmly focused on the thinking skill that is being practised and not allowed to drift to the 'interest' of the discussion content (p.12B).

While the reason for the time limitation may be understandable, there is a concern that only the quickest thinking students can adequately contribute in the CoRT lessons. Furthermore, how does the programme based on such rigid pace account for students whose personalities are such that their thinking is slow but of a high quality?

Consideration for students of such personalities is largely nonexistent since the CoRT programme is solely concerned with the quantity and not the quality of ideas. DeBono(1976) explains that it is generative thinking that he wishes to encourage because:

Generative thinking is concerned with bringing things about and solving problems. Generative thinking is practical, creative and constructive. Generative thinking has to deal with the world and take action even if knowledge is incomplete (p.16).

This then forms the reasoning behind DeBono's insistence on the brisk pace at which the lessons should proceed. However there is a danger in that seeking merely to generate large volumes of possible solutions in the end might only help to foster a negative kind of attitude in the students with regards to taking due care and attention in tackling the problems that they encounter inside or outside the imaginary format as presented in the CoRT lessons. Although claims by DeBono suggest a much wider scope of effectiveness, the evidence suggests that the programme is designed to be effective only within narrow margins of generative thinking. Until the first independent evaluation was carried out by Hunter-Grudin(1985) much of the evaluation of the effectiveness of the CoRT programme was carried out by DeBono himself. To claim that the CoRT programme is the most effective method for teaching thinking naturally demanded

some form of evidence to that effect, and the difficulty in producing such evidence from his series of lessons (given the flaws in the theoretical underpinnings of the programme) culminated in DeBono's attack on those demanding such proof as follows:

The type of person who makes this request is basically doubtful or suspicious of the idea of teaching thinking as a skill. The request for proof and evaluation would seem to be a very normal one, except that any proof that is offered is always deemed to be insufficient.

'What is the evaluation which shows that children can be taught to think more than they are at the moment?'

'We would like to think that we are teaching them to think, but instead of doing this we may be handing them a pre-package.'

Hard data are judged to be irrelevant or the result of teaching to the test. Soft data in the form of teachers' comments are judged to be biased or subjective. These objections are valid. But a request to show that teaching thinking has changed the life of a pupil over the succeeding twenty years is a form of evaluation that could not be applied to subjects such as literature, languages, geography, science or history (p.140).

What we have above, then, is an attempt by DeBono to minimise the impact of any negative outcome of the evaluations of his experiments.

DeBono provided examples of eight experiments in his book *Teaching Thinking*. These experiments were based on groups with and without CoRT training who were each tested on a problem typical of those in the CoRT programme. The result

then is, not surprisingly, that in all the cases in the experiment the group that completed the CoRT lessons produced a higher number of ideas in response to the problem.

The first experiment consisted of eight groups of children who were given the following problem to discuss:

*A schoolgirl wants to train to be a teacher. Her father has to live abroad for five years because of his work, and her mother is going with him. Should the girl go with them or stay with relatives or friends so that she can finish school and do the training?*

The discussions were tape-recorded and analysed without any indication of who was responsible. DeBono reported that the four groups who had not undergone the CoRT training considered significantly fewer number of aspects of the problem than the four groups who had benefited from the CoRT lessons, suggesting that the CoRT lessons had resulted in improved skills in generating ideas.

In spite of the impressiveness of the results, there still remain a number of questions to be answered. For instance, the fact that the groups were asked to solve the problem in a typical 'CoRT fashion' may have meant that the non-CoRT group were at a disadvantage. Furthermore, what evidence was there to indicate that the two groups were matched in terms of abilities, experience in group discussions and so on?

In all of the experiments virtually no information is given about the various groups involved and how they were selected. It is not clear whether the researcher was also involved in teaching the CoRT lessons. The CoRT method raises an important issue to do with truth seeking. In that the burden of academic study involves the idea of seeking the truth, it is difficult to see how DeBono's programme encourages the development of such an attitude. On the contrary, it appears to discredit such an attitude by degrading quality and depth of thinking for mere quantity of ideas generated however shallow they may be. The important lesson to be drawn from the experiments is that it is not at all conclusive to what extent the performance of the CoRT trained children in the experiments is a direct result of their engagement in the programme.

Considering the issues so far raised, it is not enough for us to take on trust what we are told by DeBono and those in favour of the CoRT programme simply because of its widespread use and the number of years that the programme has been running. If we are to accept DeBono's programme in our schools then we must be sure that there is sufficient evidence to do so. This brings us to the issue of transfer.

With regards to skill transfer, which presumably forms the greatest asset of the programme, it is doubtful that this does occur as claimed by DeBono. Hunter-Grundin's comprehensive independent evaluation of the programme suggested no substantial evidence of any transfer of learning

to other areas of the children's activities. DeBono disputes the results by pointing to the study carried out by Edwards(1991) in favour of the programme as showing "significant effects on a wide variety of standardised test". DeBono's website (2002)([www.edwDeBono.com](http://www.edwDeBono.com)) presents a large collection of unpublished material in support of the programme. Let us now turn to Hunter-Grundin's study.

#### **6.4.1. Hunter-Grundin's evaluation of CoRT**

Hunter-Grundin's (1985) evaluation of DeBono's CoRT programme is based on a large and independent study of the effectiveness of CoRT materials. The study was carried out in Cambridgeshire, England and it involved ten schools over a period of two years. The assessment instruments used in the evaluation involved six different sets of tests as follows; Reading comprehension(Reading for Meaning), Mental arithmetic(Problem Solving), Logical reasoning(Reasoning Ability), Creativity, CoRT essays I&2, Recorded group discussions. The tests were administered at the beginning and end of each of the two academic years over which the study took place. Instruments such as Reading comprehension, Mental arithmetic and Logical reasoning involved multiple choice questions, while the rest of the instruments involved written responses for which the personal judgement of the marker is



required.

The major difficulty that the study faced was finding appropriate tests to evaluate the effectiveness of the programme. The use of the tests mentioned above raises issues about their validity and reliability in evaluating a thinking skills programme. The problem with using multiple choice questions was indicated in the discussion of Lipman's programme in Chapter 5. The banality of such formats assumes that there is only one right answer to a question for which pupils have the choice of answering rightly or wrongly. On the other hand, using an open-ended written format leads inevitably to the production of responses that require the assessment to be based on personal judgement. Glover (1989) highlighted some of the issues with the assessment of creativity in general. One reason for the unlikelihood of finding a method of assessment that is free from the problems mentioned above is the complex nature of thinking highlighted in the first part of the dissertation.

In spite of these shortcomings, some of which Hunter-Grundin appears to acknowledge, the study, as already indicated, still concluded that the teaching of the CoRT programme does not necessarily result in the transfer of skills of thinking as envisaged by DeBono. The importance of the study is not so much to do with the final conclusions that were reached, for the conclusions as discussed above were produced by methods that are by no means unproblematic in testing creativity. Instead, it exposes some of the major

educational problems with the CoRT programme. For example giving teachers substantial training is not considered extremely vital, teachers are left with no sense of the kind of theory underpinning the programme, both teachers and pupils are required to strictly follow the programme's guidelines and teaching method, thus promoting rote learning (Blagg,1991). Let us now turn to the study by Edwards which DeBono cited in defence of his programme against Hunter-Grundin's findings.

#### **6.4.2. Edwards on the CoRT method.**

According to Edwards (1991), his study is the third and most comprehensive in a series of studies undertaken to uncover the effects of DeBono's CoRT thinking skills programme. The study was carried out over a period of five weeks involving seven primary school classes from various schools in North Queensland, Australia. The treatment group consisted of four classes and each were taught the 10 lessons of the CoRT- 1 programme by their teachers who were exposed briefly to the programme (a total of about three hours) and thereafter were left to work on their own from the programme's Teacher's Notes. Both treatment and control classes underwent a battery of tests in a pre and post-test design. On the basis

of these tests Edwards concluded that there is evidence of "potential transfer" of CoRT skills to performance in academic disciplines.

Can we take Edwards's study as providing clear evidence of "potential transfer" of CoRT skills across academic disciplines? Prior to listing the various tests used in his study, Edwards highlighted the difficulty of testing for the effectiveness of thinking skills programmes. In order to overcome such drawbacks new instruments were designed specifically to test the programme in addition to well known ones such as the Myers-Briggs Type Indicator (The Myers-Briggs Type Indicator is a self-reporting inventory which classifies people into dichotomous categories along each of four dimensions: extraversion-introversion, sensation-intuition, thinking-feeling, and judgement-perception. See Stricker (1963) for a full description and evaluation of this test) and Torrance Tests (verbal form A) (The Torrance test is used in the assessment of creative endeavour based on three categories: Fluency (the ability to generate new ideas), Flexibility (the ability to represent a variety of categories), and Originality (the ability to generate unusual ideas. See Glover et al(1989)). The new instruments included Self-Concept as a Thinker(SCAT), Student Thinking Assessment(STA), Thinking Approaches Questionnaire(TAQ). An initial problem in presenting his research findings is that Edwards provided very little information on these new instruments and it is not clear whether they were designed

solely by Edwards or in collaboration with DeBono. More importantly it is difficult to ascertain what some of these instruments are testing. For example in the Thinking Approaches Questionnaire instrument students are asked to self-assess their thinking approaches in areas covered specifically by CoRT, but this is indeed confusing since one of the main aims of the programme is to get away from any content specific material. Edwards did not indicate how these tests were administered and the kind of scoring procedure that was applied. The fact that the responses to questions on the questionnaire are open-ended due to the nature of what is being tested (i.e divergent thinking) means that considerable subjectivity will occur in evaluating how creative or original the answers to test problems might be. As already highlighted in the discussion of Hunter-Grundin's study, the attempt to test for the effectiveness of thinking skills programme suggests that it is unlikely that unproblematic tests can be devised without any compromise. In concluding that the CoRT programme is effective in teaching and transferring thinking skills, Edwards overlooked some of the difficulties that are generally associated with the use of the Myers-Briggs and Torrance Tests in assessing divergent thinking. For example evaluations of both the Myers-Briggs test (Stricker, 1963) and Torrance Tests (Law, 1990) concluded that these psychological tests are not by any means totally effective in testing divergent thinking, as a result of the considerable subjectivity involved in such

thinking. What these issues suggest is that there are major problems with Edwards's research and for that reason DeBono's use of it to defend his CoRT programme can only provide an inaccurate impression of the effectiveness of his programme.

#### **6.5. Summarising DeBono's CoRT programme**

The level of effectiveness that DeBono claims for his CoRT programme raises questions concerning the evidence for such claims. As indicated in the earlier sections of this chapter, there are major problems with CoRT as presented by DeBono.

DeBono so far has not provided any coherent theoretical basis for this CoRT programme. Although some supporters might not view this lack of coherence as a major drawback for the successful implementation of the programme, the fact is that having a coherent theoretical basis is important in providing a deeper understanding of the programme and the appropriate ways for its application in education.

The polymorphous nature of thinking as discussed in Part One of the dissertation clearly underlines the problems raised in viewing thinking purely as a skill and trying to

teach it as demonstrated in the CoRT programme. For the same reason the studies carried out to test for the effectiveness of CoRT have been unable to provide valid and conclusive evidence in favour of the programme. What these studies such as Hunter-Grundin's have done is highlight the shortcomings of the programme in how it aims to achieve its goal.

## **CHAPTER 7**

### **INSTRUMENTAL ENRICHMENT**

#### **7.1. Feuerstein's Instrumental Enrichment (FIE)**

In contrast to both Lipman's and DeBono's programmes discussed in Chapters 5 and 6, Reuven Feuerstein's programme is more closely associated with psychological theory.

Feuerstein developed his programme out of his concern for the integration of young Jewish people in Israel. These young Jews held in transit in Morocco and southern France originated from many deprived cultures in Europe, Asia and Africa. The fact that these Jews were being received, settled and schooled for citizenship in a new Jewish nation with a unique and modern technological culture required that tests of some sort had to be used. Consequently, tests of various psychological kinds were administered as a basis for planning their formal education later in Israel.

Feuerstein's clinical observation and experience with the methods of measurements available for testing and classifying these young people indicated that a substantial wealth of capacities was often left out. Feuerstein's effort to address this problem led to a radical shift from the static method of a testing regime that only tested what these young people had already learnt to a more dynamic approach in

which the testing situation itself was transformed into a learning experience for them. This dynamic approach as demonstrated in the Learning Potential Assessment Device (1979) culminated in the development of the formal instructional programme known as Feuerstein's Instrumental Enrichment (FIE).

FIE is presented as a strategy for the redevelopment of cognitive structure in the retarded performer. At the core of this conception of a retarded cognitive performance, according to Feuerstein, is the phenomenon of cultural deprivation, defined as a "state of reduced cognitive modifiability of the individual in response to direct exposure to sources of stimulation". Feuerstein's notion of cultural deprivation is not directly determined by factors such as emotional disturbance, low socio-economic status, poverty or even by organic disorders, but instead, by the lack of a mediated learning experience. This lack may arise as a result of parents not providing it in the early years of the child's cognitive development. Feuerstein believes that his Instrumental Enrichment programme based on the theory of mediated learning experience is capable of reversing the conditions of retarded cognitive performance as experienced by the culturally deprived.

The programme is based on the fundamental idea that it is the learner rather than the material to be learned that should be modified. In his book *Instrumental Enrichment*, Feuerstein pointed out that:



The aim of the Feuerstein Instrumental Enrichment (FIE) program is to change the overall cognitive structure of the retarded performer by transforming his passive and dependent cognitive style into that characteristic of an autonomous and independent thinker. It is our view that both the low level of scholastic achievement and the low level of general cognitive adaptation of the retarded performer, especially among socioculturally disadvantaged adolescents, are a product of a lack of, or inefficient use, of those functions that are the prerequisites to adequate thinking (p.1).

Feuerstein's belief that the human intellect is highly adaptable and modifiable at all ages and stages of development underpinned his entire approach to the development of the programme, which emerged from his theory of the relationship of early mediated learning experience and later cognitive competence.

## 7.2. The theoretical foundation of FIE

Feuerstein's work on changing cognitive abilities by his Instrumental Enrichment programme was developed in the 1960s and Jean Piaget, with whom he had studied, was a major inspiration. Piaget's work on intelligence demonstrated that the essence of intellectual capacity lies not in its measured product as presented in IQ tests but in its active construction by the individual. Piaget's work helped to undermine the dominant view that intellectual capacity is fixed at birth, and in so doing shifted attention from the static concept of IQ towards a more dynamic process-oriented approach to understanding cognition. It is upon this dynamic process that Feuerstein's work is based.

Mediated learning experience (MLE) provides the theoretical basis for Feuerstein's programme. MLE refers to the way in which stimuli emitted by the outside world are transformed by a mediator. A mediator is any knowledgeable adult who shapes the way the child perceives the world. Mediators are usually made up of parents and significant others in the life of the child such as grandparents, siblings, teachers, caregivers etc. Feuerstein argues that mediators are not simply sources of stimulation for the child but, more importantly, control the stimuli a child receives and in so doing help to structure the child's universe in the image of their own. Through this process of mediation the cognitive structure of the child is generally affected. In a

mediated learning experience the mediator intervenes between the child and the environment and in so doing transforms and organises the stimuli in the direction of some specifically intended goal or purpose.

The place of mediators in the cognitive development of the child highlights the importance of culture in mediation. In other words cultural identity is transmitted to the child through the mediator. Indeed the theory views the absence of such cultural identity as a condition that is produced by a lack of MLE. For Feuerstein MLE can be considered as the main factor that determines the varying courses of cognitive development in otherwise similarly endowed individuals, even when they are subjected to similar conditions of stimulation. Feuerstein's ideas are groundbreaking, and it is in the conception of MLE that he differs from Piaget. Whereas Piaget's (1966) model of cognitive development emphasised the stimulus-organism-response formula, Feuerstein maintains that cognitive development in the human race is critically affected by human mediation, thus changing Piaget's formula from stimulus-organism-response to stimulus-human-organism-response.

Feuerstein presents MLE in terms of input, elaboration and output of data, which invokes a particular kind of model of the mind. If we view Feuerstein's theory of MLE as an information-processing model based on the input of information by the mediating adult and the subsequent desired output by the child, then what we are led to is the view that

the mind is a computer programme and the brain a digital computer, which can be repaired when faults occur. The problem with viewing the mind on a computer model is that it raises larger and central questions (Searle, 1992) in the field of philosophy of mind, as already indicated in the first part of the dissertation. It is not the intention to discuss these problems in detail but merely to highlight a possible source of problems for Feuerstein's theory of MLE.

Feuerstein views MLE as an essential determinant of cognitive modifiability that enables individuals to make efficient use of their experience. In other words it produces in the individual the tendency to develop strategies of how to learn by equipping him or her with the necessary cognitive tools. According to Feuerstein the ill effects of the lack of MLE, which may be conceptualised as the deprivation of the individual of the prerequisites of higher mental processes do not have the permanent, stable, and irreversible characteristics usually attributed to the neurophysiological organisation of the individual. Feuerstein offers his enrichment programme as a method of reversing the lack of MLE. Thus the assumption is that FIE is an enduring form of MLE by which the instruments provide the opportunities for the cognitive improvement of the retarded performer. However, further clarification is required on how the individual instruments in FIE contribute to the general improvement of cognition, and more importantly why these individual instruments were chosen.

Feuerstein's instruments are derived from his Learning Potential Assessment Device (LPAD), which attempts to produce fairer interpretations of intelligence test results by rejecting what Blagg(1991) referred to as "culture free" intelligence tests. For Feuerstein it is the child's peaks of performance and the conditions of their appearance that provide the key objects for the child's cognitive examination. Consequently the use of traditional measures as in formal test circumstances is seen as restricting the mediator's flexibility to assist the child to perform at the highest possible level. Feuerstein's method (as presented in the instruments) sacrifices quantitative measures of learning potential for deeper and better qualitative data, but this presents a serious problem in terms of the objectivity of its method of assessment, since it depends not only on the mediator's intimate understanding and interpretation of the child's responses but also on the mediator's ability to mediate effectively. Furthermore the tasks contained in the instruments are very similar in their content and presentation to formal intelligence and aptitude tests and as such it is not clear how effective these instruments are.

According to Feuerstein the construction of the individual instruments of the programme is based on a cognitive map that aids in the categorisation and definition of the components of mental acts. The cognitive map is meant to be a model that covers seven dimensions<sup>1</sup> by which a mental

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<sup>1</sup> The seven dimensions are made up of the following Content, Mode, Operation, Phase,

act can be analysed. The issue this raises is that what constitutes normal cognitive behaviour is not commonly agreed upon and so it is not clear on what basis Feuerstein chose these seven dimensions as fundamental to the analysis of the cognitive behaviour of the retarded performer. A possible consequence of this is that the instruments offer no more than mere psychological tests with little prospect of transfer across subject domains. For example, how does the first instrument known as *Organisation of Dots*, which involves the drawing of geometrical shapes such as squares and triangles from a collection of dots (to be discussed fully in the next section), contribute to the improvement of cognition? For Feuerstein this instrument introduces a structure according to a given standard and the opportunity for the projection of virtual relations, which is a fundamental component of cognition. However Feuerstein makes no strong claims about the uniqueness of this instrument except that it is one of many tools for the improvement of cognition. This suggests that tests of similar nature can be employed.

The *Organisation of Dots* is mathematical in spirit, and so if it can provide such a vital component of cognition we can assume that replacing the *Organisation of Dots* with other appropriate mathematical tests such as finding solutions to arithmetic or algebraic problems will leave the outcome expected by Feuerstein unchanged. If this is possible, then

what remains to be answered is why does Feuerstein use *Organisation of Dots*? A possible clue (Feuerstein, 1980) is that this instrument is derived from a test designed and used by Andre Rey, one of Feuerstein's influential teachers, as a selective device for trainees seeking technical vocations and professionals requiring spatial skills. Clearly there are some theoretical concerns about FIE, but in spite of these issues the social aspect of learning that is built into MLE provides a powerful idea.

In highlighting the importance of the social context of learning, Feuerstein's theory of MLE is similar to the ideas proposed by Lev Vygotsky on the cognitive development of the child. A central theme in Vygotsky's (1978) writing is that a child's development cannot be understood independently of the external social world which the child inhabits. Vygotsky argued that human learning presupposes a specific social nature and a process of participation by which children develop into the intellectual life of those close to them. In other words, through participation in activities with others children come to acquire cognitive, social and communicative skills that help them to function in socially acceptable ways within their culture.

The importance of culture and social interaction in the intellectual development of the child underpins the highly influential Vygotskian concept called the *zone of proximal development*. This "zone" is essentially the distance between the child's independent capacity and the capacity to perform

in collaboration with or under the guidance of an experienced person. The role of culture and social interaction clearly highlights the striking similarities between Vygotsky's *zone of proximal development* and Feuerstein's MLE regardless of the interesting fact that both psychologists were writing from what can be assumed to be very different political perspectives. Vygotsky wrote mainly from a socialist perspective. Feuerstein's writing on the other hand emanates from a democratic perspective. Although both theories are directed towards the understanding of the cognitive development of the child there is an important difference in the immediate aims of the two psychologists. Vygotsky's theory concerns the general relation between learning and development and the specific features of this relationship when children reach school age, while Feuerstein's on the other hand is directed specifically towards the cognitive rehabilitation of the mentally retarded.

The attractiveness of Feuerstein's idea, which involves the interaction between mediator and child, rests on the notion that concepts and solutions do not emerge from a vacuum but are based on values and belief systems. For Feuerstein, such values and belief systems are fundamental to effective thinking, and underpinning his programme is the belief that all human beings of any age, however badly disabled, from whatever cause, can become truly effective thinkers. Feuerstein's programme promises to provide a remedy for specific cognitive deficiencies, and to promote maximum



transfer of skills gained to wider areas of opportunity as presented both formally and informally to the retarded performer. But how does the programme attempt to deliver such promise?

### 7.3. How FIE works

In order to liberate the potential of the retarded performer by the enhancement of their prerequisites of thinking, Feuerstein suggests the use of the special activities or instruments contained in his programme as a source of the much needed intellectual nourishment.

The various components of the programme are called "instruments" as it is addressed not to any specific skill or content area but to the "process of learning itself". In other words, the contents around which each instrument is built serve only as a vehicle for the development of thinking. In *Instrumental Enrichment*, Feuerstein wrote:

The content of an instrument is only a vehicle and is considered as secondary to the main goal, which is the acquisition of prerequisites of thinking (p.119).

What Feuerstein seeks to achieve is to facilitate the acquisition of certain basic habits such as planning, systematic analysis, keenness, attentiveness etc through his very rich and ingenious materials. For Feuerstein, the acquisition of these basic habits is a process of learning characterised by three phases of mental acts as follows:

1) Gathering information(Input) phase builds up the capacity to gather and organise information.

2) Processing information(Elaboration) phase is the period when things are thought through.

3) Expressing information as solutions(Output) phase involves the way in which thinking is communicated.

By paying attention to these learning characteristics, Feuerstein believes that the low attainment of retarded performers caused primarily by the lack of mediation can be corrected.

The Instruments of the programme are made up of 15 components introduced and managed by teachers as a series of paper-and-pencil exercises involving materials for one-hour lessons, between 3-5 times a week, for 2-3 years. In the programme, each exercise is followed by discussions to prompt insight and applications to other areas of learning. These instruments are not set materials but instead are systematic

guides to imaginative teaching. Each instrument focuses on a specific cognitive deficiency and provides a learning experience to rectify it, hence each instrument is selected to fit identified deficiencies. The instruments include the following:

- Organisation of Dots
- Orientation in space I
- Orientation in space II
- Orientation in space III
- Comparison
- Analytic Perception
- Categorization
- Family Relations
- Temporal Relations
- Numerical Progression
- Instructions
- Syllogisms
- Transitive Relations
- Representational Stencil Design
- Illustrations

These instruments form the foundation upon which the various exercises in the programme are based.

In the *Organisation of Dots* exercise, for example, the pupil is presented with what seems like random arrays of dots (representing various geometrical shapes). The task is to find and trace out these shapes. The aim of this exercise is to help train pupils to plan and search systematically, to

formulate their own hypotheses, to perceive clearly and create their own order and information.

The *Orientation in space* instruments are designed to help pupils identify relationships between objects. For example, in one task the pupil is asked to either stick or draw a picture of a boy in the middle of a garden scene, then decide which of the objects in the picture, for example flowers, tree, bench, house, is right, left, in front of or behind the boy.

Similarly the instrument called *Comparison* gives pupils the opportunity to compare and contrast objects. The exercises involve the comparison of two items, starting with size, form, number, spatial and temporal concepts and concluding with abstract concepts such as function, composition etc.

Feuerstein's programme is based on a limited range of tasks free from the traditional school curriculum content. According to Feuerstein this is necessary in order to allow the child to focus attention on the process of thinking and not to be distracted by the "clutter" created by content.

#### 7.4. Comments on the effectiveness of FIE

In developing his programme as discussed in section 7.3 Feuerstein attempts to produce context-free tasks in order to help the child from being distracted by the contexts of curriculum subjects. In view of this position it is difficult to establish how Feuerstein accounts for the object-relatedness of thinking as already discussed in Chapters 1 and 2.

There is clearly no dispute that the programme was developed specifically for people with special educational needs as a result of their learning difficulties. However, given this initial reason for the development of the programme, a number of questions remain to be answered.

(1) Is the programme successful in achieving what it considers to be its main goal, i.e providing a remedy for the deficiencies of the mentally retarded performer?

(2) Is it appropriate to extend such a programme to the wider population of normal school children?

In order to comment on (1) and (2), it would be helpful to look at the results of some of the studies carried out to test the effectiveness of the programme.

The initial result of the evaluation of the programme conducted by Feuerstein involving a population of socially disadvantaged and culturally deprived low achieving

adolescents unsurprisingly confirmed the benefits of the programme for the group. Since then, there have been a number of studies into the effects of the programme on participants. In Britain, encouraging claims with regard to the benefits of the programme have been made by a number of studies on the effect of the programme. However, as we shall observe from some of these studies, there is still relatively little convincing evidence to substantiate the claims for the programme particularly in terms of (2) above. We now turn to two of these studies.

#### **7.4.1. "Making up our Minds"**

'Making up our minds' was what Weller and Craft(1980) called their exploratory study on the effectiveness of FIE in UK schools. The study was one of the largest of its kind in Britain to evaluate the effects of the programme. It involved five local education authorities (LEA), from which a total of eighteen institutions participated with about 36 teachers and over 250 pupils (some pupils had some form of learning difficulties) between the ages of 11-15 years. The schools ranged from special units to large comprehensive schools. Most of the pupils studied the materials from the programme for 2-3 hours a week over a period of two years. The teachers involved in the study were trained by a series of two five-

day residential courses. Weller and Craft reported initial scepticism among the teachers in that "some of the teachers were highly dubious" about the study. However, they later claimed that the situation improved during the course of the study.

The diversity of the participating institutions highlights the assumption that FIE can be applied to any group of pupils. However, in view of the fact that the programme was designed specifically to aid children with cognitive problems it is not clear how FIE can be of value to pupils within the various institutions with normal to excellent cognitive development. The difficulty in providing unequivocal evidence in support of the effectiveness of the programme and its value to all pupils presents a serious problem in extending the programme beyond its original purpose.

The main source of data for the evaluation of the programme was comments made by pupils and teachers and classroom observations by a group of independent evaluators. Weller and Craft admitted that the use of quantitative data was considered useful but little valuable test data emerged from the study. This is not surprising because, as anticipated in Chapter 1, monitoring changes in terms of the effectiveness of thinking is very likely to result in intractable problems due to its polymorphous nature. Weller and Craft were explicit in conceding the fact that there are no acceptable methods for assessing the acquisition of

cognitive skills and their transfer across various subject domains. The fact that the study depended heavily on the use of 'soft data', i.e. comments and anecdotes, clearly confirms the difficult problem inherent in the measurement of the desired cognitive skills. The question that this difficulty raises is whether these skills, and in particular, their transferability can be effectively measured by formal tests. As already indicated in the previous sections of the current Chapter, the programme was derived from Feuerstein's Learning Potential Assessment Device (LPAD), which attempts to measure intelligence in a dynamic way. In other words it tries to say something about the cognitive potential of the retarded performer and as such it is difficult to quantify observations and changes that take place. The fact that LPAD was developed as a result of the inadequacy of rigid formal tests in assessing intelligence brings it directly in opposition to such tests. Consequently their use in ascertaining the effectiveness of FIE is unlikely to yield sensible or accurate results.

Although nearly all the teachers involved were sure that the programme greatly enhanced their own professional development (this may well be due to the insights offered by the programme into teaching and learning perspectives), they were not entirely convinced about the value of the programme for pupils. Many of the teachers suggested that class sizes of at most ten pupils are needed for effective mediation. This suggestion highlights one of the most important aspects



of the programme: its original purpose in dealing with retarded performers on a more or less one-to-one basis. The study concluded that there was little hard evidence on the effect of FIE on pupils' cognitive development and school achievement. In fact, nearly half of all the pupils in the study responded in the negative or were unsure when asked if the programme they had undergone was useful in their other lessons. Although the study was inconclusive, claims were nevertheless made about the hope of a promising tool that Instrumental Enrichment has to offer teachers. We now turn to another large-scale study to establish the effectiveness of the programme.

#### **7.4.2. "Can we teach intelligence?"**

This large scale evaluation study carried out over a period of two years was reported by Blagg(1991). The motivation for it came from the exploratory study reported by Weller and Craft discussed in section 7.4.1 above and it promises to provide a more rigorous evaluation of FIE. The study was a British government-based initiative designed to explore the possibilities of improving the educational opportunities for 14-16 year-old low-attaining pupils (in relation to the public examinations) in mainstream education, thus extending FIE beyond its original use.

The success of the study clearly depends on the kinds of appropriate tests that are employed, and in searching for the right assessment methods Blagg noted that it was difficult to devise "appropriate, accurate, and reliable procedures" to test the success of the programme. The lack of appropriate methods of assessing the effectiveness of the programme presents an important and persisting problem. As already encountered in our discussion of Weller and Craft's study in section 7.4.1, the use of traditional cognitive assessment methods of testing and evaluating are problematic because FIE attempts to influence the cognitive development of the learner in a dynamic way whereas most standardised tests evaluate the products of learning. In spite of these important limitations, a battery of standardised assessment tools was used to assess the effects of the programme on the pupils involved. Clearly the use of inadequate tools can only compromise the study and weaken the conclusions that are finally reached on the effects of the programme. The study relied on the use of questionnaires as the predominant method by which data was collected from teachers.

The final conclusion of the study found little quantifiable evidence to suggest that the programme had a positive effect on the attainment of the pupils who were involved. There was no evidence, in particular, to suggest that the programme produced any improvement in their cognitive skills. Although there was some evidence of positive changes to pupils' self-esteem, the changes were

found to be as much a function of the whole school environment and the effectiveness of particular teachers involved in the study.

For the teachers involved in the study, it was reported that the programme prompted them to reflect on how pupils think and learn as a result of the examination of their individual roles as mediators of children's intellectual development. However, the teachers were concerned about the relevance of the programme for the pupils.

In considering the conclusions of the study, it is important to emphasize the limitations of the various standardised tests and their impact on the conclusions reached. However, there is no suggestion that FIE is highly effective in mainstream education.

Although Blagg acknowledged the potential of the programme in improving cognitive skills, he concluded that while the pupils in the study became more conscious of these, there was little evidence to suggest that the pupils became more able to apply them outside the context of the programme. Blagg observed that the key issue with the programme is its failure to teach for transfer. In spite of the fact that Feuerstein deliberately sought to prevent "clutter" (i.e. subject content) in the programme, teaching the prerequisite to thinking through a medium of abstract tasks that are contextually stripped bare presented problems of its own, as Blagg noted in his study as follows:

During the course of this study, pupils certainly became more competent in tasks, like searching for geometric shapes in amorphous clouds of dots. Unfortunately, the skills and strategies exposed by these tasks often remained steadfastly tied to those artificial contexts. The bridging process at the end of each lesson did not always work. Even with appropriate provocation and help, some pupils were unable to identify important elements in their learning and consider where else they might apply. Moreover, some teachers were less resourceful in prompting pupils to think of various literal or figural transfer situations. In other words, some pupils and teachers were "stuck in the dots and the triangles."(p135).

What is clear from the study, given that it was intended as a highly detailed and searching evaluation of the programme, is that it confirmed the restricted application of FIE.

### **7.5. Is FIE appropriate for all pupils?**

In spite of the lack of suitable tools to measure the effectiveness of FIE, the two studies discussed in the previous sections have both drawn conclusions that point to the restricted application of FIE to children with special educational needs. Between these two large-scale studies funded by local LEAs and controlled by government administrative officers and advisers there have also been small-scale independent studies.

Shayer and Beasley(1987) carried out a small scale evaluation study of the programme over a period of two years. The study initially involved one teacher and a single class of twenty 12-13 year-olds low-attaining pupils in a comprehensive school. The focus group of ten pupils were withdrawn from their regular class for three lessons a week of Instrumental Enrichment lessons conducted by a trained Instrumental Enrichment teacher for the duration of the study. In this study, as in the studies already discussed, finding suitable measures to test the effectiveness of the programme proved difficult, so some adaptations had to be made to various standardised tests to give a quantitative record of change. This raises questions about the validity of the test results. Reporting on the result of their study, the authors noted evidence of substantial effects on the participants' abilities to process new data or information.

However, they also noted little evidence to suggest that the gains were readily transferred into improved general achievement in school.

The studies discussed so far have all been unable to present substantial evidence beyond reasonable doubt that Feuerstein's Instrumental Enrichment programme is effective across all age and ability ranges.

Although the positive evidence that the studies claim tends to be patchy, some researchers are so desperate to confirm the worthiness of the programme that they are prepared to take small signs of changes they noticed as evidence of the success of the programme. Shayer and Beasley, for instance, insisted that the evidence they found was enough to justify the time spent over the study. Such claims only raise questions about the objectivity of the researchers.

Burden(1987) argues that the effectiveness of the programme is often weakened because studies carried out so far pay marginal attention to the conditions within which the programme should be delivered. For example, the programme should be delivered by specially trained teachers with thorough understanding of its theoretical foundation to specially chosen groups of adolescents under favourable conditions. These conditions would at least include a positive introduction of the programme into the school curriculum and a favourable environment for the transfer of acquired skills to other subject areas.

The difficulty in providing the conditions highlighted by Burden particularly with regards to mainstream comprehensive education (for example having the resources) are much more formidable than the lack of attention and due care that Burden suggests research studies are failing to address. The fact that the transfer of strategies to other subject areas forms one of the major goals of FIE implies that the programme can only be judged to be successful when this is achieved. But since this will involve major organisational changes in schools, for example providing a time-table slot for the programme lessons in addition to the teaching of the traditional subjects, this can only lead to a major disruption to an already overcrowded school day.

In the light of such difficult problems, it is important that we bear in mind what the programme was specifically designed to do, for whom, and whether it is appropriate to use it beyond its limited area of operation. Head and O'Neill(1999) provide an example of the restricted application of the programme. Their experiment involved six pupils in a special school for children with social, emotional and behavioural difficulties. Head and O'Neill ran the programme for twenty weeks and reported encouraging results in the academic performance of the pupils.

Feuerstein's ideas have provided major encouragement to researchers such as Adey and Shayer(1994) in their attempt to find appropriate methods of intervention in the cognitive development of pupils. Adey and Shayer's work resulted in

what they called Cognitive Acceleration through Science Education (CASE), and this will form the topic of our discussion in the next chapter.



## CHAPTER 8

### COGNITIVE ACCELERATION THROUGH SCIENCE EDUCATION

#### 8.1. Rationale for the programme

The rationale for the development of CASE (Cognitive Acceleration through Science Education) programme arose from the need to address issues concerning the low academic standards in schools and colleges since the end of the Second World War. CASE is a content-dependent cognitive intervention programme based on Piaget's analysis of cognition. In developing the programme Adey and Shayer(1993) adopted a Piagetian approach as this characterised "higher order thinking skills". They wrote:

We started from this viewpoint that the possibility of teaching general thinking skills was worth pursuing and the viewpoint that what has recently been referred to as "higher order thinking skills"(Resnick,1987) is well characterised by Inhelder and Piaget's descriptions of formal operations (p.3).

Although Adey and Shayer acknowledge that there are difficulties associated with the validity of the Inhelder-

Piaget account of formal operations, they nevertheless insisted that in the main the characteristic performances of children on the Inhelder-Piaget tasks have always replicated the original findings and can be treated as a "fact requiring explanation." These considerations formed the basis upon which the development of the programme was carried out for over 15 years.

The aim of the programme is to accelerate pupils' cognitive development to the level of formal operational thinking such that they can engage successfully with the instructional objectives of the traditional curriculum. According to the developers, they chose to set the design of their activities in a scientific context and used the schemata of formal operations as a guiding framework for a number of "micro-political" reasons. The "micro-political" reasons Adey and Shayer gave included their own familiarity with the foundations of science teaching, the cognitive mismatch between demands made by various science curricula and the abilities of average secondary school pupils, the interest shown by the science teaching community in the experimentation with learning theories, and finally the fact that the very scientific nature of Inhelder and Piaget's schemata of formal operations made it much easier

for the theory to be considered favourably by science teachers than teachers of languages.

The course materials entitled *Teaching Science* are aimed at encouraging the development of thinking from concrete to formal operations. In particular, they are designed to help pupils develop confidence in scientific thinking from level 5 upwards of the National Curriculum. The learning materials originally consisted of 30 activities but have since been increased to 32 activities to be taught over a period of two years to 11/12+ year pupils of average ability. The activities, each lasting about 60-70 minutes, target some aspect of formal operational thinking in a gradual and systematic way. The activities generally begin with some concrete preparation on the chosen topic, then develop through to problems requiring high level thinking. The initial activities focus on the control and exclusion of variables, and then they progress to ratio and proportionality, probability and correlation, compensation and equilibrium, use of formal models and so on. Both teacher and pupil worksheets with specific examples accompany each activity.

The teacher's role in these activities is considered to be of great importance for the success of the programme. Consequently the developers suggest that training specific

to the delivery of the programme is essential for CASE teachers.

Adey and Shayer(1993, 1994) reported very striking results after evaluating the impact of CASE on the GCSE grades of pupils who participated in the programme two years after the experiment. Based on the results reported by Adey and Shayer materials have been developed to promote the CASE methodology further (Moran and Vaughan, 2000). Nearly a decade after their report Adey and Shayer(2002) continue to maintain that the CASE intervention programme generally enhances pupils' thinking. We now focus on their study.

## 8.2. Evaluating the impact of CASE

Evaluation of the CASE programme involved nine schools in England. The age ranges of most of the schools were 11 or 12 to 18, but two were 9 to 14 middle schools. All pupils, both control and experimental, were given a pre-test of reasoning tasks based on Piaget's framework at the beginning of the evaluation of the programme and as expected no significant difference in levels of cognitive development was detected between the experimental and control groups. At the end of the two years intervention a post-test was immediately administered, and in addition the common science achievement tests were taken by many of the schools. These tests were followed by delayed post-test a year later. The post and delayed post-test were also based on Piagetian tasks. In the fourth and fifth year after the intervention programme was initiated GCSE results were used to track the progress of ex-CASE pupils.

Results from the various tests that were reported did not indicate conclusive gains by the experimental group over the control group. For example, it was reported that some 12+ years old boys in the experimental group made more highly significant gains in cognitive development than

those in the control group when post-test on Piagetian tasks were administered. This, however, is not surprising since the tasks relate to the way the programme was delivered and one would expect the experimental group to perform well on such tasks. But what was surprising on the other hand was that no significant differences emerged between any of the experimental and control groups when the common science achievement test was administered soon after the programme was completed. It is sensible to expect the experimental group to perform significantly better than the control since the programme was designed to enhance higher order thinking. When this did not occur, Adey and Shayer argued that it is not reasonable to expect an intervention programme such as CASE, which addresses underlying cognitive functioning, to show an immediate effect on academic achievement. They argued further that:

It may very well be a couple of years before enough general experience has been re-processed with students' new higher powers to show up on crystallised intelligence test-items. There must *in principle* be a delay for effects to show on such tests (p.91).

It may well be the case that some delay is required for the effects of the programme to show however Adey and Shayer give no particular reason why two years' delay is needed rather than say four or six years'. It may well be that

their choice was influenced by practical considerations such as the fact that most pupils are set to disappear (leave compulsory education) two years after the end of the programme (considering that the programme started in year 8). Consequently this only provides two years maximum for observing any impact (if any) of the programme. However, choosing a time period based on such a consideration does not say anything useful about the programme but merely indicates administrative constraint imposed by the duration of compulsory education.

In an attempt to justify their argument for the two-year delay period, Adey and Shayer pointed to the GCSE success results of ex-CASE pupils in science, mathematics and English two years after the programme ended as an indication of the long-term effect of the programme. Furthermore, they claimed that the enhanced achievement in English and mathematics is evidence of "far transfer" of the effects of the programme, which was set in a science context. This evidence, they wrote:

Supports the hypothesis of a general cognitive processor which can be positively influenced by appropriate intervention strategies set in the context of the ordinary curriculum (p.103).

There are difficulties with the claims made by Adey and Shayer regarding the success of pupils involved in the CASE programmes. Let us consider two of these claims. The first claim, that pupils' success is a direct result of the long-term effect of the programme, assumes that there were no other influential factors involved in the success of pupils. However, Adey and Shayer provide no evidence to show that the success was in fact caused by the intervention and not by other factors such as natural psychological processes due to maturation, or other learning experiences offered through the curriculum materials that participants might have had long after the programme ended.

This brings us to the second claim. Adey and Shayer's second claim that pupils' success is evidence of 'far-transfer' is directly related to the first claim. But as in the first claim they were unable to provide explicit evidence (considering the factors highlighted earlier) in support. What they were able to offer was merely a comparison of skills required for typical GCSE English tasks and those promoted by CASE, concluding from this comparison that success of ex-CASE participants in GCSE English must be a result of 'far-transfer'. Making such a claim complicates issues even further by the implicit



assumption that pupils in their GCSE English lessons are not sufficiently grounded in skills and techniques to deal with tasks typically required for GCSE English. Therefore the possibility that pupils' achievement in English was enhanced as a result of how the lessons were delivered must also be considered.

So far the discussion has concentrated on some of the issues pertaining to some of the conclusions drawn by Adey and Shayer based on the trial test of the programme. There are further issues concerning the nature of the programme itself, to which we now turn.

The CASE programme consists of ideas from two main theoretical sources: Jean Piaget's developmental psychology (highlighted in Chapter 5) and the socio-cultural theory of Lev Vygotsky (highlighted in Chapter 7). However, the programme is based largely on Piaget's developmental theory. In brief, the theory rests on the idea that there are different stages through which the mind of a child matures into the mind of an adult. The existence of the stages as real structures of the mind is derived from the inability of children at certain ages to perform certain kinds of task. Their failure to perform these tasks is taken to imply that their minds are still at a stage at which the cognitive operations necessary to perform such

tasks successfully are not yet available. The influence of Piaget's work has led to critical evaluations of the theory.

In view of the reliance of CASE on Piaget's work it is surprising that Adey and Shayer failed to provide any substantial discussion of areas of controversy regarding Piaget's position. Where such controversial issues emerge in their discussions, Adey and Shayer(1994) offer inadequate explanations in support of Piaget's framework, and insist that the Piagetian task "has always replicated the original findings and can be regarded as a fact requiring explanation"(p.3). Nevertheless, difficulties associated with the Piagetian framework have so far persisted.

In commenting on the Piagetian framework, Hamlyn(1967,1978) pointed out that Piaget's notions of accommodation and assimilation and the equilibrium to be achieved between these processes are essentially Kantian ideas. Hamlyn argued that Piaget presented a strictly philosophical point embedded in a biological/psychological theory. For Hamlyn the assumption underpinning Piaget's idea, that our knowledge of objects is partly determined by what these objects are in themselves, and partly by how we regard them, is wrong in two ways. Firstly, the growth of

knowledge is not itself a causal matter however much it may depend on bodily conditions. For Hamlyn the involvement of accommodation and assimilation in perception and the acquisition of knowledge amounts to the idea that there is a mutual modification of subject and object. But such reciprocal causal relationships mainly exist in biological situations where the attainment of equilibrium is the function of an organism. The efficient functioning of the body depends on the existence of physiological balances of various sorts. When the equilibrium of an organism is disturbed, the stimuli that affect certain organs are themselves affected and modified by a process of feedback. But the same process cannot be claimed for the relationship that comes to exist between concept and object in perception since the relationship is not at all causal. To have a concept of X or Y is to know what it is for something to be X or Y and this basically involves nothing causal. This leads to the second point.

The second point highlights a direct philosophical problem that arises from the use of a misleading biological theory as a basis of the acquisition of knowledge. The theory suggests that the equilibrium to be attained is one between something essentially subjective about the individual (the concept) and something objective about the

world around us. Thus knowledge is a mix of the objective and the subjective. But this is precisely what Hamlyn objects to because there is nothing subjective in fitting something to a concept, as we are not imposing a subjective viewpoint on it. For Hamlyn the objectivity of a concept is connected with the idea that it must be inter-subjective and interpersonal just as knowledge is. Consequently, it is impossible to view the growth of knowledge as a transaction solely between the individual and his/her environment without any impact of the social, which Piaget seriously underestimated.

A major difficulty with Piaget's theory was pointed out by Winch(1998). According to Winch, Piaget's thesis is essentially a negative thesis since it seeks to show that children cannot learn at certain ages. A difficult problem arises with any attempt to prove such a thesis since it is always possible for a counter-example to be produced which then leaves it untenable in its general form. For example, if one claims that anyone of age X cannot learn Y, then a single instance of someone of age X learning Y destroys the theory. The main response to such an argument is to say that the theory is about stages rather than ages, but this response will not hold because unless ages are linked closely to stages the theory reduces to a tautology.

What should be clear at this point is that Piaget's developmental theory is fraught with conceptual difficulties and as such it is important that any learning programme adopting the theory fully acknowledges its limitations by resisting the temptation to claim any kind of generality for the programme.

### **8.3. Remarks on CASE**

Adey and Shayer(1994) present CASE as a general thinking skills programme set within a specific domain of knowledge but what is not clear is how they claim to achieve this. Far from being just a convenient way of overcoming administrative difficulties, the use of domain-specific knowledge forms a crucial factor in demonstrating the successes (if any) that Adey and Shayer claim for the programme. For instance they cite "micro-political" reasons for adopting a domain-specific approach to the development

of CASE. These "micro-political" reasons, as already mentioned in section 8.1, concern the ease with which science teachers are willing to accept the broad aims of the experiment and to cooperate with the researchers to achieve a successful outcome. If we grant that "micro-political" reasons are not required for CASE to proceed, then what we are left with is a programme similar to DeBono's CoRT programme or Feuerstein's Instrumental Enrichment programme. In other words it would be a 'stand alone' programme to be taught on its own terms, and under this circumstance the need to contextualise the programme materials arise. Finding successful ways to present the programme so that the assumed general thinking skills can be applied in any context - the very essence of all general thinking skills programmes - remains a major source of difficulty for programmes seeking to promote such general skills of thinking. It is clear that adopting a context-free approach for CASE is bound to lead to similar shortcomings associated with programmes already discussed in the earlier chapters. In fact Adey and Shayer(1994) later admitted that the reasons for seeking to embed the programme in a context-specific domain are much more serious than "micro-political" reasons. They commented that:

This is not simply a matter of micro-political expediency. The strategic decision to deliver the intervention through a specific context reduces the initial unfamiliarity factor for teachers and students enabling them immediately to apply new thinking skills within a familiar context (p.79).

The delivery of Adey and Shayer's programme through a specific context goes far beyond the reduction of unfamiliarity with the material which they claim. It is clearly indicative of the fact that thinking involves intentional objects and as such specific contexts are necessary for the programme to make any sense. An important point about Adey and Shayer's comment above is that it reaffirms the importance of the development of pupils' specific skills as part of their overall cognitive development.

Sensing the rising discrepancy as a result of the dependency of their programme on context-specific knowledge and their pledge to encourage general thinking skills, Adey and Shayer wrote:

We reject the notion that science might claim a unique position for the development of general thinking skills but recognise that the work already done in a science context gave it certain pragmatic advantages over other subjects. Adding to this our own familiarity with the foundations of science teaching and the fact that the world of science

education has traditionally been rather sympathetic to psychologies of learning, the choice of science as the doorway through which to explore the development of general thinking become a reasonable one(p.79).

Clearly Adey and Shayer are devoted to promoting general thinking skills through CASE, but what is implicit in their statement is the importance of knowledge specific to a context. For example, although it is not very clear what is meant in the passage above by "work already done in science context gave it certain pragmatic advantages over other subjects", we can assume that the "pragmatic advantages" will include the use of specific ways of viewing the world (scientific method) in order to gain understanding. Thus it is reasonable to conclude that CASE is much more dependent on context-specific skills than Adey and Shayer would admit.

If CASE is deemed to be a successful intervention programme, it is due principally to the fact that it involves no more than the reorganisation and presentation of learning materials in motivating ways within a specific context.

There are two key points that can be drawn from CASE. The first is that the programme suggests that finding interesting and imaginative ways to teach the curriculum subjects is essential in encouraging effective thinking.



The second point is that the method of delivery of the learning materials underlines the important role of the teacher. These points will later be argued further. Let us now turn our attention to the growing interest in the introduction of thinking skills in formal education.

## CHAPTER 9

### THINKING SKILLS PROGRAMMES IN FORMAL EDUCATION

#### 9.1. The International perspective

The notion that there are generic thinking skills that can be deployed flexibly in a wide range of work and life contexts is at the heart of initiatives by national governments to produce well educated young men and women. The rationale for these initiatives by national governments is that future national and global success in business and industry is dependent on the ability of teachers and lecturers to teach knowledge and skills relevant to generic competencies as well as those specific to particular discipline areas such as engineering, chemistry, accountancy, computing, etc. Another reason for the interest in generic thinking skills is connected to private business's alleged desires for schools, colleges and universities to produce graduates who are analytic, critical, reflective, flexible and effective problem-solvers, able to add value to their organisations. The notion that there are these competencies or generic skills which students can develop

for the purposes of employment are very similar across international borders.

In the context of the USA, for example, the Secretary's Commission on Achieving Necessary Skills (SCANS) framework is part of an official nation-wide effort to link education to the world at large (Marginson and O'Hanlon, 1993). The commission created a list consisting of five workplace competencies and three foundation skills called 'Workplace know-how' which included such thinking skills as *'the ability to learn, to reason, to think creatively, to make decisions, and to solve problems'*. The commission recommended that these workplace competencies and skill be made explicit at all levels of the nation's school system.

In the Australian context the Finn committee concluded that there are certain essential things which they termed 'employment-related key competencies' that all young people need to learn in their preparation for employment (Mayer, 1992). In other words, these generic skills are seen to be at the crux of life-long learning to enhance students' flexibility and adaptability for effective participation in changing patterns of work and work organisation. The committee identified seven key competencies including thinking skills, which in this case was referred to as 'solving problems'. This involves *'the capacity to apply problem-solving strategies in*

*purposeful ways, both in situations where the problem and the desired solution are clearly evident and in situations requiring critical thinking and a creative approach to achieve an outcome'.*

As in the case of the USA the commission also recommended that these skills be explicit throughout the school system.

The key competencies produced in the above countries have some obvious overlaps with those produced in the UK called 'key skills'. The Dearing report, *Review of Qualifications for 16-19 Year Olds* published in March 1996, recommended the use of the term in order to reduce the confusion that existed over labeling and to underline their apparent importance. According to the Department for Education and Employment (DfEE), key skills are the generic skills which individuals need in order to be effective members of a flexible, adaptable and competitive workforce and for lifelong learning. Included in these key skills is 'problem solving.' This involves learning to *'identify problems; plan and try out ways of solving problems'*.

The Government sees learning such general problem-solving skills as a priority and wants to move to a position where they are a normal and integral part of post-16 education and training. One of the ways in which this is being done is by finding the best possible method

grounded in research to deliver such skills to pupils. In the case of the UK, pupils are being targeted from as early as the first year of their secondary school education. Discussions in the proceeding sections will focus on the situation in the UK.

### **9.2. Delivering thinking skills in UK schools.**

The growing interest in teaching children how to think reflects the current government's commitment to finding ways to improve the educational experience of children.

In a recent announcement by the Secretary of State for Education and Employment, all children are to be taught thinking skills in their first three years at secondary school under a programme to develop imagination and creativity. The programme will first be launched on an experimental basis at pilot schools however, the Secretary of State plans to extend it throughout England over the next few years. In order to achieve this aim he indicated that teachers would be trained in techniques developed through the thinking skills programme called

CASE discussed earlier in Chapter 8. He is convinced that the benefits to be had in participating in the CASE programme could extend beyond academic attainment and consequently made a clear indication to that effect as follows:

I want children to be able to think creatively and problem solve to address the issues of tomorrow - not just about work, but contributing to the debate about genetic engineering, the future of the planet and issues of global citizenship (The Guardian,6/1/00).

Under the proposed programme teachers will be trained to teach thinking skills within their own subject areas. Guidance on teaching thinking skills is included in handbooks on the new national curriculum.

The present level of interest in teaching pupils thinking skills is also shown by the government's endorsement of the research report on teaching thinking skills produced by Carol McGuinness(1999). Although the report is very much welcomed in bringing the discussions on teaching thinking skills to the fore, it is important that careful and detailed consideration be given to the dangers involved in the wholesale acceptance of its findings. The report(Report 115) was commissioned by the Department for Education and Employment(DfEE)and it is essentially a review and evaluation of the various approaches for developing pupils' thinking.

The research report is divided into ten sections. Section 1 states the purpose of the report. Section 2,3 and 4 mention some of the ideas underpinning current attempts to teach thinking. Sections 5,6 and 7 all discuss examples of the three main approaches to teaching thinking. Section 8 investigates the role of information and communication technologies in developing thinking. Section 9 considers the importance of teacher development and support. Section 10 states the main conclusions from the research.

The value of the report in highlighting the major approaches for developing pupils thinking cannot be denied. Although it is very comprehensive in its coverage, it is surprising that it fails to adequately review some of the well-known thinking programme such as CoRT developed by Edward DeBono, discussed in Chapter 6. More importantly, it almost completely fails to highlight the long-standing debate on both teaching thinking skills as a subject and the existence of general thinking skills, thus presenting a non-problematic view of what is involved in teaching thinking skills. The report also cites and approves the CASE programme as a successful model of cognitive intervention. The findings of the report will be the focus of further discussion in the next section.

### 9.3. McGuinness's report on thinking skills.

McGuinness's report has become an important blueprint for the integration of thinking skills into the school curriculum and for that reason it needs to be subjected to careful scrutiny.

The purpose of the review was set out as follows:

- 1) to analyse what is currently understood by the term "thinking skills" and their role in the learning process;
- 2) to identify current approaches to developing children's thinking and to evaluate their effectiveness;
- 3) to consider how teachers might be able to integrate thinking skills into their teaching - within subject areas and across the curriculum;
- 4) to identify the role of Information Communication Technology (ICT) in promoting a positive approach to thinking skills;
- 5) to evaluate the general direction of current and future research and how it might translate into classroom practice.



In view of the fact that the above points form the basis upon which the research was carried out, it is reasonable to focus on how the report addresses each of them.

Point 1.

In analysing what is currently understood by the term "thinking skills", the report fails to adequately highlight the issues associated with the use of the term. In the report, McGuinness claims that:

The idea of thinking-as-a-skill continues to have theoretical force as it places thinking firmly on the side of "knowing how" rather than "knowing that" in the long standing philosophical debate about the nature of knowing (p4-5).

It is not quite clear what exactly McGuinness means by "thinking being firmly on the side of knowing how rather than knowing that". The importance of clarifying the confusion surrounding the use of the concept of thinking goes without saying since it lies at the heart of any attempt to enhance pupils' thinking. In providing a less than adequate explanation, McGuinness only contributes to the existing confusion. The point that has already been made repeatedly in the dissertation is that due to the highly complex nature of thinking it is impossible to attempt to arrive at a coherent definition of thinking as

a unitary "skill". The idea that placing thinking-as-a-skill "firmly on the side of "knowing how" rather than "knowing that"" at best assumes that *knowing how* is entirely independent of *knowing that* and at worst is nonsensical. The fact that knowledge can be understood in different ways does not necessarily imply that these different ways are mutually exclusive. For example, knowing how to do something presupposes knowing about that something, hence knowing how to drive a car involves knowing what a car is in the first place, knowing that a car has a steering wheel and various levers such as an accelerator, a combination of gears and brakes etc.

The complex nature of the relationship between thinking and knowing highlights the point that thinking cannot be viewed simply as a general skill to be applied in any problem-solving situation. The content specificity of thinking (McPeck,1981; Barrow,1990) means that its development is tied to particular contexts. However, McGuinness overlooks this important point about the nature of thinking and argues that if we want pupils to become better thinkers then we must "devise ways of educating directly for thinking." If such an attempt ends in failure then it is (among other things) precisely because thinking skills cannot simply be introduced as a subject into the school curriculum.

The assumption that there are general thinking skills that can be taught in their own right pervades much of the work presented in the report. McGuinness presents the various approaches as merely vehicles for delivering thinking skills and labels these approaches as:

- (A) *The general approaches* include context-free and context-dependent programmes based on specially designed materials.
- (B) *The subject specific approaches* are based on the view that high quality thinking is linked with the ways of thinking associated with different disciplines.
- (C) *The infusion approaches* attempt to develop a "thinking curriculum" where teaching thinking is infused across all areas of the curriculum.

In spite of the above categorisations it is difficult to find out how these various approaches differ in practice. For example, programmes such as CoRT or Instrumental Enrichment are easily identifiable as examples of the general approach. On the other hand CASE, which is a context-dependent programme, is also considered by McGuinness as an example of a general approach programme. But the fact that CASE is linked with the ways of thinking associated with science means that it can also be viewed as belonging to the subject-specific approach

group. McGuinness mentioned LOGO (a computer aided learning programme developed by Seymour Papert(1980) for teaching children about mathematical concepts of shape and space) as an example of a specific approach to teaching thinking, but it is not obvious how LOGO differs from CASE, considering the fact that they both depend on specific contexts. Thus confusion arises over how we are to consider and classify the various teaching thinking programmes. This confusion is augmented once we begin to consider other methods such as McPeck's 'philosophy-of' approach. McPeck is also interested in promoting higher-order thinking and calls for the teaching of the philosophies of the various curriculum subjects. Does this therefore make McPeck's suggested approach a subject-specific thinking skills programme as indicated by McGuinness? Obviously McPeck would object to this classification on the basis that there are only specific thinking skills to be gained through his approach. What is required from McGuinness in order to resolve the existing ambiguity in her categorisation is further clarification of how the various thinking skills programmes are categorised.

The transfer of thinking skills across domains provides the fundamental reason for all the various teaching thinking skills programmes and approaches. In view of the importance of transfer, why did such a

crucial aspect of teaching thinking skills only receive minor attention in the report? The answer is that the issue of transfer presents an intractable problem for teaching thinking skills programmes. And in order to avoid dealing with the implications of such an intractable issue supporters of thinking skills programmes either try not to highlight it, or produce less than adequate evidence in support of the transferability of their programmes, as suggested in the previous chapters of the present part of the thesis. Sternberg's (1987) observation that the activities of teaching thinking skills are meaningless if they do not result in transfer is still relevant today. Similarly the conclusion drawn by Perkins (1987) that programmes on teaching thinking skills fail to provide the conditions for transfer continues to hold.

McGuinness acknowledges the major problem regarding the transferability of thinking skills across domains and concludes that in order to be successful, all thinking skills programmes need to adopt methods to minimise the risks of failing to transfer the "general thinking skills" gained across domains. This advice to prospective users of thinking skills programmes is indeed futile, since the assumption that there are such "general thinking skills" to be transferred across domains is unsubstantiated.

Point 2.

In identifying current approaches to developing children's thinking McGuinness introduced a number of well known programmes such as Feuerstein's Instrumental Enrichment(FIE), Cognitive Acceleration through Science Education(CASE) and Philosophy for Children(PfC). These influential programmes have formed the main topic of discussion in this part of the thesis. It is very much a cause for concern that although McGuinness mentioned positive evaluations of these programmes, very little or no critical evaluation of these thinking skills programmes was provided. As demonstrated in Chapters 5,6,7, and 8, these critical evaluations are very important in providing a balanced view of the effectiveness of general thinking skills programmes, given the importance of the report in influencing the current proposal to introduce all pupils in Britain to thinking skills. McGuinness also stated that DeBono's CoRT programme is a widely known thinking skills programme but gave no reason for not discussing it as a structured programme for developing thinking.

Point 3.

In discussing how teachers might be able to integrate thinking skills within and across various subject areas, McGuinness highlighted various strategies and experiments

conducted in mathematics, science, history and geography. These strategies offer no more than quality teaching, which can be found in any thriving traditional method of teaching. For example the various competencies necessary for successful mathematical problem-solving such as depth of mathematical knowledge, level of understanding of the problem, reflection and monitoring of possible solutions, and confidence in mathematics are an intrinsic part of learning to become a mathematician. These competencies are not exclusive to a thinking skills approach.

Similarly, the infusion approach, which seeks to "exploit naturally occurring opportunities for developing thinking within the ordinary curriculum (p.19)", provides no more than what pupils are likely to obtain from any well-structured and durable form of teaching.

#### Point 4.

The emergence of the electronic computer as an important tool in recent years has helped to turn the limelight on the impact of computers in education. In discussing the role of computers in education the report mostly provided information on various experiments and programmes involving the use of computers in developing pupils' thinking. However, much of the research on the use of

computers focused mainly on describing various experiments. No attention was given to any critical discussion of the experiments and researches mentioned in the report except for some cautionary notes on the use of computers.

Point 5.

The attempt to evaluate the general direction of current and future research and how it might translate into classroom practice is underpinned by the assumption that there are general thinking skills independent of any subject-specific content. According to McGuinness, there is now a "shift from thinking skills to thinking classrooms" and this shift can be observed through the three models of teaching thinking skills (ie via the general, subject and infusion approaches). However, it is not exactly clear what McGuinness implies by "thinking classrooms" in spite of its mention in connection with information and communication technology.

The report generally provides an initial survey of the various attempts to teach thinking skills, but, as already indicated, the conceptual difficulties associated with the idea that thinking can be viewed as a general skill have not been adequately addressed.



#### 9.4. Preparation for life

One of the key functions of formal education is to do with the preparation of pupils for future participation in adult life. National governments are determined to find ways to achieve their goal of preparing their young citizens in the best possible way. However, the probability of such grand proposals failing runs very high particularly when they lack any sort of thorough analysis or evaluation. The importance of seeking ways to enhance the effectiveness of pupils' thinking cannot be denied, but it is vital that care is taken in finding the best way to achieve this task.

In the concluding section of the report McGuinness maintains that, although theoretical emphases can differ, sufficient research and ongoing practice have accumulated to identify core concepts in a framework for developing skills in thinking. McGuinness implies that finding a way through the difficult conceptual issues associated with the idea of teaching thinking is not altogether crucial in affecting the kind of framework that is employed. But not paying careful attention to finding a firm theoretical foundation can only result in the perpetuation of the present conceptual confusion.

The report produced by McGuinness is mainly descriptive in nature, providing a generally positive overview of some of the widely known teaching thinking skills programmes. Consequently, the conclusions reached in the report fail to present a balanced account of the ongoing debate on teaching thinking. The bias in the report is brought sharply into focus by the uncritical review of the thinking skills programme Activating Children's Thinking Skills (ACTS) developed under the guidance of McGuinness.

Johnson(2001) draws our attention to the dangers associated with the attempts to teach thinking as a set of skills. For such attempts will lead to specific-subject knowledge being viewed not only as mere material on which to practice such skills, but worse still as a source of great inconvenience or waste of pupils' time. Specific subject knowledge, as pointed out by Johnson, is far more important than proponents of general thinking skills care to admit, for the same reason given by Hirst, McPeck and Barrow that one cannot separate thinking from the context within which it is applied. In other words, what counts as good thinking is determined largely by the subject matter. And to have knowledge of subject matter is to acquire certain ways of saying or doing things and feeling about those things.

Another source of danger noted by Johnson is the reduction of all thinking to problem solving, which can subsequently be reduced to following a few simple rules to arrive at the desired solution(s). In the end the real danger in viewing thinking as merely rule following is that flexibility, which is of great importance in the search for general thinking skills, will be lost as the ways and methods of thinking become set in some prescribed and rigid format. Furthermore, reducing thinking skills to merely rule following can create a condition that undermines or completely ignores the feelings and emotions that form a crucial part of thinking.

### 9.5. Learning from the past.

The current efforts being made to introduce general thinking skills into the school curriculum have their roots in the late nineteenth century, a time when faculty psychology very much dominated educational thinking. In his book *The New Education*, about educational thinking in the period 1870-1914, Selleck(1968) tells us that the influence of faculty psychology brought with it the notion of general mental abilities. In particular, three main doctrines from faculty theory were dominant among educationists of the time.

The first postulated the existence of a number of faculties or powers through which the mind operated. The intellectual faculties for example, consist of the faculties of imagination, of judgement, of reasoning, of perception, of memory. Other faculties such as the faculty of form contribute to the understanding of form and size, while the faculty of tune assists in the understanding of melody. The subject of morality is covered by including the faculty of the will.

In addition to the assumption that these faculties existed was the notion that they could be trained, which in turn provided the justification for the belief that a general discipline of the mind was possible. As a result,

faculty training became the basis upon which education was defined. The curriculum in the main was viewed as a means of training the various faculties. For example, arithmetic developed the reasoning powers; history developed the powers of memory etc.

To the belief in the existence of faculties and the need to train these faculties was added the assumption that, just as muscles can be trained through a series of physical exercises, so, too, can the mind be trained in the activities of the classroom. This training can then be transferred to tasks in real life situations far beyond normal school settings.

What is clear with regards to teaching general thinking skills is that traces of faculty theory persist in the twenty first century, long after its collapse as an influential theory. If we are seriously interested in seeking ways to enhance pupils' thinking we should pay careful attention to past efforts in order to avoid repeating similar mistakes.

There are no easy or straightforward solutions to the issue of teaching pupils to think effectively. Care must be taken to seek a firm foundation. We must not ignore or avoid the difficult conceptual questions that arise, especially if thinking skills are held to be of great importance not only to the pupil but also to the community in general. These questions include: What is

the nature of thinking? Are there different kinds of thinking? What personal qualities are most beneficial in promoting effective thinking in pupils? How can these qualities be developed? Supporters of teaching general thinking skills very rarely devote much effort to finding answers to these kinds of difficult questions.

As already indicated there are major practical and theoretical problems involved in considering the introduction of thinking skills programmes in formal education. We now turn to some of these practical issues.

## **9.6. Practical Issues Concerning the Programmes**

The discussions in Chapters 5,6,7 and 8 indicate important issues, both practical and theoretical, that present formidable obstacles for the implementation of general thinking skills programmes into the mainstream curriculum within formal education. In this section brief comments will be passed on some of these practical problems.

### **9.6.1. Evidence of effectiveness**

One of the limitations of the thinking skills programmes is related to the quality and objectivity of the evaluation studies of them.

In a survey of some of the evaluation studies, Sternberg and Bhana(1986) highlighted major scarcity of evidence in support of some the general claims made in favour of thinking skills programmes. The survey found that evidence offered in support of the benefits of these programmes is often based on the confirmation of users whose selection is usually unspecified. Moreover, many of the studies were conducted by the originators of these

programmes themselves and the results announced or made available only through journals and books published by the same originators.

For example, as already indicated in Chapter 5, studies and reports on Lipman's Philosophy for Children are largely published through the programme's journal entirely dedicated to the promotion of the positive aspects of the programme. This raises issues to do with bias.

Regarding DeBono's CoRT programme, with the exception of Hunter-Grundin's(1985) independent evaluation of the programme involving primary school children which produced no concrete evidence of cognitive generalisability, much of the evidence concerning its effectiveness can hardly be obtained outside of what DeBono publishes on the programme's effectiveness. Here too, issues to do with bias are raised.

Although firmly rooted in a theory of learning, the extension of Feuerstein's Instrumental Enrichment programme to "normal school settings" rather than specific "special needs settings" presents difficulties in terms of the effectiveness of the programme across all age and ability ranges.

The scarcity of positive evidence in support of the effectiveness of these programmes can be attributed to a number of factors to be examined next.



### 9.6.2. Demands on Teachers

The importance of the teacher's contribution to the success of the general thinking skills programmes cannot be overstated. The major programmes under discussion here acknowledge the importance of the teacher in the smooth running of the programmes.

For Lipman et al(1977), it is the teacher in the classroom who can arrange the learning environment in such a way as to enhance the continual growth of children's philosophical awareness. However, one of the most important requirements demanded of the teacher is that he/she must not only know philosophy, but must also know how to introduce this knowledge in a way that supports the child. In order to achieve this aim, teachers have to be carefully prepared to use the programme materials, particularly by becoming accustomed to the requirement of leading a community of inquiry. The fact that the programme is highly teacher-sensitive implies that, in general, it is only open to those teachers who are pre-disposed to this method of teaching.

DeBono's CoRT programme, on the other hand, requires no training to either explain or teach the material. According to DeBono, any teacher ought to be able to understand the material regardless of his/her background.

Given the rigidity of the programme (that is, the programme material is strictly defined in terms of what and how pupils must learn) it is ironic that teachers are asked by DeBono to "feel their way through the course." It is not too surprising that this situation, as already discussed in Chapter 6, arises simply because of the immense confusion inherent in the theoretical foundation upon which DeBono's entire programme is constructed.

Feuerstein admits that his programme poses a huge problem for the training of teachers to teach the material contained in it, due to the complexity of the entire Instrumental Enrichment programme. The demands of the programme are such that extensive and indeed expensive teacher training is required in order to master all the materials and techniques based on the guiding theory of Mediated Learning Experience. Consequently, comprehensive and thorough teacher training is not easy to achieve.

There is little doubt that the success of the programmes depends on the quality of training that the teachers involved undergo. However, it is doubtful whether these training requirements can be met. Given the nature of the programmes it is difficult to establish a practical and unambiguous teaching method. In most cases only vague indications of what is required are outlined while the crucial task of actually teaching and guiding

pupils is left to a self-selection of dedicated teachers. The problem surrounding the training of teachers is one of the major difficulties facing these programmes. We now turn to another important limitation of the programmes.

### **9.6.3. Transferability**

A critical test for the success of any general thinking skills programme is whether the competence developed through instruction can be applied in another context different from that in which it was first developed. Consequently, the transferability of thinking skills from one domain to another domain lies at the very heart of thinking skills programmes. Sternberg(1987) described transfer as the fundamental question in the teaching of thinking without which instruction in thinking skills is in effect meaningless. In other words the activities of any thinking skills programme are useless if it does not result in transfer.

Given the importance of transferability, we should therefore expect to find abundant cases of successful transfer. On the contrary, there are as yet no conclusive results confirming this. In an attempt to highlight this issue Perkins(1987) noted that instructional programmes

on thinking fail to establish the necessary conditions for transfer. The inadequacies of these programmes in this respect are indeed far-reaching, given the fact that transferability forms the single most crucial reason for the pursuit of teaching thinking as a subject. The issue of transferability forms an important part of the discussion in the next chapter.

## CHAPTER 10

### THE DEBATE ON GENERAL THINKING SKILLS

#### 10.1. Sources of the debate

The importance of the debate on General Thinking Skills (indicated henceforth as GTSS) is that it enables a better understanding of what these skills involve and whether or not they exist.

In order to engage in the debate it is important to first discuss the sources from which the campaign to teach GTSS originates. Two sources can be readily identified as:

- 1) The desire to assist children to become autonomous adults by developing the general effectiveness of their thinking.
- 2) The influence of cognitive psychology in searching for GTSS.

These two sources have played significant roles in the efforts to teach GTSS and will now be briefly discussed.

The desire to assist children to think effectively in order to develop into autonomous adults has been significant in the justifications given for the promotion of thinking as an important educational aim. For example,

Dewey(1933) argued that thinking must be made an educational aim because

In the first place, it emancipates us from merely impulsive and merely routine activity (p17).

Decades after Dewey's influential work, Siegel(1988) concluded that based on democratic principles

The critical thinker must be *autonomous*- that is, free to act and judge independently of external constraint (p54).

The vision of autonomy based on the notion of liberating the individual from ineffective ways of thinking runs through the various teaching thinking programmes discussed earlier. The main target group of these programmes is the general student population, although Feuerstein's Instrumental Enrichment programme originally targeted a special group within this.

The main aim of Feuerstein's programme also includes the promotion of autonomy. It seeks to assist the retarded performer to gain acceptable cognitive competence and by so doing restore dignity and respect to them. However, attempting to extend the programme to the general population in formal education raises a difficult problem in that doing so implies that all pupils have cognitive difficulties as defined by Feuerstein. Another issue is that although the programme presupposes the

improvement of the skills of reading, writing and calculating, it is unclear how this is achieved through the use of context-free material. The inconclusive evidence regarding the effectiveness of the programme suggests that it is perhaps best for the programme to concentrate its special efforts on the improvement of special needs education.

DeBono's rationale for his CoRT programme rests on his belief that the individual must be liberated from the shackles of the present educational system by the introduction of generative thinking. In order to do so, DeBono(1976) argued that:

Education must free itself from the impractical myth that scholarly excellence will solve everything (p.16).

For DeBono, it is imperative that thinking is taught as a subject in order to compensate for the inadequacies (i.e deficiencies in promoting independent thinking) of the educational system as we know it. Yet in spite of the fact that DeBono relies heavily on the use of visual aids as an important aspect of his 'attention directing tools', he nevertheless assumes that participants in his programme can at least read, write and calculate.

Lipman's paramount reason for his Philosophy for Children programme is based on the idea of autonomy, that is, the ability of the child to make his or her own free

independent judgements. For Lipman, the ability to think independently forms the distinguishing feature of the reflective model of education. Lipman(1991) wrote:

Not uncommonly, the reflective model of education is distinguished from the standard model on the ground that the primary objective of the reflective model is the autonomy of the learner (p.19).

In order to realise this vision of the child as an independent thinker, the Philosophy for Children programme relies extensively on the assumption that the child's ability to read, write and calculate is in a sense complete.

All of these programmes therefore suppose that they offer the means to liberate the potential of the individual with regards to his or her independent thinking, hence promoting their autonomy. The programmes have identified important issues which the traditional educational system must address. It is because of the shortcomings of this system in the promotion of autonomy and independent thinking that teaching thinking programmes have received much attention in the past and continue to do so at present. The point made by them that in promoting autonomy the improvement of thinking must be paramount is beyond dispute. But the means they suggest for attaining such a goal (ie developing GTSS) remains problematic, as discussed in earlier chapters.



The other major source that has been influential in the debate on GTSS is cognitive psychology. As indicated in Chapter 9, the connection between psychology and the endeavours to teach GTSS is traceable to the nineteenth century.

Cognitive psychologists conceptualise GTSS as strategies that are related to the successful undertaking of tasks. Their approach tries to discover problem-solving like processes implicated in tasks and form these into rules or techniques to be studied and deployed with skill.

For instance, Meichenbaum's(1985) programme for training children in problems to do with self-control is one of many examples of the attempt to teach cognitive skills. In another study working with retarded children to improve their cognitive skills, Brown(1978) listed a number of strategies as follows,

- (1)Spend a brief moment to consider the task at hand.
- (2)Deliberate on what one knows and what is required for a solution to the task.
- (3)Check that one's plan of attack is ready to go into operation.
- (4)Review ongoing progress.

In a similar study to improve the cognitive functioning in aggressive boys, Camp(1980) developed a

cognitive skills programme based on seeking answers to key questions as follows -

- (1) Define what the problem is
- (2) Devise a plan for the problem
- (3) Try out plan
- (4) Review result of plan

Although these kinds of strategies are now being extended to normal school settings (just as in the case of Feuerstein's Instrumental Enrichment programme), they were initially developed to support children learning in special educational needs settings. Some psychologists, however, do not see these strategies as usurping domain-specific knowledge but rather as supplementing it, as indicated by Meichenbaum(1985):

We see our approach as supplementing the already existing school curriculum (p.421).

On the other hand, there are other psychologists who are uncertain about the benefits to be gained in the direct training in such strategies. For example, studies by Chi et al(1982) and Carey(1984) on 'expert' and 'novice' thinkers suggest that the crucial differences between the two groups of thinkers are due almost entirely to the level of sophistication of their domain-specific knowledge, with negligible part played by learning general skills or strategies. Hunt(1991) noted that

researchers in the field of Artificial Intelligence found no inferential rules that were domain independent which could be employed to build general intelligence.

What these various studies highlight is the lack of consensus among cognitive psychologists on the effectiveness of general thinking skills. The lack of consensus is symptomatic of deeper practical and conceptual problems inherent in the attempts to teach thinking skills as a separate subject. The transferability of GTSs is one such problem and to this we now turn.

## 10.2. The transferability of thinking skills

In the long-running debate on teaching thinking what continues to be a source of much contention is the sort of thinking that holds the best promise of maximum transfer across domains.

What the limitations of programmes teaching general thinking skills indicate is that in spite of its numerous shortcomings there is still no substitute for the knowledge that comes from the study of the various disciplines of the school curriculum.

A large number of the curriculum disciplines are built around propositional knowledge and the kind of thinking common to these consists largely (but not exclusively) of theoretical reasoning. The individual disciplines do not draw just on one type of thinking. Instead, different disciplines emphasise different types of thinking in very complex ways. For instance, disciplines like fine art, music and literature emphasise imaginative thinking but they also involve other types of thinking such as reasoning and contemplative thinking. In these disciplines reasoning is involved in working out the layout of how the piece of art work, music or literature is to proceed, and appreciating the final product involves contemplative thinking. Similarly,

religious study emphasises contemplative thinking, but may still, for example, involve imaginative thinking; and in science, the emphasis may be on reasoning but imaginative and contemplative thinking are also important. What this suggests is that the emphasis on the different types of thinking in the major disciplines occurs in such complex ways that they cannot be addressed adequately by teaching just one particular type of thinking that can be generally transferred and applied across all disciplines or domains.

#### **10.2.1. Transfer between closely related subjects**

Transferability of thinking skills across domains remains the key motivating factor for the establishment of general thinking skills programmes in formal education.

In what ways can we accept the notion that transfer of some sort could occur? Subjects of study that are closely related share very similar features and therefore the possibility of transfer of thinking skills from one to the other is high. For example, the close relationship between subjects such as mathematics and physics suggests

that thinking skills from one subject could be easily transferred to the other

Let us examine some of the basic thinking skills essential to doing mathematics and then investigate their use in the field of physics. Since the close relationship between mathematics and physics underlines the obvious transfer of thinking skills between the two disciplines, the examination therefore will be presented as an example of what transfer of thinking skills between disciplines may entail.

Engagement in mathematics requires one to be proficient in the use of a huge number of technical skills. These skills provide the tools for thinking and solving problems in the subject. For example, mastery of basic technical skills such as the rules of number (i.e. addition, subtraction, multiplication and division) and basic algebra form part of the foundation for thinking in the subject.

Mathematics generally can be regarded as a structure of relationships, the formal symbolism being a way of communicating or thinking about parts of the structure. As a way of making connections within the structure, mathematical statements are used, and to express such a connection involves symbolism. For example the symbolic statement:

$$2(x + y) = 2x + 2y$$

states a connection between two parts of the structure, one dealing with addition and the other with multiplication. The knowledge that we can proceed from the symbols  $2(x + y)$  to the symbols  $2x + 2y$  and vice versa is a technical one and it is used in the process of solving mathematical problems. Algebra is the area of mathematics that uses symbols to represent numbers and to make generalisations about the relationships between them, hence in the above example  $x$  and  $y$  can be substituted for numbers and as such these letters represent any number. A polynomial is an algebraic expression that is the sum of a number of terms, for example the algebraic expression :

$$4x^3 + 6x^2 + 5x + 2$$

consists of three terms and this is called a polynomial in  $x$  of degree 3. Similarly the expression:

$$8x^6 + 3x^3 + 9x + 7$$

is a polynomial of degree 6, since the expression could be written as:

$$8x^6 + 0x^5 + 0x^4 + 3x^3 + 0x^2 + 9x + 7 .$$

The most general form of a polynomial can therefore be written as:

$$a_n x^n + a_{n-1} x^{n-1} + a_{n-2} x^{n-2} + \dots + a_2 x^2 + a_1 x + a_0$$

This is a polynomial in  $x$  of degree  $n$ , meaning the highest power of  $x$  is  $n$ . In a polynomial,  $n$  must be a positive integer (written  $n \in \mathbb{Z}^+$ ) and  $a_n$  must not be zero

(written  $a_n \neq 0$ ). The number  $a_n$  is the coefficient of  $x^n$  and, whilst  $n$  must be a positive integer, no restriction applies to  $a_n$ .

The use of polynomials pervades the field of mathematics and the rules of number can be applied in the same way to polynomials, making it possible for two polynomials to be added, subtracted or multiplied.

We can add  $3x^2 + 4x + 6$  and  $6x^3 + x + 5$  as follows:

$$\begin{array}{r} 3x^2 + 4x + 6 \\ 6x^3 + 0x^2 + x + 5 \\ \hline 6x^3 + 3x^2 + 5x + 11 \end{array}$$

We can subtract  $2x^2 + 4x + 3$  from  $7x^3 + 3x^2 + 5x + 4$  as follows:

$$\begin{array}{r} 7x^3 + 3x^2 + 5x + 4 \\ 2x^2 + 4x + 3 \\ \hline 7x^3 + x^2 + x + 1 \end{array}$$

And in a similar manner we can multiply

$4x^2 - 3x + 4$  by  $3x^3 - x + 1$  as follows:

Firstly the two sets are enclosed in brackets in order to provide a clear method of grouping as follows

$$(4x^2 - 3x + 4)(3x^3 - x + 1).$$



Each term of the first is then multiplied by the whole set of the second expression as follows:

$$4x^2(3x^3 - x + 1) - 3x(3x^3 - x + 1) + 4(3x^3 - x + 1)$$

$$=12x^5 - 4x^3 + 4x^2 - 9x^4 + 3x^2 - 3x + 12x^3 - 4x + 4.$$

Like terms are then collected together i.e. simplified to give the following result

$$=12x^5 - 9x^4 + 8x^3 + 7x^2 - 7x + 4.$$

Polynomials can also be factorised. That is, some factor common to each of the terms in the polynomial can be extracted. For example, the expression

$$5x^3 + 3x$$

contains  $x$  in each term of the polynomial so

$$5x^3 + 3x \text{ can be said to be identical to } x(5x^2 + 3).$$

In solving mathematical problems polynomials form the basis of the different types of equations and inequalities for which solutions are then obtained. For example, the equation

$$4x + 6 = 2x + 12$$

is a linear equation, i.e it involves just one unknown and the value of this is the solution of the equation.

Using the rules of number, the method of solution is to get all like terms together on one side of the equality sign which in this case is the left hand side (LHS) and the rest on the right hand side (RHS) as follows:

$$4x - 2x = 12 - 6$$

$$2x = 6$$

$$x = 3 .$$

The solution indicates that the LHS is identical to the RHS when the value of  $x$  is 3. We can verify the correctness of the solution by substituting the  $x$ 's with 3 in the original equation. The same way of thinking can be applied to non-linear equations and inequalities. An equation is called an inequality when the equal sign (=) is replaced by one of four inequality signs:

$>$  is greater than;

$\geq$  is greater than or equal to;

$<$  is less than;

$\leq$  is less than or equal to.

So 'three is greater than one' can be written  $3 > 1$ , and 'minus 5 is less than 2' can be written  $-5 < 2$ , and so on.

The rules for manipulating inequalities are the same as those used for manipulating equations with one major exception. This major exception comes into force when we try to multiply or divide both sides of an inequality by a negative number. In this case the inequality sign is reversed. That is, if  $x > y$  then

$$nx < ny \text{ if } n \text{ is negative}$$

and

$$x/n < y/n \text{ if } n \text{ is negative.}$$

The thinking behind this rule can easily be shown from the following examples:

i)  $8 > -3$  i.e 'eight is greater than minus three'.

But if we multiply through by  $-3$  say, then (i) becomes  $-24 < 9$  i.e 'minus twenty-four is less than nine'.

ii)  $-16 < 4$ , i.e 'minus sixteen is less than four'.

But if we divide by  $-4$  then (ii) becomes  $4 > -1$ .

For example, to find the set of values for which  $15 - 6x < 23 - 4x$  the following steps are applied:

$$-6x + 4x < 23 - 15$$

$$-2x < 8$$

$$2x > -8$$

$$x > -4.$$

The solution shows that any value of  $x$  greater than  $-4$  will satisfy the inequality.

In mathematics the notations and the rules governing their manipulations are important in thinking and stating things clearly, and form the basis for the skills involved in doing mathematics. In the field of physics the application of mathematical thinking skills is clearly self-evident.

Let us for example look at the relative velocity rule. This rule states that in a perfectly elastic collision the relative velocity before collision is the same as the negative of the relative velocity after collision. Using mathematical symbolism, skills and other known laws of motion, the rule can be derived as follows: By the principles of conservation of momentum

$m_1u_1 + m_2u_2 = m_1v_1 + m_2v_2$  (notice the use of mathematical symbols).

Putting like terms together (a mathematical thinking skill)

$$m_1u_1 - m_1v_1 = m_2v_2 - m_2u_2 .$$

Factorising (a mathematical thinking skill)

$$(i) m_1(u_1 - v_1) = m_2(v_2 - u_2) .$$

By the principle of the conservation of energy

$$1/2m_1u_1^2 + 1/2m_2u_2^2 = 1/2m_1v_1^2 + 1/2m_2v_2^2 .$$

Applying above mathematical thinking skill, therefore,

$$m_1(u_1^2 - v_1^2) = m_2(v_2^2 - u_2^2)$$

and

$$(ii) m_1(u_1 - v_1)(u_1 + v_1) = m_2(v_2 - u_2)(v_2 + u_2) .$$

Substituting (i) in (ii)

$$m_2(v_2 - u_2)(v_1 + u_1) = m_2(v_2 - u_2)(v_2 + u_2) .$$

Therefore

$$u_1 + v_1 = v_2 + u_2 ,$$

which gives the coil and recoil equation as follows:

$$u_1 - u_2 = - (v_1 - v_2) .$$

Similarly, the minimum velocity that a small mass must have in order to escape from a point in a gravitational field and reach infinity can be worked out by the application of mathematical thinking skills as follows:

The potential energy of a small mass at distance  $r$  from the centre of a large mass  $M$  is given by:

$$E_p = -GMm/r .$$

$E_p$  is the amount of energy the mass will need to just escape the gravitational field. If the mass is projected with a speed  $v$ , it follows that it will escape if:

$$(1/2)mv^2 \geq GMm/r ,$$

that is

$$v^2 \geq 2GM/r .$$

Hence the escape velocity  $v$  has magnitude given by

$$v = (2GM/r)^{1/2} .$$

The above examples demonstrate the abundance of mathematical thinking skills in the field of physics. Indeed the mathematisation of physics makes it difficult to draw a clear line between the two subjects. Generally mathematics plays an important role in the natural sciences and therefore it is expected that transfer and use of skills from mathematics to the natural sciences will be very strong. But can the same be said for acting or activities such as boxing, swimming or playing football? In other words is it possible to transfer mathematical thinking skills to the performance of, say, playing football?

Solving mathematical problems and playing football are very different sorts of activities and the

application of mathematical thinking skills as discussed above is inappropriate in playing football. In the latter the skills and judgements concerning what a footballer does cannot be adequately taught by breaking the skills down into various parts. In the process of scoring a goal the footballer does not go through a list of skills as is the case in solving mathematical problems. Similarly, the boxer does not consult a checklist before stepping back to avoid a punch aimed at his jaw, nor does he check his list before landing an uppercut.

An important aspect of thinking skills has to do with feeling, which is closely related to judgement. In attempting to score a goal the footballer must have the right kinds of feelings about how to handle the ball, in particular, how close to get to the goal post, when to shoot the ball and so on. Similarly the boxer must have a feel for the right moment to step aside or take a particular stance in order to block his opponent's blow or deliver the knockout punch. In exercising swimming skills the swimmer must also feel confident about the application of those skills. These feelings are specific to the fields in question and depend on being initiated into them.

The point that is being made in this section is that the possibility of transfer occurring across closely related domains cannot be denied due to the complex

interconnections between these domains and the way they share concepts. Where the domains are further apart one would expect less transfer. An example may be useful to emphasise this. A car and an aeroplane are modes of transportation, however it is clear that having the skill to drive a car does not necessarily imply that one can pilot an aeroplane. Of course one might be able to drive other cars or even a six-metre long articulated lorry. We can rightly assume that the fact that one can drive a normal motor vehicle means that such skills can be easily transferred to the handling of other normal motor vehicles. But, having such skills is of no particular use in piloting an aeroplane since being able to pilot an aeroplane does not necessarily depend on having motor vehicle driving skills. An aeroplane and a car are simply very different sorts of vehicles, even though both share activities related to the control of their movements such as for example, switching on the ignition in order to start the engine, acceleration, braking, etc. The issue regarding the transferability of thinking skills has played a major role in the debate on GTSSs.

### 10.3. A defence of general thinking skills

Much has been discussed in earlier chapters about difficulties in presenting a sound argument for the teaching of thinking as a subject in its own right. In spite of these difficulties interest in teaching thinking continues to grow, as suggested by Higgins and Baumfield(1998).

In their defence of general thinking skills, Higgins and Baumfield highlighted three kinds of arguments which in their view form the core of the major objections offered against general thinking skills. In this section brief descriptions of these arguments together with the responses by Higgins and Baumfield will be presented.

#### i) Argument (1) - A priori arguments.

A priori arguments relate to or involve deductive reasoning put forward in advance of any empirical evidence. Such arguments against general thinking skills are based on the premise that thinking must always be thinking about something.

For Higgins and Baumfield an apparent paradox is created as a result of the hidden dangers in a *priori*



arguments concerning general thinking skills. In attacking such arguments Higgins and Baumfield cite Zeno's paradox of Achilles and the tortoise as a forceful insight into the debate. They claim that although it seems logically impossible for Achilles to overtake the tortoise, it is clear that in the real world Achilles must overtake the tortoise because 'common-sense' tells us that if he is running faster and has enough time then he will obviously catch and overtake the tortoise. Similarly the logical arguments against general thinking skills cannot yet destroy the evidence for their existence.

ii) Argument (2) - Domains of knowledge argument.

The domains of knowledge argument is also an *a priori* argument with the special condition that not only must thinking always be thinking about something but this something must be domain-specific. This argument against the teaching of general thinking skills is based on Hirst's (1965) domains of knowledge theory (to be discussed later in Chapter 11).

According to Higgins and Baumfield, in order for such a theory against general thinking skills to be valid, the domains of knowledge must be mutually

exclusive, that is, they do not overlap or intersect in any way. Consequently, the burden falls upon those who hold this view to demonstrate the mutual exclusivity of the domains. For Higgins and Baumfield it is clear that the domains theory of knowledge does not necessarily imply that if thinking is always about X then this X is domain-specific.

iii) Argument (3) - Expert-Novice argument

The expert-novice argument is based on studies in the field of artificial intelligence reported by Chi (1982) and Hunt (1991) (highlighted in section 10.1). This argument states that experts use detailed subject-specific knowledge in solving problems within their particular areas of expertise rather than general thinking skills, thus invalidating the existence of such skills.

Higgins and Baumfield's objection is that it does not follow from this argument that novices need only more detailed subject-specific knowledge in order to become expert thinkers in a particular field. They argue that further investigations regarding the application of detailed specific knowledge by the expert are needed in

order to ascertain the strength of the expert-novice objection.

In general Higgins and Baumfield view these three arguments as insufficient to render further investigations in support of general thinking skills redundant. Their attempt to expose weaknesses in the above arguments against general thinking skills received a sustained response from Johnson and Gardner(1999) in opposition to their attempt.

#### 10.4. The case against general thinking skills

In this section the case against general thinking skills will be outlined. Before focusing on Higgins and Baumfield's response to argument (2) very brief comments will be passed on their view regarding arguments (1) and (3).

##### i) Comment on argument (1)

Johnson and Gardner(1999) noted that in the objections raised by Higgins and Baumfield it is not at all clear what they mean in their response to argument (1) that "logical arguments against general thinking skills cannot yet destroy the evidence for their existence." The fact still remains that there is no substantial evidence in support of the existence of general thinking skills, and consequently the claim by Higgins and Baumfield that there is such evidence only contributes to the erroneous argument against a priori objections to GTSSs.

ii) Comment on argument (3)

Higgins and Baumfield may have a case in claiming that novices do not only need more detailed specific subject knowledge, but they are mistaken in assuming that what is needed in addition is learning some general thinking skills. What separates experts from novices is not only their wealth of subject specific knowledge but also their long and sustained period of hard work, which involves among other things experience, persistence and determination in developing their understanding and feeling for their subjects. These good qualities of character cannot be taught simply as pure skills as in the case of writing or performing a headstand.

iii) Comment on argument (2)

Higgins and Baumfield's demand that if such arguments against general thinking skills are to be successful then the domains must be mutually exclusive only serves to confuse the debate further. In the extensive literature on teaching thinking skills those who argue against them do not deny that the domains are interrelated. Hirst(1974), whose influential work forms

the cornerstone of the domains of knowledge theory, made the point very clear that:

It was no part of the thesis even in its earliest formulation that the forms of knowledge are totally independent of each other, sharing no concepts or logical rules. That the forms are inter-related has been stressed from the start (p.89).

The point that has been made repeatedly is that although some types of thinking such as imaginative thinking appear in several domains, they take on particular characteristics within the different domains. As rightly indicated by Johnson and Gardner(1999), proponents of general thinking skills are influenced by what they called the 'Naming Fallacy'. This is the condition whereby the existence of a general label such as 'imagination', 'observation' or 'persistence' applicable to a range of activities leads to the assumption that there is a general thinking skill corresponding to the general label. But the activation of any of the above(i.e imagination, observation or persistence) in effective thinking is dependent on the agent having specific knowledge of some sort (this will be discussed further in Part Three).

### 10.5. Coming to terms with general thinking skills

In spite of Johnson and Gardner's excellent work in highlighting the major flaws in Higgins and Baumfield's argument, Johnson and Gardner are not willing to commit themselves to the position that general thinking skills do not exist. Their non-commitment to this position is clearly suggested in their response as follows:

And we must admit we have never knowingly argued that there is anything contradictory in the idea of GTSS (p436).

Johnson and Gardner are right in holding the view that there is nothing contradictory in the idea of GTSS but conclusive empirical evidence is required to substantiate their existence across all subject disciplines.

One of the major sources of confusion surrounding the discussions on GTSS is that writers fail to make it explicit in what ways their use of the term 'general thinking skills' is to be understood. For example Higgins and Baumfield stated that:

Recently, however, interest in the teaching of thinking has been expressed by the Qualifications and Curriculum Authority (QCA) who are considering the introduction of Critical Thinking into the post-16 curriculum and in the White Paper (Dfee 1997) which recommends "the systematic teaching of thinking skills".

One major barrier to the wholesale introduction of thinking skills has been the absence of sufficiently robust data to support the efficacy of thinking skills programmes in improving pupils learning in other aspects of the curriculum (transfer) (p.391).

Does Higgins and Baumfield's discussion of general thinking skills embody an unproblematic conception of critical thinking shared by all? In highlighting the various variations in the conceptions of reasoning, Govier(1988) identified six different approaches to the teaching of logic as follows:

- 1) *Formal Logic*; this represents the traditional subject of logic known to most students. It is taught using symbols and rules, and approximate equivalences between the symbols and expressions in ordinary language, such as "not", "if-then", "or", "all" etc. They are generally taught to test arguments represented symbolically for their validity.
- 2) *Discipline-specific Logic and Critical Thinking*; this approach advocates little need to teach critical thinking or even the evaluation of natural argumentation outside the various academic subjects of study.
- 3) *Informal Fallacies*; this is a natural approach to teaching logic in a more practical and appealing way than it is possible with formal logic.



- 4) *The General Argumentation Approach*; this approach attempts to teach the identification, interpretation, and evaluation of natural arguments of whatever type.
- 5) *The General Claims Analysis Approach*; this approach is underpinned by the idea that if one is going to claim to really teach critical thinking, it is certainly desirable to teach the critical analysis claims, definitions, and explanations as well as arguments.
- 6) *'Strong' Critical Thinking approach*; this approach demands that the conceptual frameworks or worldviews presumed be identified not only in the argument but also in the evaluator.

Although these approaches all focus on the analysis of argumentation, there are some variations in their conceptions of reasoning. It is important, therefore, that in view of these varied approaches to teaching critical thinking or reasoning skills writers are very clear about which approach they are referring to. Higgins and Baumfield in this case fail to do so. In view of such lack of information, how are we to understand their comment about "thinking skills in relation to the improvement of pupils' learning in other aspects of the curriculum"? What is suggested by their talk of thinking skills is a very general kind of skill that can be applied in any learning or problem-solving situation.

Johnson and Gardner equally fail to highlight this issue in their critical response to Higgins and Baumfield and as a result it is not clear how we are to understand the term 'general thinking skills'. This confusion runs through much of the writing on thinking skills. For example Sternberg's (1987) remark that:

Lipman's Philosophy for Children is designed to bring thinking skills into the everyday lives of children, blurring as much as possible the distinction between thinking as a subject for academic study and thinking as a part of one's everyday life (p.254).

What are we to make of the above remark? Frankly, we are being urged to view the Philosophy for Children programme (discussed in Chapter 5) as a general thinking skills programme far beyond its original ideals.

The temptation to generalise pervades much of what is presented in favour of thinking skills programmes. Some writers such as Pithers and Soden (2000), acknowledge that there is disagreement and an ongoing debate on the nature of thinking and the notion of transfer from one discipline domain to another, but they still cannot resist using the term 'critical thinking' not only "as defined in the literature" but also as a way of "summarising the generic abilities" which can be deployed flexibly in a wide range of work and life contexts. Whilst Pithers and Soden accept that the notion

of the generalisability of thinking skills is contested, Burden and Nichols (2000) state the contrary, that this is no longer disputed.

In an attempt to clarify the issues that contribute to the persisting debate on thinking skills Smith(2002) argues rightly that the notion of thinking skills has often been misapplied by supporters of GTS. Smith then goes on to describe thinking skills in terms of tasks as follows:

Thinking skills are used in the performance of thinking tasks, tasks requiring a considerable mental contribution for their performance (p.209).

Smith explains thinking tasks as follows:

A task is a job or piece of work, something that needs to be done. Most tasks involve both mental and physical activities, though their proportions vary considerably – chess versus rugby, for instance. Tasks that have a high degree of mental content, or where thinking is the key to success, can be thought of as 'thinking tasks'. Playing chess is a thinking task, as is writing poetry and planning a party (p.211).

It is clear from the passage above that for Smith playing chess involves a higher mental content than playing rugby, but this view is problematic. The fact that chess involves minimum physical activity in relation to playing rugby does not necessarily imply that playing rugby

involves a lesser mental content. In both cases making the right strategies and moves in the attempt to win require effective thinking as already highlighted in the first part of the thesis concerning the nature of thinking. Furthermore, in viewing thinking skills as tasks it is not clear how Smith accounts for contemplative thinking for example, since such thinking is not necessarily aligned to tasks, as already discussed in Chapter 2. On one hand, Smith rightly points out the fruitlessness of seeking a universal criterion for GTSS (ie across all fields of thought and practice) and on the other hand, he argues that thinking skills (ie those that are usefully applicable in "a majority of content domains") should be regarded as 'general' and on that basis be included in thinking skills programmes. In view of earlier discussions in Chapters 5 to 8 concerning the aims and proposed methods of delivery of the GTSS programmes, it is not clear how we are to understand Smith.

The lack of clarity surrounding what writers refer to as general thinking skills continues to sustain the ongoing confusion. There are some important points to be made here.

Firstly, this ongoing confusion is a direct result of writers substituting 'thinking' for 'reasoning'. Sternberg exemplifies this kind of confusion in his

comment above about blurring the distinction between "thinking as a subject for academic study and thinking as a part of one's everyday life." There are different types of thinking involved in dealing with the wider issues of life and these are much more complex than the type of thinking (i.e reasoning) studied as an academic subject.

Secondly, the different types of thinking discussed in Chapter 1 clearly highlight the complex nature of thinking. For example, sign-cognition as a type of thinking consists of certain features that distinguish it from contemplative thinking. Therefore to view thinking exclusively in terms of reasoning or contemplation, say, without regard to the different ways that it manifests itself can only result in erroneous conclusions about the concept. The multifacetedness of the notion of thinking illuminates the difficulty in the claim that there is a list of GTSS that can be applied to any given context (further comments will be made later). In supporting such a claim Higgins and Baumfield include the following items: observation, using evidence, being systematic. But are these qualities just purely skills? It can be argued that being observant also depends on keenness, attentiveness, carefulness say, and these are dispositional. The claim by Elliot(1975) that knowledge as a product of thought owes its successes to the operations of such mental powers as guesswork, pushing

ideas to their limits, shifts of perspectives, discovering objects of feeling and impressions and so on underlines the importance of dispositions. Such mental powers can be adequately understood in this way. One cannot consider these mental powers merely as skills that can be perfected through practice and exercise in the same manner as being able to whistle.

The ability to reason or think imaginatively, say, may involve certain skills (such as writing) that can be improved by exercise, but there are certain aspects of mental qualities involved in thinking that have very little to do with skills. For example, to be an imaginative thinker is not simply a matter of perfecting skills or techniques, it also involves dispositions such as patience, perseverance, courage etc. and a considerable knowledge of specific context(s) towards which the thinking is directed. Furthermore, as discussed in Chapter 1, one of the key characteristics inherent in thinking is that it involves intentionality, and as such it requires an intentional object. If (x) is an intentional object, then one's attention is directed towards that object (X), hence thinking involves attention being directed or focus on an object (X). The involvement of intentionality in thinking means that some knowledge regarding the object(X) is essential.

As already mentioned, there is nothing conceptually illogical about the idea of general thinking skills. But the assumption that there are easy and uncomplicated ways of improving the average pupil's standard of thinking contributes to the present confusion surrounding the teaching of GTSS. After all, we have established that having mathematical thinking skills can be very useful in physics, for example, and perhaps other related subjects. Smith(2002) also highlights this point. However, the transferability of mathematical thinking skills to other related subjects must not be taken to mean that such skills are transferable to any context; it must be understood to mean *transferable to some other related context(s)*. In seeking the most effective way to promote pupils' thinking we stand to gain much in our clarification and understanding of what it means if we resist the use of the phrase 'general thinking skills' as the term of reference.

The skills we learn form part of our experiences and these in turn shape our characters and the sorts of persons we become. For example, when one acquires the martial art skill of Aikido, one's character is transformed in certain ways by the experiences of the skill gained in that one becomes more confident as the skill becomes part of one's way of life. In the same way, gaining any skill such as for example, writing, composing

poems, swimming, horse riding, piano playing, singing in tune, speaking a foreign language, driving a car, piloting a jumbo jet, calculating the integral of a hyperbolic function, advancing theories in cosmology, analysing human genetic material, performing key-hole surgery, making friends and so on, informs and shapes our characters and our outlook on life. Just as the different kinds of food items that we eat contribute to the maintenance of our bodies so, too, the skills that we learn contribute to the shaping of our attitudes and characters in relation to the way we say and do things. Little account is taken by supporters of general thinking skills (Barrow,1987) of the extent to which understanding, dispositions, values and emotional maturity are involved in the acquisition of nearly all skills.

To think effectively requires one to be in possession of knowledge relevant to the particular object of thought together with the appropriate dispositions. These essential ingredients form the basis upon which any successful engagement in thinking can take place. These factors will form the basis of the discussion in Part Three of the thesis.



## 10.6. Rethinking teaching thinking

What has emerged from the discussions above is the profound confusion and difficulty surrounding the conceptual and practical soundness of some of these programmes. The immense contribution of these programmes to the debate on how the young of today can be guided to become effective thinkers of tomorrow cannot be denied. Nevertheless the bid by these programmes to project themselves as subjects of study in their own right has failed, simply because of their assumption that it is only in this way that teaching and learning to think effectively can flourish.

The idea that thinking can be taught as a skill forms a major assumption running through the works of those in favour of teaching thinking as a subject, but is this assumption justified?

A moment's reflection on what is meant by thinking makes it clear that it ranges over more than just a single notion. The discussion in Chapter 1 clearly indicated the multitude of meanings that the notion of thinking can be understood to embody.

Proponents of general thinking skills often present a list of skills to be mastered as a major part of their programmes. For instance, Lipman (discussed in Chapter 5)

listed over thirty skills which children should learn. Similarly, DeBono (discussed in Chapter 6) and Feuerstein (discussed in Chapter 7) each have lists of skills to be mastered. The idea that by learning and mastering the itemised list of skills one can become an effective thinker, capable of bringing such thinking to bear on any domain, can be traced back to Dewey's (1933) writing on the topic. In developing what he called 'reflective thinking' (discussed in Chapter 1), Dewey produced a list which he regarded as forming the steps in the process of thinking as follows:

- 1) Recognising the existence of a difficulty.
- 2) Locating and defining the difficulty.
- 3) Finding possible solutions.
- 4) Refining the possible solution(s) by reasoning.
- 5) Reviewing the result and drawing conclusion.

What was central for Dewey was that the mind should be skilled in strategies for attacking and solving problems. From the discussion in Chapter 1 it is clear that reasoning is a subset of thinking, so to reduce thinking to the mastering of a list of reasoning skills can only result in inconsistency and confusion.

If helping students of all ages to become more effective thinkers is important, we must rethink teaching thinking so as to secure a firm foundation for its development. One of the key elements in this is the

examination of the nature of thinking. Given this, it is alarming that in the vast literature on teaching general thinking skills, there are only very limited in-depth discussions on the nature of thinking. What has been established in this Part of the thesis is that

1. General thinking skills programmes have been unable to provide convincing evidence for the effectiveness of their programmes.

2. Any conception of thinking and its teaching and learning must embrace knowledge of various contexts as well as the acquisition of the appropriate dispositions.

## **SUMMARY OF PART TWO**

In Part Two of the thesis the focus has been on the various programmes devised for the promotion of thinking as a curriculum subject.

These programmes are in some cases underpinned by theoretical framework(s) and in Chapter 4 two main frameworks were considered. In Chapter 5 Lipman's Philosophy for Children was discussed with some detailed evaluation of some of the studies that are used in

support of the programme. In Chapter 6 the focus was on the basis on which DeBono's CoRT programme is considered to be effective for teaching thinking. Chapter 7 concentrated on Feuerstein's instrumental enrichment and some of the issues in its use beyond special educational needs. In Chapter 8 CASE was discussed and the importance of good teaching rather than the use of special thinking skills programme was highlighted. In Chapter 9 the focus was on the teaching of thinking skills in formal education with particular discussion of the current official interest in teaching such skills in state schools in England. Chapter 10 concentrated on the general thinking skills debate and concluded that although the existence of general thinking skills is not logically impossible there is no sufficient or good empirical evidence for them.

What remains problematic is the assumption that since we can talk about general thinking skills then we must be able to teach them generally across any context, regardless of knowledge specific to the context. We now turn to Part Three of the thesis.

## **PART THREE**

### **ON THE DEVELOPMENT OF THINKING**

The development and transfer of thinking across different domains form a major part of the programmes promoting general thinking skills.

These programmes radiate confidence in the existence of general thinking skills that can be taught. But whether there are such skills that can be applied to any domain without recourse to specific knowledge within domains is highly debatable, as suggested in the earlier chapters of the thesis.

In this part of the thesis the discussion will explore the necessity of knowledge and the importance of courage and other dispositions in thinking effectively. This is followed by considerations about the promotion of thinking in formal education.

## CHAPTER 11

### THE NECESSITY OF KNOWLEDGE

#### 11.1. The Concept of Knowledge

In view of the vastness of the literature on knowledge only a brief account of the concept will be presented in this section. It is not the intention to present a comprehensive account, but merely to provide a background for the main discussion on the necessity of specific knowledge in effective thinking.

In order to think effectively relevant knowledge of some sort is required. As already mentioned, there are different types of thinking and these depend on specific knowledge among other things. For example, thinking effectively in mathematics depends on some specific knowledge of mathematics. Similarly, being able to think effectively in playing chess depends on knowing how to play chess, and in the same way being able to think effectively in legal matters depends on having knowledge of law.

In our ordinary conversations we use the word "to know" in a number of different ways. For example, we talk of:

- a. Knowing Tony Blair
- b. Knowing London
- c. Knowing how to play the piano

d. Knowing how to solve mathematical problems involving calculus.

e. Knowing that London is the capital city of Britain.

f. Knowing that the moon revolves round the earth

These examples are only a small sample of the different ways in which the word is used, and what this indicates is the wide range of our everyday concept of knowing. From the sentences above it is not difficult to observe the different meanings that the word brings out. In one sense, 'to know' as in sentence (a) and (b) means to be familiar with; however, the degree of familiarity may vary. One can say one knows Tony Blair although one has never met or spoken to him before except viewing him in the media. In this case one's knowledge of Tony Blair is limited to the experiences of seeing him, in the media. In another way one can know by actually having first hand experience. In this case one knows Tony Blair as a result of one's familiarity with him in the sense that not only is one able to recognise him on seeing him, but more importantly one has had the experience of being in his company on one or several occasions. However, to know London, in this sense of being familiar, may prove to be more complicated, since 'knowing London' might simply mean that one is acquainted with London or it might mean that one has the skill or competence to find one's way around London geographically, historically or socially. Therefore to say that one knows London might mean that one knows it in both the skill and familiar senses of knowing.

In a second sense, 'to know' as in sentence (c) and (d) involves having some skill or competence. Hence to know how to play the piano involves demonstrating the skill in action. Similarly, to know how to solve mathematical problems involving calculus means that given such problems one has the skill or competence to solve them successfully. It is this skill or competence that is involved when one is said to know how to do or say something.

In a third sense, 'to know' as in sentences (e) and (f) involves the acquisition of some true information (Lehrer, 1974). Hence for one to know that London is the capital city of Britain involves having correct information about London and Britain. Similarly, knowing that the moon revolves round the earth involves having the correct information about the moon and the earth. Since this sense of knowing forms the largest part of the philosophical literature on the concept of knowledge, further discussion of this kind of knowledge will be undertaken.

Knowing what to do or feel is another kind of knowledge. It involves the ability to do and feel what is right in terms of moral choice (Scruton, 1996). As noted earlier, there are many varieties of knowledge and the examples given above represent but a small selection.

Philosophers describe the kind of knowledge that applies to our belief and convictions in the statements we make (as in our earlier examples (e) and (f)) as knowledge of truths. In the same way they refer to the knowledge which is not



entirely linguistic but involves knowing people, places or feelings as in examples (c) and (d) as knowledge of things. Russell (1912) described knowing by personal experience as 'knowledge by acquaintance' and knowing through some verbal account as 'knowledge by description'. For some philosophers (Russell, 1912; O'Hear, 1985) knowledge by acquaintance is fundamental to knowledge of description, because knowing, for example, that bananas change from greenish colour to yellowish colour when they ripen involves acquaintance with greenness and yellowness and the other things that make up the features of a banana. However, the idea that there can be such knowledge by acquaintance is debatable and is not shared by all philosophers (O'Connor and Carr, 1982).

What is common among philosophers is the desire to distinguish knowledge into theoretical and practical versions, commonly known as 'knowing that' and 'knowing how'. These are terms popularised by Ryle (1949) and Hartland-Swann (1958). Knowing how involves being able to perform a skill and this need not require any verbal ability as seen in example (c), whereas the need to verbalise what one knows is important, for example, in knowing that the moon revolves round the earth. In most philosophical discussions theoretical knowledge forms the basis of the standard analysis of knowledge, and the argument in its defence is that practical knowledge requires theoretical knowledge. For example, knowing how to play the piano involves knowing that the piano keys must be pressed down in order to sound a note.

Similarly, knowing how to bake a cake involves knowing that eggs are required for baking the cake. In the next two subsections the focus will be on further discussions of theoretical and practical knowledge.

#### 11.1.1. Theoretical knowledge

Much of the analysis of knowledge in the literature seeks to explain the conditions that one must satisfy and how it may be done in order for one to claim knowledge that. A common definition sets three conditions for knowledge, referred to as the belief condition, the justification condition and the truth condition:-

X knows that (*p*)

if and only if

(a) (*p*) is true

(b) X believes that (*p*) is true

(c) X is justified in believing that (*p*) is true

These conditions jointly define knowing that, and as such form the necessary and sufficient conditions of knowledge.

The conditions provide an important way into the analysis of

knowledge but the existence of counter-examples to these conditions presents some difficult problems for the standard analysis of knowledge as justified true belief. However, it is not the intention in this discussion to delve into any detailed discussions of the conditions and their shortcomings but to merely present a very brief and very general overview of the concept.

Although there is no question about the necessity of the first condition for knowledge that '(p) is true', there are issues relating to the rest of the conditions defining the traditional theory of propositional knowledge.

Some philosophers have argued that a person may know that (p) is true without believing that (p) while others have opposed it (Lehrer, 1974). The popular example used to show that 'X can know without believing that (p)' is where a person gives correct answers to questions without a hint of confidence or conviction that this is the true answer.

Concerning the third condition - 'X is justified in believing that (p) is true', one can imagine cases that are true but not well founded. For example, a person might believe that certain lottery numbers are going to be the winning numbers simply because he/she dreamt it. Even when the numbers appear as the winning numbers we would hardly say that this person's belief, regardless of the firmness with which he held it, amounted to knowledge since the grounds for the dream were not properly justified. This is why the third condition is held to be necessary. But a problem concerning

this condition arises where someone 'just knows'. That is, they are sure in their minds about certain things and are consistently right about them but are unable to provide justifications for their belief. A popular example of this type of situation is that of the spiritualist medium with clairvoyant powers who makes clear, definite and true claims regarding the whereabouts of certain objects or states of affairs elsewhere.

The level of justification required before we can talk of knowledge is also another source of difficulty. For example, if we conclude that X's justification for believing that  $(p)$  must entail the truth of  $(p)$ , then this leads to an infinite regress since the truth of  $(p)$  may depend on the truth of  $(p')$  which in turn depends on  $(p'')$  and so on. Attempts have been made by philosophers to formulate the third condition so as to be general enough to allow for at least some cases in which the appropriate grounding of X's true belief does not lock into a regress. Ayer (1956) presented an example of this attempt as follows:

The necessary and sufficient conditions for knowing that something is the case are first that what one is said to know to be true, secondly that one be sure of it, and thirdly that one should have the right to be sure (p35).

This refinement of the conditions of knowledge allows for the right to be sure under circumstances that may vary with subject matter, expertise or standards of rigour. However,

there still remains a difficulty. For example, in the case of the spiritualist medium mentioned earlier, we may in the end say that she has the right to be sure, though not for any other reason except that she is right about the things that she claims to know. It is not difficult to establish that having the right to be sure forms a necessary condition of knowledge. It is not, however, sufficient in the sense that one may have the right to be sure of something if one believes it to be true on the best of authority, yet what one thinks one knows may turn out to be false and is not for that matter knowledge.

There are many things we know for which we have no adequate justification. Consequently the plausible existence of unjustified knowledge continues to be problematic for the traditional theory of knowledge. There are further questions about the sufficiency of the conditions of knowledge presented in the standard definition. Gettier(1967) described a set of cases that suggest that the traditional theory must be wrong, because even when all the conditions are met as well as they could be, this still does not guarantee a case of knowledge. Gettier used his examples to suggest how the traditional theory of knowledge fails to state a sufficient condition for someone's knowing a given proposition. Gettier himself draws no implications from his examples but the difficulties involved in producing a criterion have led to various theories (Scruton,1996)

designed to distinguish reliable beliefs from unreliable ones.

### 11.1.2. Practical knowledge

By contrast with theoretical knowledge, as already mentioned in our earlier discussions, practical knowledge is to do with procedure. This kind of knowledge cannot be analysed as if it involved belief, justification and truth. In other words, it cannot be treated in the same way as the propositional case where X knows that so and so is the case. The procedural case where X knows how to do something involves the demonstration of skill(s) or competence(s).

Knowing how to do X is a matter of skill or technique. It represents the possession of a learned capacity or competence that is rationally exercised. In other words, this kind of knowledge is relevant only to cases where training is typically involved in a gradual way by means of repeated performances or trials.

Having a skill or technique is very different from *knowing that* the skill involves x and y. For example, a person might well have all the relevant information about riding a bicycle without having the actual skill of riding one.

It has already been said that *knowing how* to do something involves a procedure. In considering how this procedure works Ryle(1949) asked,

What is involved in our descriptions of people as knowing how to make and appreciate jokes, to talk grammatically, to play chess, to fish or to argue? Part of what is meant is that, when they perform these operations, they tend to perform them well, i.e correctly or efficiently or successfully. Their performances come up to certain standards, satisfy certain criteria. But this is not enough. The well-regulated clock keeps good time and the well-drilled circus seal performs its tricks flawlessly, yet we do not call them 'intelligent'. We reserve this title for the persons responsible for their performances. To be intelligent is not merely to satisfy criteria, but to apply them; to regulate one's actions and not merely to be well regulated (p29).

For Ryle we learn how through the cycle of example, practice and criticism, hence *knowing how* can be understood in terms of intelligent and skilful procedure, which, as already mentioned in section 1.2 of Chapter 1, would be commonly described as involving thinking what one is doing while one is doing it.

In contrasting intelligent performances with habits, Ryle wrote:

The ability to give by rote the correct solutions of multiplication problems differs in certain important respects from the ability to solve them by calculating. When we describe someone as doing something by pure or blind habit, we mean that he does it automatically and without having to mind what he

is doing. He does not exercise care, vigilance, or criticism. After the toddling-age we walk on pavements without minding our steps. But a mountaineer walking over ice-covered rocks in a high wind in the dark does not move his limbs by blind habit; he thinks what he is doing, he is ready for emergencies, he economizes in effort, he makes tests and experiments; in short he walks with some degree of skill and judgement. If he makes a mistake, he is inclined not to repeat it, and if he finds a new trick effective he is inclined to continue to use it and to improve on it. He is concomitantly walking and teaching himself how to walk in conditions of this sort. It is of the essence of merely habitual practices that one performance is a replica of its predecessors. It is of the essence of intelligent practices that one performance is modified by its predecessors. The agent is learning (p.42).

Ryle's distinction between habits and intelligent performances is characterised by practice and criticism in the sense that in performing intelligently the agent is always learning, criticising and improving performance through practice. This distinction is of considerable interest from an educational point of view particularly with regards to the development of thinking, as will be seen in the proceeding chapters.

The brief outline of the concept of knowledge presented above is intended to provide a basis for discussing the importance of knowledge in thinking.



## 11.2. The need for knowledge in thinking

The suggestion from the above section is that knowing that something is the case and knowing how to do something are connected to specific contexts. However, it is evident from the way some general thinking skills programmes (e.g CoRT) attempt to teach their materials that they tend to assume there is no need for knowledge in learning to think effectively. The idea that thinking can be taught as a general subject of study fails to recognise the complexities involved with respect to knowledge and its importance in thinking. Mankind's struggle not only to survive, but also to appreciate and value the world as it is, generates the need for, and the accumulation of, knowledge, and its subsequent refinement and transfer to the next generation through education.

Let us dwell for a moment on the centrality of knowledge in thinking. In considering what constitutes thinking in Chapter 1 it was noted that the importance of intentionality in thinking presupposes the use of concepts, and it is not difficult to show that to think at all about something involves having some idea(s) about that something. For instance, to think about catching the 12noon train from Euston station to Barnet first of all involves knowing what a train is. Similarly to think about riding a bicycle involves knowing what a bicycle is.

One cannot think about a mobile telephone without knowing how to recognise a telephone or more precisely a cordless one. On the same account, one cannot think about a square table without knowing how to recognise squareness or table. The importance of concepts in the notion of intentionality means that the different types of thinking discussed in Chapter 1 do involve knowledge and understanding. This will be clear from the following examples.

1) As already discussed in Chapter 1 sign-cognition is a type of thinking that is closely connected to practical behaviour. This type of thinking is presented in an example given in Chapter 1 of a marksman shooting a snipe. To be able to shoot a snipe the marksman must first have some knowledge of snipe and their movement in order to estimate their flight pattern.

2) Reasoning generally involves trying to find a solution to a problem. This type of thinking could take the form of practical or theoretical reasoning. Practical reasoning, where the emphasis is on bringing about some good, requires knowledge for the attainment of that good. For example, trying to fit a lock and handle to a door in the first instance involves knowledge of what a lock and handle is, and secondly knowledge of how to fit the lock and handle. Similarly, the structural engineer who is confronted with the problem of saving a subsiding building from collapsing

requires knowledge of building structures and knowledge of how to distribute weights and forces acting on the building. Where the emphasis is not directly on bringing about some practical good but rather on illuminating truth and understanding, the reasoning involved is theoretical reasoning. To prove that a prime number is divisible by only 1 and the prime number itself depend on knowing what a prime number is, knowing about the number system and knowing how to construct a mathematical proof. It is not necessary to show that theoretical reasoning is a sub-species of practical thinking. However, what is important to note is that in both cases knowledge specific to the problem being solved is crucial.

3) Our earlier discussion of the imagination indicated various ways in which thinking can be described as involving imagination. For example, being able to form a novel hypothesis and follow new or alternative lines of inquiry requires knowledge of what is generally believed to be the case. For instance, the Ptolemaic conception of the universe based on the notion that the earth was the centre of the universe dominated the minds of learned people for more than a thousand years until Nicholas Copernicus challenged the established view by successfully following alternative line of inquiry regarding the earth and its position in the solar system. According to Reichenbach (1942) the significance of Copernicus lies precisely in the fact that he broke with

traditional belief which appeared to be supported by compelling sensory experience. The success of Copernicus in initiating a scientific revolution was rooted in his vast command of scientific knowledge of the time. Reichenbach commented on the success of Copernicus as follows:

He could do it only because he had at his disposal a considerable amount of accumulated scientific thought and scientific data, only because he himself had followed the road of disillusionment in knowledge before he glimpsed new and broader perspectives (p.13-14).

What is clear is that the key to effective thinking when considering alternative lines of inquiry lies in the possession of relevant specific knowledge.

To be able to image depends on having concepts of some sort. Thus being able to imagine a barking dog depend on knowing what a dog is and being able to recognise the sound of a barking dog, and in the same way being able to imagine a tall ship depends on knowing what a ship looks like. Being able to imagine the smell of roses depends on knowing what roses smell like. The different ways in which knowledge is used in the different forms of imagining yet again highlight the complex ways in which thinking depends on knowledge.

4) In contemplating, attention is focused on particular objects of contemplation. These could be of God, sounds, pictures, natural scenes and objects such as animals, plants

etc. For example, the contemplative listening to music, say Beethoven's fifth symphony or last string quartets, depends on having some knowledge and understanding of his music.

Similarly, to contemplate the impact of the work of Copernicus in shaping how we view the universe depends on knowing his work and the challenges that he had to overcome.

What is clearly obvious in all the examples discussed above is the importance of knowledge in each of the different types of thinking.

In view of the above discussion, developing effective thinking within and across domains requires the acquisition of knowledge within an extensive and thorough education. The kind of education envisaged would involve the study and acquisition of both practical and theoretical types of knowledge for example knowing how to read, write, calculate and live in multicultural settings and knowing that history is important in shaping our lives.

Contrary to the view that is often disseminated by proponents of teaching thinking programmes, the nature of such an extensive and thorough education is that it requires years of considerable endurance and dedication to hard work. This brutal fact cannot be glossed over by pretending there are short cuts to acquiring such knowledge, for there are none.

The process of adhering to certain standards in trying to get things right is part of the aspect of education which R.S.Peters called 'initiation'. For Peters, this initiation

is always into some body or collection of knowledge and the process by which this body of knowledge is gained requires effort in upholding standards enshrined in the living body of knowledge by reference to which it is possible to feel, think and act with varying degrees of taste, relevance and skill.

In education the curriculum subjects provide the means by which the different types of knowledge are attained. In mathematics for example, geometry is not only concerned with *knowing that* the sum of the three interior angles of any triangle equal 180 degrees but also *knowing how* to construct a triangle. Similarly, history involves knowing how to construct a historical account although it is mainly concerned with *knowing that* events in the past occurred in some particular order. In sports education the emphasis is on *knowing how* to play sports.

The way of thinking in a specific subject of study is largely dependent on some knowledge of the subject and on the different types of thinking that form the basis of that subject. For instance, in mathematics having some basic mathematical skills is important to how we think in the subject. On the other hand, however, the way we think in the subject forms the basis for gaining a deeper understanding and knowledge of the subject. The different types of thinking involved in coming to gain further mathematical understanding and knowledge include reasoning (following rules), imagination (supposing, hypothesising and in some instances picturing) and contemplation (appreciating proofs).

In thinking mathematically reasoning is needed for presenting rigorous logical arguments and also for following basic rules that guide a mathematical procedure. The use of imaginative thinking in mathematics is very important where the solution or understanding of a problem not previously encountered is required. Contemplative thinking in mathematics is essential in coming to appreciate the simplicity and beauty of some mathematical results. What is crucial in the effective deployment of these different types of thinking in the subject is having some knowledge of the subject.

Similarly, in cookery reasoning is called for in following rules governing the sequence in which ingredients in a recipe are applied. It also involves imaginative thinking in the creation of new and exciting recipes, and in most cases where the ingredients need to be applied in a particular way this calls into action the use of sign-cognition. What this indicates is that *knowing how* to cook well involves different types of thinking, but that these different types of thinking depend on some knowledge of cookery.

The subtle ways in which the different types of thinking mesh within a subject domain show that thinking in a particular domain requires some knowledge relevant to that domain. For example, in history, being able to think historically depends on having some historical knowledge which consist in knowing the relevant facts about past events

and also knowing how to interpret these facts in the present. For Collingwood (1986) history is a special form of thought and therefore to think historically requires historical knowledge. Collingwood argued that:

Historical knowledge is the knowledge of what mind has done in the past, and at the same time it is the redoing of this, the perpetuation of past acts in the present. Its object is therefore not a mere object, something outside the mind which knows it; it is an activity of thought, which can be known only in so far as the knowing mind re-enacts and knows itself as so doing. To the historian, the activities whose history he is studying are not spectacles to be watched, but experiences to be lived through in his own mind; they are objective, or known to him, only because they are also subjective, or activities of his own (p.218).

Thinking historically as suggested by Collingwood includes knowing how to re-enact the past. To do this involves being able to think not only critically but also imaginatively.

What emerges from the present discussion is the affirmation of the complex nature of thinking as already indicated in Chapter 1. Although knowledge is a product of thinking, still the way in which knowledge and thinking interact remains very complex. This high level of complexity is evident from the way in which on the one hand knowing is a goal of thinking in such cases as solving a problem, pursuing truth etc, and on the other hand, it is crucial as a precondition for thinking, as in the example given earlier regarding the necessity for mathematical skills on thinking mathematically and vice-versa.



The seductiveness of the rationale underpinning the general thinking skills programmes is very clear. It emanates from the fact that no one is capable of knowing all there is to know about everything, together with the fact that we are incapable of predicting what kinds of knowledge might be required for particular situations in the future. Thus the general thinking skills approach promises to teach certain general principles which students can apply to all areas of human knowledge and in the process overlooks the complexities highlighted above. This approach contrasts with attempts to promote effective thinking through the body of knowledge as presented in the established traditional fields of study. In the attempt to bypass these, the case for the general thinking skills approach is greatly weakened.

### 11.2.1. Domain specificity of knowledge

The position that without any specific or related knowledge about (X) it is impossible to think effectively about that (X) has been argued for in various ways by philosophers (McPeck, 1981 ; Barrow, 1987). However, these philosophers do not themselves provide explicit theories in support of this position. The most significant theory to be deployed in support of the domain specificity of knowledge is Paul Hirst's (1965) 'forms of knowledge' theory.

The 'forms of knowledge' theory holds that a good problem-solver, an imaginative thinker or a critical thinker is a person who has a thorough understanding of the 'logic' of a specific form of knowledge and as such is capable of applying it in ways which can be described as imaginative, critical or effective. Since each form has its own logic, being a critical thinker, an imaginative thinker or an effective thinker conforms to the logic of a specific form of knowledge.

Hirst listed four distinguishing features by which a developed form of knowledge can be identified. These features are as follows,

- 1) There are a group of core concepts that are peculiar in character to the form. Thus gravity, acceleration, hydrogen, and photo-synthesis are characteristics of the sciences; number, integral and matrix are characteristics of

mathematics; God, sin, and predestination of religion; ought, good, and wrong of moral knowledge; and so on.

2) Each form has its own distinct logical structure by which concepts can be related.

3) Each form has its own distinctive expressions, which are testable against experience.

4) Each form has its own particular techniques for exploring experience and testing its statements.

By using these distinguishing features Hirst classified the various distinct forms of knowledge as mathematics, physical sciences, human sciences, history, religion, literature and the fine arts and philosophy.

One of the important aspects of Hirst's thesis is that it helped to shape discussions on the curriculum particularly in terms of its justification and taxonomy. The various critical comments on the inadequacies of the thesis resulted in Hirst's (1974) further clarification and minor modification of the original thesis, for example by omitting the fourth distinguishing feature of a form of knowledge.

In spite of this subsequent clarification, there have been further critical views (Elliott, 1975. O'Hear, 1981. Kleinig, 1982) of the 'forms of knowledge' thesis. For example, in rejecting Hirst's view, Elliott (1975) argued that the most fundamental development of mind is the development of the powers of the mind and it is possible for this to occur outside the various forms of knowledge. According to Elliott such mental powers include among others those of

retention and anticipation, synthesis and synopsis, discovery of structure, discovering the objects of feelings and impressions, guesswork, pushing ideas to their limits, shifts of perspectives and so on. For Elliott the forms of knowledge owe their origin, character and achievement to the operations of the mental powers. But does Elliott's theory lend support to the existence of general thinking skills?

The operations of the mental powers are generally important to our existence, so it is not useful to use such factors to support arguments for the existence of general thinking skills because life is something that we have as a necessary condition for being alive, and to be alive is not something that one learns to do. For the same reason some of Elliot's powers of the mind, such as, for example, retention and anticipation, are necessary conditions of living that we are born with and therefore need not be considered in the discussions. However, others such as pushing ideas to the limit and shifts of perspectives are not necessary conditions but are tied to specific contexts.

In spite of the inadequacies of the theory put forward by Hirst, it still remains a powerful thesis in highlighting the point about the need for knowledge in effective thinking. This thesis views the principles inherent in Hirst's theory as relevant to the point made earlier that effective thinking in X requires at least some knowledge of X. To highlight further the importance of specific knowledge in effective

thinking let us consider an example from the field of mathematics.

#### **11.2.1.1. Effective thinking in mathematics**

Throughout the history of mathematics new ways of thinking in the subject have always depended on detailed knowledge of the domain and its applicability. In explaining the process of his own mathematical creativeness, Henri Poincaré (1952) clearly indicated the importance of detailed mathematical knowledge in his thinking. He wrote:

Often the mathematician uses a rule. Naturally he begins by demonstrating this rule; and at the time when this proof is fresh in his memory he understands perfectly its meaning and its bearing, and he is in no danger of changing it. But subsequently he trusts his memory and afterward only applies it in a mechanical way; and then if his memory fails him, he may apply it all wrong. Thus it is, to take a simple example, that we sometimes make slips in calculation because we have forgotten our multiplication table (p.34).

If we ask what mathematicians require in the use of rules we will find among other things a detailed knowledge of the subject matter. It is on the basis of this knowledge that thinking mathematically and the subsequent creation of new ideas in the subject occurs, as Poincaré clearly suggests:

For fifteen days I strove to prove that there could not be any functions like those I have since called Fuchsian functions. I was then very ignorant; everyday I seated myself at my work table, stayed an hour or two, tried a great number of combinations and reached no results. One evening, contrary to my custom, I drank black coffee and could not sleep. Ideas rose in crowds; I felt them collide until pairs interlock, 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 out the results, which took but a few hours (p.36).

He goes on to say:

Now we have seen that mathematical work is not simply mechanical, that it could not be done by a machine, however perfect. It is not merely a question of applying rules, of making the most combination according to fixed laws. The combinations so obtained would be exceedingly numerous, useless and cumbersome. The true work of the inventor consists in choosing among these combinations so as to eliminate the useless ones or rather to avoid the trouble of making them, and the rules which must guide this choice are extremely fine and delicate (p.39).

Poincaré's observations clearly indicate that problem-solving ability does not develop in a vacuum. It needs a wealth of background knowledge before it can operate effectively. This point was also emphasised by Polya(1957) as follows:

We know, of course, that it is hard to have a good idea if we have little knowledge of the subject, and impossible to have it if we have no knowledge.

Good ideas are based on past experience and formerly acquired knowledge. Mere remembering is not enough for a good idea, but we cannot have any good idea without recollecting some pertinent facts; materials alone are not enough for constructing a house but we cannot construct a house without collecting the necessary materials. The materials necessary for solving a mathematical problem are certain relevant items of our formerly acquired mathematical knowledge, as formerly solved problems, or formerly proved theorems (p.9).

The sequential nature of mathematics demands the acquisition of prior knowledge in order to think and solve mathematical problems. For example, in elementary geometry knowing the definitions, axioms and propositions and being able to prove important theorems is crucial in understanding the topic. Similarly, knowledge of the theory of numbers requires thorough understanding of the basic units of number and the various ways in which they can be combined. Until this important body of mathematical knowledge is acquired, thinking in the subject is greatly limited. A glance at the following typical mathematical problem on isomorphism should make the point clearer.

Prove that the groups given by the following multiplication tables are isomorphic.

$$G : \begin{array}{c} \phantom{G :} \\ \phantom{G :} \end{array} \begin{array}{cc} & -1 & 1 \\ -1 & \begin{array}{|c|c|} \hline 1 & -1 \\ \hline \end{array} \\ 1 & \begin{array}{|c|c|} \hline -1 & 1 \\ \hline \end{array} \end{array}$$

$$H : \begin{array}{c} \phantom{H :} \\ \phantom{H :} \end{array} \begin{array}{cc} & 0 & 1 \\ 0 & \begin{array}{|c|c|} \hline 0 & 1 \\ \hline \end{array} \\ 1 & \begin{array}{|c|c|} \hline 1 & 0 \\ \hline \end{array} \end{array}$$

A typical way in which a seasoned mathematician would solve this problem is as follows:-

Let  $\mu: G \rightarrow H$  be defined by  $1\mu = 0, -1\mu = 1$ ;

then  $\mu$  is one-to-one and onto mapping. We need to check that  $(g_1 \cdot g_2)\mu = g_1\mu g_2\mu$  for all possible choices of  $g_1$  and  $g_2$  in  $G$  i.e we must check that:

(i)  $(1 \cdot 1)\mu = 1\mu 1\mu$



$$(ii) \quad (-1.1)\mu = (-1\mu)(1\mu)$$

$$(iii) \quad (-1.-1)\mu = (-1\mu)(-1\mu)$$

$$(iv) \quad (1.-1)\mu = (1\mu).(-1\mu)$$

(i), (ii), (iii) and (iv) hold.

Thus for (i):  $1.1 = 1$  by the multiplication table.  $1\mu = 0$ .

$1\mu.1\mu = 0.0 = 0$  hence (i) holds.

Therefore  $G$  is isomorphic to  $H$ .

Is it possible for the mathematically unsophisticated to solve this problem by simply relying on general thinking skills? Clearly in order to solve this problem it is important to have some specific knowledge about the topic. At least one would have to know that:

1. A typical group( $G$ ) is a non-empty set with a binary operation and the following properties,

(i) it has a unique identity element

in other words  $x.1 = x = 1.x$  for all  $x$  in  $G$

(ii) for every choice of the elements

$x, y, z$  in  $G$ ,  $(x.y).z = x.(y.z)$

(iii) every element  $x$  in  $G$  has an inverse  $y$  in  $G$  such that  $x.y$

$= 1 = y.x$  where  $y=1/a$ .

2. Isomorphism is a one-to-one and onto mapping therefore isomorphic groups are roughly the same except for the names of their elements.

The preceding discussion shows that for thinking to be effective it requires the acquisition of relevant knowledge. However, having knowledge alone does not necessarily mean that it will be applied whenever the need arises. Where knowledge is applied in thinking effectively courage plays an important role. Although this claim is mainly psychological, its importance is clear in thinking which leads to imaginative results. Arriving at an imaginative or original result involves some element of uncertainty and risk of failure, thus courage is important in order to persist in spite of the risks of failure. A further discussion of courage will form the focus of the next chapter.

## CHAPTER 12

### THE IMPORTANCE OF COURAGE

#### 12.1. The dispositions in thinking

In this chapter the focus will be on courage as an important dispositional quality in thinking. The dispositions in general play a considerable role in thinking and are essential in any attempt to find ways to support pupils in learning to think effectively.

Ryle(1949) gave some useful examples of dispositional properties such as the brittleness of glass and the solubility of sugar. The brittleness of glass does not necessarily consist in the fact that it is at a given point in time actually being reduced to smithereens on impact, the glass may be brittle without ever being shattered to bits. The brittleness of the glass, therefore, is a characteristic property of the glass. Similarly, to say that sugar is soluble is to maintain that when added to liquid it dissolves. Whether or not the sugar is added to liquid does not negate the solubleness of the sugar, as it is a characteristic property of the sugar. To possess a dispositional property is independent of any actual state or change. It is, maintained Ryle, to be bound or liable to manifest a particular state or change when a particular condition is realised. Although in the same way this is also true about dispositions concerning qualities of human

character, the solubleness of sugar is not the same as a feature of human nature like generosity, since sugar does not have a mind. The comparison however, brings out the same underlying idea. For example, to describe Mr K. as being a chronic gambler does not mean that K is gambling at a particular given moment, but refers to K's enduring tendency to gamble when not engaged in some other way.

There are many human dispositions. The virtues for example, are dispositions connected to choice. Siegel(1999) highlighted 'thinking dispositions' that are particularly connected to thinking. As observed by Siegel, these dispositions have direct implications for education. Siegel argues that "a thinking disposition is the tendency, propensity, or inclination to think in certain ways under certain circumstances."

According to Siegel's definition, to describe a person, Anne for example, as having the tendency to critically assess what she is told or hears, is to claim that Anne is inclined to evaluate the information she receives. The evidence for this claim is that she regularly and routinely acts in this way. In other words, Anne is prone to think in a variety of ways, i.e. question the reliability of the source of her information, check whether it is in harmony with other beliefs of hers, and so on.

Siegel's analysis underlines the role of the dispositions in effective thinking. But much of what Siegel has to say adds no more to what we already know about this. In particular, a key point made by Siegel that thinking dispositions are properties of thinkers was raised before

him by McCarthy(1992) in objection to an earlier conception of critical thinking put forward by Siegel in his book *Educating Reason* where he, Siegel, argued that the term 'critical thinking' must include the inclination to be appropriately moved by reason. The shift in Siegel's position on the dispositions in critical thinking is a clear indication of his assimilation of McCarthy's criticism. Similarly, his call for the need to focus on student sensitivity and the creation of favourable settings in any educational effort aimed at fostering thinking dispositions was highlighted by Passmore(1972) in advocating teaching children to be critical.

In analysing the dispositions Siegel oversimplifies their structure and consequently misrepresents what is involved in their acquisition. Siegel notes that there are many different sorts of dispositions, ranging from mechanical ones such as the solubility of sugar to 'cognitively charged' ones such as standing up to authority. For Siegel these 'cognitively charged' thinking dispositions constitute the 'animating force' that causes thinkers to think well hence it is important for educational research to focus on a deeper understanding of their cognitive character. In focusing mainly on this cognitive character of dispositions, it seems that Siegel is reducing the acquisition of such dispositions to cognitive development. But this acquisition does not only involve what one thinks but also how one feels and the spirit in which one acts. For example, a person's tendency to being careful involves not only what the person thinks,

knows, understand etc., but also a variety of emotions and feelings such as love of getting things right, loathing for hypocrisy, disgust at shoddiness etc., as well as the willingness to act or persevere in the face of difficulties etc.

The claim by Siegel that thinking dispositions entail the critical assessment of information assumes much that needs to be clarified. For example, Siegel offered as a basic example of a thinking disposition the tendency to evaluate and be directed by reason, but how basic is this basic example? In order to critically assess information, as already argued, one needs content-specific knowledge and other dispositions such as being careful, being conscientious, being patient, being persistent, being hopeful etc. It is not clear if Siegel is including these dispositions in his basic example. However, one of the useful features of Siegel's analysis is that it focuses attention on the review of what kinds of dispositions should be fostered for effective thinking.

Richard Paul(1987) proposes the cultivation of the rational passions if we are to grasp the problem of teaching critical thinking skills in the 'strong sense'. According to Paul teaching critical thinking in the 'strong sense' is teaching it so that students explicate, understand, and critique their own deepest prejudices, biases, and misconceptions, thereby allowing them to discover and contest their own egocentric and sociocentric tendencies. Paul's rational passions include clarity, accuracy, fair-mindedness, a compelling drive to seek

evidence, a devotion to truth as against self-interest, the desire to consider sympathetically opposed points of view and an intense aversion for contradiction. Paul argues that these rational passions enable us to question what is passionately believed and socially sanctioned, and to conquer the fear of abandoning a long and deeply held belief even when we are ridiculed by others. The rational passions put forward by Paul are not in the main very different from the dispositions identified by Siegel. What both Siegel and Paul acknowledge is the inherent challenge in thinking well. Thinking effectively in most cases involves facing up to difficult or complex situations and finding successful ways to overcome or understand such difficulties or complexities. In such situations an important disposition to have is courage.

Courage according to Aquinas, requires the confidence to undertake a mission and drive to follow it through. The courage to endure depends on patience and perseverance to remain undefeated by hardships. These qualities of character allied to courage are connected in important ways to the thinking dispositions discussed earlier. For example, being careful and attentive to detail is connected in important ways to being confident. On the other hand, self-confidence involves hopefulness with which one faces the future. Analysis of the different kinds of hope (Day, 1969; Fitzgerald, 1979; Godfrey, 1987) clearly establishes its central part in our existence; however, this will not be pursued in our discussion. What is clear is that there are various dispositions that are very useful

in thinking well, but the focus will be on the importance of courage in thinking effectively.

The conclusion that can be drawn from the discussion in this section is that if the development of thinking in education is to be addressed then pupils must first of all have a thorough grounding in a variety of disciplines. Finding solutions to novel problems or understanding the world that we live in depends on the kinds of knowledge that we learn to acquire. For example, in physical education the thinking involved in playing games depends on knowing how to play the game as well as knowing things about it. However, knowledge alone is not sufficient for successful transfer of thinking skills within a domain or from theory to practice, since having knowledge does not necessarily guarantee its application by the possessor. In many situations applying knowledge in thinking effectively requires courage. Therefore if any form of educational programme should seek to foster effective thinking within and across domains it should among other things endeavour to promote courage. We now focus on this.



## 12.2. Defining courage

Thinking effectively requires among other things qualities that are allied to courage. It involves effort, determination, perseverance, patience, hope and in most cases the willingness to take intellectual risks, since it is by no means certain that one's thinking will necessarily always terminate in some sort of effectiveness.

In the popular sense, courage invokes a particular kind of quality to do with the display of fearlessness by a person in the face of danger. One of the common images of this view of courage is that of the warrior fighting an enemy with brute determination in a situation of extreme danger. What this popular notion allows is very little or no distinction between the ends to which such fearlessness in the face of danger may lead. On the one hand this image of courage is by no means an excellent or positive quality in itself. Although it may sometimes be good, there is the possibility that it may be turned to bad ends including the worship of force. On the other hand, courage is viewed as one of the highest forms of excellence of human conduct. The intention in this section is not to provide answers to the contradictions associated with courage or put forward a new formulation for its definition but only to provide a starting point for our discussion of the importance of courage in effective thinking. We will begin by considering some of the influential conceptions of courage.

In the classical framework advanced by Aristotle the end result of a fearless act is crucial to labeling such an act courageous. It begins with the distinction between the means and the goal of action. It holds that if there is an end to all that we do, it will be the good achievable ultimately by action through the use of our reasoning power in accordance with virtue. Since virtue is connected with choices and actions, any action is properly considered as virtuous if it has a good or noble end, and what is equally important is the thoughtfulness exercised in particular situations to reach that end. Consequently, the goal of a courageous act must be good or noble. But the means are also important. Hence for an act to be truly courageous it must in the process of reaching a noble or good end be performed thoughtfully and carefully.

Critical to the classical framework is practical reasoning. This differs from scientific reasoning in that there are no invariable laws of practical reasoning, but the kind of reasoning to be applied is dependent on the situation in question. In other words, one's actions in being courageous cannot be repeated exactly in the same way. In the main the framework holds that courage is concerned with feelings of fear, confidence and safety. Choosing the middle way of acting between extremes is the distinctive quality of a courageous person. Courage, then, is a state of character consisting of a kind of moderation in one's deliberate choice of action based on a careful and mindful consideration of the situation in question.

Although courage is concerned with confidence and

fear, the classical model is concerned more with the latter; for the person who in the face of fear remains composed and chooses the right action is more truly courageous than the person who does so towards the things that inspire confidence. It is harder to face what is painful or uncomfortable than to abstain from what is pleasant, and it is for facing what is painful that a person is called courageous. Therefore by the standard of this model an act by a person who shows resoluteness, endurance and other qualities in confronting a fearful situation for an ignoble or wicked end does not qualify as a courageous act.

The influence of the classical framework on the writings of later philosophers on the subject cannot be denied. For example, apart from minor differences, the work of Thomas Aquinas essentially takes the same general direction as this framework. For Aquinas too, courage is a virtue that demands endurance, effort, and patience.

Although the classical framework provides an important analysis of courage, there are some difficulties associated with it. For example, if to be courageous an act must be done for the clear purpose of the enrichment of mankind, it is difficult to see how one could truly call Sir Francis Chichester's sailing round the world courageous. But given the risk and difficulties involved it is readily accepted as a highly courageous act. In some cases the classical model admits as courageous acts that are not and in others rejects those that are. Attempts to address these issues resulted in the formulation of an influential modern

conception by James Wallace which we now turn to.

According to James Wallace(1978), the courageous man is the one who undertakes an act that he believes to be dangerous but is nevertheless worth the risk. His formal definition consists of a set of five conditions as follows:

An act X, is courageous if, and only if Agent A:

(a) believes that it is dangerous for him to do X.

(b) believes that his doing X is worth the risk it involves.

(c ) believes that it is possible for him not to do X.

(d) sees that the danger in doing X is sufficiently formidable that most people would find it difficult to do X.

(e) is not forced into doing X by threats of punishment that he fears more than the danger of doing X.

Wallace's account of what constitutes a courageous act raises some difficult problems as presented in the following examples:

i) The act of the scientist who believes that direct and unprotected contact with a cocktail of deadly viruses is dangerous but is worth the risk.

ii) The act of the reckless skier who believes skiing in an avalanche is dangerous but is worth the risk.

The problem posed by these types of acts is that they meet all of Wallace's conditions but are acts that we may instinctively avoid calling courageous. On the other hand,

there are certain kinds of acts that fail to meet these conditions but are nevertheless acts that we could call courageous. One such example is that of the bible story of Job, who, in spite of his misfortunes, persevered with great patience in his belief in the righteousness of the way of the Lord. Furthermore, all the conditions not only fail to consider the end for which the dangerous act is performed, but also tend to ignore the kind of courage displayed for example in situations involving compromise.

The attempts at providing a definition of courage by the two conceptions above tend to cater well for acts within extreme margins. For example Aristotle's classical formulation has a moral requirement set into it. This requirement is clear in the demand that for an act to be truly courageous not only must it involve fear, but also the end of the act must be for some good. Consequently, the extremely narrow margins within which the standards are formulated exclude some otherwise courageous acts. On the other extreme Wallace's modern conception places no emphasis on the moral requirement for an act to be courageous but instead structures the conditions in terms of what the person believes to be worthwhile. As a result of the extreme openness of this formulation it fails to provide a check on the sort of acts that can be considered courageous and in so doing admits of absurd acts as courageous. What is required is a formulation that addresses the extremism to which the two formulations tend to, and such a proposal is put forward by Walton.

Douglas Walton(1986) proposes that we formulate the

conditions in two parts in order to separate the normative and non-normative elements inherent in the notion of courage. Walton's definition of courage therefore consists of five conditions divided into two main parts. The non-normative part, called the *practical reasoning base* comprises of three conditions as follows:

(P1) In order to bring about B, K considers that it is necessary to bring about A.

(P2) K brings about A.

(P3) K could have not brought about A

The normative part of the definition, which is imposed on the practical reasoning base is called the *ethical matrix* and this is made up of two conditions as follows:

(E1) K considers that B is [highly] worth K's bringing about.

(E2) K considers that his bringing about A is dangerous or difficult [to a formidable extent].

In the above formulation K represents an agent, A represents a courageous action and B is some state of affairs.

According to Walton, the practical reasoning base has

to be interpreted and decided upon in specific instances against some background knowledge in the evaluation of *K*'s act. This is essential since the evaluation of the act requires a defensible account of what the circumstances were, how *K* saw the situation and the extent to which the facts fitted *K*'s estimation. It is presumed that there are a number of possible choices that required *K* to make some form of deliberation that accounts for *K* bringing about *A* as a necessary element in *K*'s plan. Secondly, the ethical matrix expresses the worth of *K*'s intentions in relation to *K*'s reasoned position. Walton's justification for putting (E2) in the ethical matrix is that the assessment of risk or danger is a subjective matter in the evaluation of whether an act is courageous.

Walton's basic definition is a positive attempt to overcome some of the difficulties raised by the definitions discussed earlier. But, as in the earlier cases this definition also appears to raise its own issues since the requirements of the ethical conditions (E1) and (E2) do not necessarily overcome all the difficulties encountered in the earlier definitions. It appears Walton recognises this problem and duly acknowledges the difficulties as follows:

Implementing both these clauses in particular cases is a normative matter that raises many problems characteristic of the concept of courage in particular, and other traditional ethical problems having to do with the general moral principles, duties, and particular circumstances.

It is disputable whether we should demand these five conditions as necessary for courageous actions precisely as they stand, or require that

the agent believes they obtain, knows they obtain, or justifiably believes they obtain. We prefer the latter, and will defend this preference from time to time, though not dogmatically (p87-88).

How do we begin to view the concept of courage given the difficulties in formulating a definition? What appears to be evident, however, is that the notion of courage can be applied to a variety of situations where one or various combinations of factors such as fear, risk, danger or difficulty exist. Although in many cases essential reference is made to fear in defining courage, this is not necessarily the only possible way. Courage, as indicated by Walton, is not always coupled with the presence or absence of fear but in many instances it is defined by a positive element of determination or persistence in overcoming a difficulty. Hence a mark of courage is how one overcomes the difficulty.

A useful distinction that we can employ in viewing courage is suggested by Amélie Rorty(1986). Rorty argues that if we consider, say, compromise or co-operation as aspects that serve to enable us to persist in acting well under stress and enduring hardships when following our judgments on difficult or dangerous situations, then this opens up the opportunity of viewing courage as a set of non-homogenous dispositions helping us to maintain a well balanced stance while acting under stress. This view of courage enables us to accept the performance of both the warrior on the battlefield and Job in his distress as courageous. It can also enable us to view certain ways of



thinking such as being imaginative as courageous. This perhaps is what Passmore meant when he said:

Imaginativeness is a form of courage; it is generally safer to stick to an established way of doing things (p.163).

To be imaginative, then, is considered a form of courage since it requires that we take a difficult and risky step in going beyond what we know intellectually or practically. It is difficult because we are attempting to apply our knowledge to an unknown situation, and it is risky because the possibility of failure is great.

### 12.3. Why courage is important in thinking effectively

The traditional view of courage as indicated in the previous section is defined by the overcoming of fear. However, if we accept Rorty's (1986) suggestion for a redefinition of courage as consisting of a non-homogenous set of dispositions, this allows for the exploration of courage in effective thinking particularly within educational settings.

Courage is essential in the process of thinking things through or providing solutions to unfamiliar and difficult problems. It is with courage that we are able to think through the possibility that we are not under any obligation to think in some set way. In so doing, we are able to reject established norms if they ought to be rejected or rules changed if they ought to be changed.

Let us consider the contrary situation where courage is absent in thinking effectively. A classic example of such a situation formed a major theme in John Holt's (1990) book *How Children Fail*. Holt noted that fear is a major reason for the failure of children at school. In his observation of how a child's fears might influence his or her problem solving strategies, Holt observed that children use self-centred and self-protective strategies to avoid embarrassment, disapproval or loss of status. He wrote:

These self-limiting and self-defeating strategies are dictated, above all else, by fear. For many years I have been asking myself why intelligent

children act unintelligently at school. The simple answer is 'Because they're scared.' I used to suspect that children's defeatism had something to do with their bad work at school, but I thought I could clear it away with hearty cries of "Onward! You can do it!" What I now see for the first time is the mechanism by which fear destroys intelligence, the way it affects a child's whole way of looking at, thinking about, and dealing with life. So we have two problems, not one: to stop children from being afraid, and then to break them of the bad thinking habits into which their fears have driven them (p.92).

Holt's observation highlights the link between fear and ineffective thinking particularly within school settings, suggesting that in order to break free from the use of self-defeating strategies courage has a special part to play in transforming ineffective thinking into effective.

Although there are clear differences between school settings and that of the soldier's battlefield, in the sense that the fear a pupil might face at school, for example, may largely revolve round pressures exerted by peers whereas the fear of the soldier in the main revolves round death on the battlefield, nevertheless to overcome the fears generated by the different situations calls for courage.

In the writings of both Dewey and Ryle on what thinking is, as discussed in Chapter 1, the idea of courage, perhaps not directly but indirectly, forms an important basis for their views. Dewey(1933) concluded that:

To be genuinely thoughtful, we must be willing to sustain and protract that state of doubt which is the stimulus to thorough inquiry, so as not to accept an idea or make a positive assertion of a belief until justifying reasons have been found (p16).

If one were to ask Dewey what is involved in the sustaining and protracting of that state of doubt, he might provide us with a list of factors. However, what Dewey would find very difficult not to include would be some factor allied to courage such as endurance, persistence and effort. For how is it possible to face up to difficulties without courage, as discussed in the previous section? Ryle(1979) also wrote that:

Thinking is trying to better one's instructions; it is trying out promising tracks which will exist, if they ever do exist, only after one has stumbled exploringly over ground where they are not (p78).

Similarly, if we were to press Ryle to explain what he meant by "trying", he too might also provide us with a list of possible explanations, but what he would find very difficult not to acknowledge is, in many cases, the importance of those character traits such as endurance, persistence, perseverance etc allied to courage in his explanation, for the simple reason that trying out promising tracks requires effort, and the fact that this may or may not yield the desired result calls for courage to keep on searching.

In education, we are mostly interested in a certain type of thinking. This is generally understood in terms of

thinking as an activity largely directed towards learning, problem solving and understanding. Thinking can be described as being effective when it results in learning new things, or the production of desired solutions, or the understanding of things in our world.

In *How to Solve it*, Polya(1957) uses specific examples taken largely from geometry to teach a method which according to him can be applied to the solution of other general problems. Although these examples are not important for the present argument, what is important is that Polya identified four important phases in thinking and solving problems effectively. The first of the four phases advises us to understand the problem, for we have to see clearly what is required before we begin to seek solutions. In the second phase, we have to make a plan. That is, we have to see how the various items of the problem are connected and in particular how the unknown is linked to the information already at hand. In the third phase we carry out our plan that we have devised through to the end. And finally, we review the end result in order to consider whether our plan has yielded the right results.

Polya noted that the most difficult part in the process of solving a problem is devising a plan. He said:

We have a plan when we know, or know at least in outline, which calculations, computations, or constructions we have to perform in order to obtain the unknown. The way from understanding the problem to conceiving a plan may be long and tortuous. In fact the main achievement in the solution of a problem is to conceive the idea of a plan (p.8).

So for Polya, like other philosophers and educators interested in the enhancement of thinking in education, the element of courage in the painstaking search for the right plan and the eventual desired end(if there is any) is fundamental to any successful end result.

In a similar problem solving approach, Bransford et al(1987) emphasised five components of thinking that are applicable to a wide variety of situations. The first component, the ability to identify the existence of a problem, ranks as "one of the most important characteristics of successful problem solvers". The second component is to do with the definition of the problem. The third component involves the exploration of strategies, for, according to the writers, "the ability to identify and define problems provides no guarantee of a successful solution". Consequently, it is important that a variety of strategies are explored. The fourth component is to act on the plan that has been conceived and finally, the fifth component involves a review of the effect of the result of the action. The writers in this case also argued that:

If people simply think about possible strategies without actively attempting to apply them, they deprive themselves of information that can help to identify unforeseen problems caused by old modes of thought (p167).

In this approach too, it is easy to detect the importance of courage in the painstaking search by the thinker for the right result. Although the above examples do not form a comprehensive list, it is reasonable to

conclude that one of the important components in thinking effectively is courage. In view of the various ways in which courage is involved in thinking can it be further analysed in some way?

#### **12.4. Can there be different kinds of courage in thinking?**

It is possible for the discussion of the importance of courage in thinking as presented in the thesis to be challenged on the grounds that courage is assumed to be transferable. In other words, once developed in a particular situation or context, it will also be evident in other contexts.

To what extent is courage different in the different contexts of thinking? In the classroom for example, is the kind of courage required by pupils in successfully solving particular subject problems such as a difficult mathematical question the same as the courage involved in overcoming the fear of ridicule by peers or the courage to withstand teacher intimidation? Is the courage involved in the various contexts mentioned above the same as the courage required in playing physical sports such as tennis or football? Let us now focus on courage in each of the different contexts.

- 1) Thinking in the context of solving problems in particular subject areas as presented in the school curriculum involves, for example, the risk of getting things wrong as a result of the difficulties inherent in making progress in the subject matter. Some tasks are demanding because of their abstractness, as in mathematics. Others are difficult because they demand uniqueness, as in fine art. In some others they challenge received ideas, as in science (e.g the courage that scientists such as Copernicus, Darwin and Einstein needed to persevere with their theories). The kind of *scholarly courage* required in facing up to the various difficult problems may differ but would involve among others persistence, thoroughness and hope.
- 2) The main difference between courage involved in overcoming the anxieties of peer attitudes and scholarly courage is that whereas the former is directly concerned with how to deal with other persons the latter is not necessarily so. It is possible that a person may have the courage to pursue and find answers to very challenging mathematical problems but lack the courage to face up to pressures from his or her peers in making independent decisions. In this regard the courage required for challenging peer pressure is similar to the courage involved in enduring teacher intimidation. In so far as such instances of courage deal with one's self-



worth and one's relationship to others it could be understood as *spiritual courage*.

- 3) The courage involved in playing sports on the other hand is different from scholarly and spiritual courage in the sense that it involves the determination to risk or suffer physical pain. This form of courage in the main can be identified with *physical courage*. In playing tennis for example, being able to react appropriately in order to return a serve effectively may involve a player taking certain physical risk such as diving through the air in order to reach the ball at the right time.

The above categorisation does not in anyway attempt to suggest that the various forms of courage are mutually exclusive but merely to indicate the different contexts within which courage can be understood. However, it is by no means clear that courage is easily transferable. In other words, it does not necessarily follow that if one has the courage to tackle a difficult mathematical problem then one can easily transfer such courage to fiercely challenge the wrongdoings of political rulers, for example.

In spite of the potential difficulties that may be associated with the transferability of courage, the pressing question that requires attention is: how can it be promoted in education? So far, the promotion of courage has not been sufficiently or seriously considered in the expanding body of work on the enhancement of thinking in education.

### 12.5. Nurturing Courage

Ryle(1972) attempted to explore further the age-old question on whether virtue can be taught. His explorations concern us here since courage is also considered as a virtue. Ryle argued that there are numerous things that can be learned and yet cannot be got by merely reading or being instructed by dictation like, for example, riding a bicycle, since the skill in riding a bicycle is inculcated by example and by exercise. Hence the acquisition of the skill and competence comes, if at all, with practice. The same holds true for conduct. Ryle(1972) held that:

It is not enough just to have memorized five moral lectures or sermons which admonish us to curb our greediness, malice or indolence. This memorization will not make us self-controlled, fair-minded or hard-working. What will help to make us self-controlled, fair-minded or hard-working are good examples set by others, and then ourselves practising and failing, and practising again, and failing again, but not quite so soon and so on (p436-437).

In other words, for matters involving the development of virtues, we learn first by being shown good examples by others, then by critical supervision and training by others, and finally through our own discipline and constant practice. Consequently, we develop our virtues (and in this case our interest is focused on courage) largely through exercise and not by the memorisation or consideration of theories or doctrines. On the same issue, Passmore's(1980)

argument is very similar to Ryle's in that being virtuous is not a skill but a character trait. In practice it is very difficult for teachers to teach their pupils to be virtuous. For Passmore, the sort of teaching which sets out to develop character traits relies to a considerable degree upon example rather than theory.

If we accept that courage is a virtue and therefore a character trait, then the point that character traits are not activities at all clearly indicates that one cannot be taught to be courageous in a formal way. Although this situation leaves a formidable task in finding ways to create favourable settings for the promotion of courage, it is worth the effort given the importance of courage in effective thinking.

The need for desirable settings rich in desirable examples of courage calls for a review of how teaching and learning is conducted. Rorty(1986) reminds us that:

The best preparation for courageous action is the preparation for action:  
competence and confidence in competence (p161).

The acquisition of competence plays a crucial role in education, and for this reason the basis for an educational system that takes into account the importance of courage appears already to exist. But larger questions concerning the kinds of changes within the system that will allow for the issue to be fully addressed remain to be answered. In the next chapter a framework for the promotion of effective thinking will be considered.

## **CHAPTER 13**

### **EDUCATION FOR THINKING**

#### **13.1. Promoting thinking**

The importance of learning to think effectively in our rapidly changing world cannot be overstated. The reasons given in Chapter 3 for seeking to teach thinking skills, together with unfolding technological changes, make a compelling case. Consequently, the ongoing debate on the best possible settings for promoting effective thinking must go on for the sake of securing a firm foundation.

As discussed in Chapter 1, there are different types of thinking skills programmes claiming to teach general thinking skills however in reality they focus on particular types of skills such as reasoning skills and techniques in generating ideas. But being able to think effectively involves much more than these. It is therefore important to find ways to enhance the various types of thinking already discussed in Chapter 1.

In the school curriculum the different types of thinking manifest themselves in various ways (and this must not be assumed to indicate any form of generality). For example, sign-cognition as a form of thinking occurs in physical education but this type of thinking could also be beneficial in interpersonal and social education.

Contemplative thinking is encouraged in religious education but can also form an important part of understanding in other curriculum subjects. Reasoning skills play a crucial part in nearly all curriculum subjects from mathematics to home economics, and it is as a result of the importance of such skills that some of the major thinking skills programmes were created. In art, imaginative thinking is what the subject seeks to develop, but the power of imaginative thinking is such that it can be applied in most curriculum subjects. The importance of the imagination in most aspects of our existence makes it a vital form of thinking to be developed.

The discussions in the following sections will focus on the manifestations of the various types of thinking within the curriculum subjects in order to highlight some of the salient factors in promoting thinking.

### 13.2. Supporting Sign-cognition

In Chapter 1 the discussion focused on sign-cognition as the typical mode of mental operation at a stage of mental development where cognition and action are not yet sharply differentiated. Hence the sign of some later state of affairs (or present unobservable one) is a sign for doing something about it. For example, the loud whistle of the train station attendant is a sign of the train departing. It is also a sign for hurrying to catch the train or taking other appropriate action. Similarly, when a child, for example, wanders into the middle of a path only a short distance ahead of a cyclist, this signifies an imminent collision with the child, as well as the application of the cycle brakes. Sign-cognition is important in helping us understand people when they send signals with their bodies without speaking. Through sign-cognition we are able to learn all kinds of things about people by paying attention to their body language and the things they do. However, given the discussion in Chapter 1 and 2, the particular contexts within which this type of thinking functions must be taken into consideration.

It is not difficult to see how this form of thinking where one event or state of affairs is taken as a sign of another is involved in much of what we do in our daily lives. Much of what we do involves some sort of communication with others, and although we rely mostly on the use of words, in most face-to-face contact we pay

particular attention to the various signs and signals that form part of the way we communicate. These signs and signals termed 'markers of emotion' (Goleman,1996) can be picked up from facial expression, gestures, tone of voice and other non-verbal signs and signals.

These signs and signals assist us in steering away from potential difficulties or dangers that in some cases experience warns us against, and towards potentially positive outcomes. Hence being able to read these signs and signals is useful in trimming down the size of the potential choices that accompanies decision-making and making the process more manageable.

In a letter written by Albert Einstein (1952) to Jacques Hadamard in which he was trying to explain the kind of mental processes he uses in solving mathematical problems, he wrote:

The words or the language, as they are written or spoken, do not seem to play any role in my mechanism of thought. The psychical entities which seem to serve as elements in thought are certain signs and more or less clear images which can be "voluntarily" reproduced and combined (p.43).

He went on to say:

The above mentioned elements are, in my case, of visual and some of muscular type. Conventional words or signs have to be sought for laboriously only in a second stage when the associative play is sufficiently established and can be reproduced at will (p.43).

Although it is not clear what precisely Einstein meant by 'signs', if this relates to seeing, say, a visual element as a sign of another this highlights the far ranging use of sign-cognition in thinking effectively. If this type of thinking is important, the question that needs to be addressed is how it can be enhanced in pupils.

The difficulty with the enhancement of sign-cognition in formal education is the fact that this type of thinking is non-verbal and entirely dependent on timing, which is contrary to much of how education is conducted using verbal communication. However, we can begin by highlighting some activities that draw on sign-cognition within the school curriculum; activities such as sporting games, cookery and drama offer possibilities for engagement in this type of thinking. For example, playing football, hockey, tennis and many other sports draws on sign-cognition since being an effective player depends on how well one reads the signs and signals that present opportunities in the game. Similarly, cookery provides opportunities for engagement in sign-cognition since in cooking it is crucial to be aware of the right moments (given the various signs) to do particular things and in what sequence in order to produce the desired culinary delight. Drama offers opportunities to highlight and learn about sign-cognition among other things. In drama one of the objectives is to convey deeper feelings far beyond the words employed in particular situations, and to reach such depth also involves sign-cognition. For example, in William Shakespeare's *Othello* we can observe how Desdemona's handkerchief that fell into the



possession of Iago was skilfully used in his murderous plot by creating an important sign with tragic consequences for Othello.

As already indicated earlier, the argument being advanced does not suggest that sign-cognition is in any way general. In other words, it does not necessarily follow that being able to apply sign-cognition in the context of playing tennis, for example, will result in its use in another context, say cookery.

The development of sign-cognition in many cases is underpinned by repeated practice in learning to see X as a sign of Y, which involves the sharpening and engagement of the appropriate skill(s) within specific contexts. As already indicated, finding ways to involve pupils in thinking by signs and signals is by no means easy but in spite of the difficulties the importance of sign-cognition in our actions and responses in thinking effectively calls for the encouragement of this type of thinking in education.

If we can only explain sign-cognition solely in terms of action then contemplation occupies the opposite end of the same pole. In other words, we can view contemplation in terms of complete cessation of action. Let us turn to the discussion of contemplation as an important aspect of effective thinking.

### 13.3. Encouraging Contemplative thinking

Contemplation can deepen the understanding of the object(s) upon which the thinking is directed and in so doing improve the quality of subsequent thinking regarding the object(s). The detachment from action, which is characteristic of contemplative thinking, makes it possible to focus one's attention on whatever that is under one's consideration.

If we take for granted that contemplation has no place in thinking effectively then we are left with no means by which we can come to fully appreciate the end product(s) of thinking. Contemplation offers a way of reflecting on thoughts, actions and things. It is likely that implicit in what Dewey(1933) called reflective thinking is contemplative thinking. Although Dewey's conception of thinking mainly focuses on problem solving, still his view that reflective thinking is an "active, persistent and careful consideration" of any belief or knowledge with regards to the grounds that support it and the further conclusions that may follow, can also be said to touch on contemplative thinking.

In view of the role of contemplation in thinking well how can it be promoted? Let us begin by noting some of the difficulties involved. The main problem in promoting this type of thinking is to do with the complex ways in which it relates to the other types of thinking, as indicated in Part One. It is possible this is what Dewey(1933) meant

when he concluded that the problem of acquiring the right habit of reflection would be much easier than it is "did not the different modes of thinking blend insensibly into one another (p.9)." For example, in mathematics, coming to appreciate the beauty of the result of Pythagoras that  $\sqrt{2}$  is not a fraction is an important part of being a mathematician. The cultivation of such thinking forms an important part of understanding a subject or a context. Contemplative thinking cannot be simply assumed to be generic. What is involved in thinking contemplatively in religion may not necessarily be the same as in mathematics. In other words, we cannot take for granted that thinking contemplatively about God is the same as thinking contemplatively about an algebraic problem.

In spite of the potential difficulties in promoting contemplation, finding ways to enhance this type of thinking in pupils within the specific contexts that are conducive to such thinking is not impossible. In the school curriculum Religious Education provides an existing path into contemplative thinking, but in addition to this various ways are open for exploration. Music appreciation rather than music playing can offer pupils another way. For example, pupils can be guided and encouraged to listen to the works of the great classical composers contemplatively. Art appreciation, too, can provide such a starting point. It is possible that most of the curriculum subjects can provide pupils with valuable opportunities for them to engage in contemplative thinking. This, however, does not necessarily require that separate lessons are created in

order to promote this type of thinking; what is important is that subject materials are presented in such ways that make it possible for pupils to engage with such materials in contemplative ways. Most topics in mathematics, for example, can encourage pupils to think contemplatively. On the topic of shape and space, say, dealing with problems involving the circle can provide an opportunity to think contemplatively about curves, circles and spheres in general. Their beauty, perfection and nature's preference for the use of this shape more than any other shape can provide excellent points of entries into contemplative thinking.

It is possible for contemplation to lead to action and for action to lead to contemplation but what mediates between the two positions is reasoning. The importance of reasoning in our actions and its enhancement in pupils is what we now go on to discuss.

#### 13.4. Enhancing Reasoning

The significance of reasoning in nearly all the activities that we engage in has led some proponents of general thinking skills to the mistaken view that it is the *only* main route to effective thinking, rather than one of many types of thinking. Lipman(1986) declared that "reasonableness is the single most important characteristic of the educated man (p.151)." But Lipman's assertion is mistaken simply because there are other equally important types of thinking, in spite of the fact that the ability to reason is crucial in our everyday lives. The origin of this error can be traced back to two sources, the first being the ease with which "reasoning" is interchanged with "thinking", while the second is that much of our thinking is dominated by problem-solving which forms the basis of reasoning.

The justifications for the enhancement of reasoning in education, as discussed in Part One, go back to the central position of this type of thinking in our lives. In Chapter 1 we observed that reasoning primarily aims at calculation and is generally divided into the practical and the theoretical but that this division does not necessarily imply that the two forms of reasoning are mutually exclusive. It is important that the context is taken into consideration since being able to reason in one context does not necessarily guarantee its use in a different

context. For example, being able to reason well in finding solutions to problems in physics does not necessarily imply that one is able to apply that in playing excellent football. Although in both cases reasoning is important, it cannot be assumed to be the same since the two cases involve different contexts. In the context of physics theoretical reasoning plays the leading role in how the physicist tries to solve problems. In playing football the footballer relies on practical reasoning in the attempt to win or force a draw.

How can pupils' reasoning be enhanced? In order to tackle this question it is important to highlight the importance that is attached to theoretical thinking. In education great emphasis is placed on theoretical reasoning, while marginal attention is given to practical reasoning. It is not clear why theoretical reasoning commands much more attention than practical reasoning. A possible answer could be the ease and speed with which theoretical thinking can be assessed. For example, it is not difficult to assess a pupil's theoretical reasoning on calculating the percentage profit on items sold. It merely involves checking that the pupil knows and applies the appropriate mathematical method. However, the situation becomes much more difficult as soon as the problem is translated into assessing the practical reasoning involved, say, in how pupils decide to spend their weekly pocket money.

In spite of the difficulties mentioned above, practical reasoning is crucial in thinking effectively

since it is about the means that we choose to attain our desired ends. In order to enhance such thinking we can take certain curriculum subjects as starting points. For example, subjects such as design and technology, civic education, home economics, etc, provide excellent opportunities for the encouragement of practical reasoning. Designing and making things encourages pupils to engage in it. Similarly, civic education can be useful in enhancing pupils' capacities in making decisions and choices concerning their lives. Home economics provides similar opportunities.

What is required in order to challenge pupils to reason practically is that interesting and exciting ways are found of teaching and learning curriculum content. This suggests the involvement of the imagination, which forms the topic of discussion in the next section.

### 13.5. Fostering the Imagination

The role of the imagination in thinking well cannot be over-emphasised. Philosophers such as Warnock(1976), Passmore(1980), Egan(1992) have argued for the development of the imagination in the educational process.

Passmore(1980) argued that:

There is no form of enterprise that cannot be conducted imaginatively. Equally, there is no subject that cannot be taught imaginatively or unimaginatively (p158).

Passmore's argument suggests that imaginative thinking cuts across subject areas and that all stand to benefit if schools and colleges encourage it and seek to make it an educational aim.

Imaginativeness plays an important part in shaping our view of the world and how we deal with the issues that life and living presents (this does not imply that the other types of imaginings are less important). In most fields of human endeavour it is an asset, for it is imaginative scientists, engineers, philosophers, designers who provide us with the solutions to our pressing problems. The versatility of the imagination suggests that it can be applied in many diverse situations. However, this is not to imply that the pervasiveness of the imagination in various activities means that it is generic. Clearly the context



in which it operates must be taken into account. It cannot be taken for granted that being able to think imaginatively in breaking new ground in the field of mathematics for example, will automatically result in being able to do the same in the field of, say, chemistry or music.

In order to break new ground, it is important that one is able to go beyond what is currently known or accepted. For example, Copernicus demonstrated imaginativeness and independence of thought in challenging the Ptolemaic conception of the universe, which at the time had dominated the minds of learned people for over one thousand years. The Copernican view of the world contradicts our immediate experiences, since every immediate experience shows the world as being stationary while the heavens continue to move. The significance of Copernicus lies in the fact that he had the courage to go beyond the norm, in other words he was able to pursue an alternative possibility radically different from the dominant belief apparently supported by immediate experiences. The move away from the safety of the dominant belief or norm is very significant in the works of those imaginative men and women who have changed our views of the world.

The notions of imagination discussed in earlier chapters suggest that in the classroom teachers will be confronted by a variety of pupils some of whom imagine by forming vivid mental images, and others, while not being totally unable to form images, only do so in a very sketchy manner. On the other hand it may be that the non-visualiser is imaginative in generating different perspectives on

given situations.

As indicated by Passmore(1980), the fact that a person can be imaginative in one area and unimaginative in another area presents a problem to the teacher since the latter would prefer to use methods of fostering imaginative thinking which are widely effective across the different ways that pupils are likely to imagine things. In view of this difficulty, how can the fostering of imaginative thinking among pupils be achieved? A possible way forward is to view imaginative thinking as the consideration of a diversity of alternatives specifically within the various learning experiences encountered in the curriculum. Hence in the mathematics class asking what difference it would make if our number system as we know it consisted solely of even numbers provides a good example. Considering such an alternative to the present number system could stimulate imaginative thinking about our number system in particular and its application to our daily affairs. However, such consideration is predicated on pupils' existing knowledge of the subject.

As an initial starting point in fostering pupils' imaginativeness, curriculum subjects could be introduced and taught from historical perspectives. For example, presenting mathematical knowledge initially from a historical perspective can reveal the story of how the subject has evolved, the successes and failures in the attempts by mathematicians to solve their particular problems and the origins of the problems themselves.

In order to foster pupils' imaginative thinking, teachers will have to present learning materials in very different ways from what is currently the case, where a central aim is to get pupils to pass examinations. This is not to claim that examinations are unimportant but only to indicate that where teaching to pass examinations takes precedence over teaching for understanding it is difficult to see how learning to think imaginatively can flourish. When facts are presented as one possibility out of many possibilities it is much more likely to result in fruitful reflection, which in turn leads to a deeper understanding. The development of pupils' thinking is by no means simple and this forms the focus of the discussion in the next section.

### 13.6. The complexity of teaching thinking

The complexity of teaching thinking must be acknowledged in any attempt to develop or enhance pupils' thinking. Failure to recognise the various types of thinking can only produce inadequate results.

Teaching thinking simply in terms of the improvement of reasoning or the generating of ideas as in the cases of the programmes discussed earlier fails to address the complex nature of thinking. For example, DeBono's CoRT programme attempts to teach what he calls "generative thinking" by instructing learners to simply memorise and apply his techniques. DeBono's method fails to address important factors such the importance of knowledge and reasoning in generating ideas.

Progress is being made in the right direction through the introduction of thinking skills in the new National Curriculum (2000) for England. However there are issues that remain to be addressed. The targeted thinking skills are grouped under five main headings as information processing, reasoning, enquiry, creativity, and evaluation. However, it is not clear why these have been identified as representative of thinking since others such as contemplation and sign-cognition have not been included in the above list. The manner in which the thinking skills have been presented seems to suggest that they are taken to be general skills that can be taught through individual

subjects. But, as this thesis has argued, there are problems in viewing the listed thinking skills to be separate from the individual curriculum subjects.

The interconnectedness of the various types of thinking means that in seeking to enhance pupils' thinking all the various types of thinking must be targeted. An analogy with our dental structure may help here. Our teeth can be categorised into molars for crushing and chewing, incisors for cutting and canines for tearing. Although there are differences among them, they are connected and work together to help us eat solid food more efficiently. It is possible to use only the incisors or the molars to eat but this is generally inefficient, as any one who has lost their incisors knows very well. Similarly to target a particular type of thinking to the exclusion of the others may not necessarily hinder thinking, but it may do so. The ways in which the various types of thinking come into use in thinking effectively are underpinned first and foremost by knowledge, as discussed earlier in Chapter 11, and among other factors by courage, which was discussed in Chapter 12. In order to develop pupils' thinking, attention must be paid to the enhancement of these two major factors.

In Chapter 4 the discussion highlighted the framework produced by McPeck. The framework presented some useful ideas that can be adapted for teaching and learning. For example, McPeck's philosophy-of approach, which basically emphasises the study of the philosophical aspects of individual curriculum subjects as an essential part of learning those subjects, can be transformed to the

history-of approach so that the history of subject X and the history of subject Y become an integral part of what it means to "learn X" or to "learn Y". Gaining knowledge of the historical contexts within which the various subjects have developed can deepen pupils' knowledge and understanding of their subjects long before they begin to think philosophically about them. Thus the history of mathematics would be as much a part of mathematics education as elementary algebra, that is, it would be well woven into the fabric of the subject rather than an optional extra. Alongside the presentation of materials in their historical contexts every opportunity must be sought to immerse pupils in the various types of thinking underpinning the subjects under consideration.

The possession of courage among other virtues is important in thinking effectively because the possession of knowledge will not necessarily result in its use at the right time and for the right reasons. However, the major problem with learning to be courageous is that it cannot be learned by memorising some key facts. In other words, as courage is a disposition it cannot be taught and learned as a pure skill. Consequently, providing the right kinds of examples and guidance for thinking within the educational context is by no means easy.

In suggesting contexts for developing thoughtfulness Schrag(1988) concludes that the conventional classroom is not conducive and therefore new settings must be devised based on pupil participation (in small groups) in various projects such as producing a newspaper, building a car or

an aeroplane, conducting an oral history of the local community etc. Leaders of these projects, according to Schrag, would be considered educators but qualifications would not have to include teaching credentials. Schrag's sole purpose in proposing this new setting is to encourage the virtue of thoughtfulness in the young.

It is not clear how Schrag's proposal can provide the very broad knowledge that is offered within the conventional school setting in spite of its shortcomings. It is possible that in learning how to build a car pupils might learn a lot about engines, transportation in general and wider issues including pollution, but it is debatable whether the focus on building a car will allow for further consideration beyond the project at hand. Furthermore it is not clear why Schrag insists that qualifications of the leaders of these projects need not include teaching credentials. A possible reason is that these projects occur outside the context of the school and therefore the adults involved will not necessarily be qualified teachers. But there is a danger in playing down the knowledge and skills that go into teaching and motivating pupils since these are generally acquired through supervision. The importance of teachers in encouraging thinking will be discussed later.

What makes effective thinking difficult to engage in (and hence difficult to encourage within the educational context) is that it cannot be simply switched on whenever it is needed. If it occurs at all it involves hard work, perseverance, patience, etc. in the application of the different types of thinking mentioned above. For example,

in our earlier discussion in section 11.2.1.1, we saw how Poincaré strove for fifteen days without much progress in his attempt to prove that there could not be any functions like those that he called Fuchsian functions. It was not until one evening lying on his bed unable to sleep, presumably troubled by the unyielding mathematical problem facing him, that he began to have vivid ideas about possible solutions to his problem. As a result Poincaré was able to work on how the different ideas fit together to produce possible solutions, which then led to the solution of his problem. What is highly significant in Poincaré's description of the process by which he came to solve his problem is his imaginativeness. Having used imagination to generate different perspectives, it was then possible for him to apply his reasoning to check and confirm his results. What this suggests is that fostering pupils' imaginativeness offers a promising route by which the factors that help to promote several kinds of thinking can be addressed. It also offers the means by which different perspectives can be generated on a situation under consideration. However, these points about fostering imaginativeness do not imply that the other types of thinking are less significant.

The ability to think effectively can be directed towards good or evil ends, so one of the key challenges for teachers is to find appropriate ways to work on the pupils' moral sensitivities. Teachers are in a position to provide favourable settings. The role of teachers in guiding pupils not only to gain confidence in thinking but also to develop



their moral sensitivities highlights the importance of the sort of training that teachers need to undergo.

### **13.7. The importance of teacher preparation.**

As indicated in the previous section the importance of the teacher in enhancing pupils' thinking cannot be over-emphasised. In fact all the general thinking skills programmes discussed in the thesis acknowledge the importance of the teacher and make various provisions for training teachers in the use of their programmes. However, in spite of their high regard for teacher development and claims of various positive effects, they have not fully succeeded in becoming established in mainstream education.

Leat(1999) considered some of the reasons why thinking skills programmes fail to thrive in the classroom. Leat's work was based on interviews with numerous teachers who have used or experienced these programmes. In his analysis Leat explains the nature of the various forces operating on teachers, pupils and schools to prevent Thinking Skills programmes from making any lasting impact as follows:

- 1) Teacher socialisation is a powerful force, and this can operate negatively in influencing how teachers perform

their work, for example, through staffroom conversation when teachers discuss pupils, curriculum or educational issues.

2) Teachers' existing classroom knowledge that helps them with particular topics and classes becomes threatened as they struggle to implement new learning environments based largely on co-operative groupwork.

3) A considerable tension is created since the intentions of Thinking Skills programmes run counter to the usual subject intentions of classroom teachers. Classroom teachers' subject knowledge is geared towards their particular subject purpose and this is in sharp opposition to the content free nature of Thinking Skills programmes.

4) The view that teachers have of themselves in the classroom and of what teaching is about plays an important part in accepting or rejecting the struggle and difficulty that accompanies the implementation of the programmes. For many teachers such change is either impossible or too costly.

5) Not all teachers are prepared to accommodate the emotional turmoil inherent in the change that accompanies the implementation of Thinking Skills programmes.

Leat concluded that these forces present individual teachers with some difficult challenges in introducing these. If the drag effects of these forces are to be overturned in any curriculum innovation, in-service teacher education and support need to include networks of teachers, peer support and a detailed exploration of evidence in

support of children's learning.

Leat's work provides an important starting point in two ways: firstly, by highlighting the importance of teachers in any curriculum innovation and secondly, by recommending possible approaches to in-service training. However, the key issue that Leat's work failed to explore is the kind of training that teachers initially undergo for their professional qualification. The investigation of this issue is important in illuminating why the forces identified by Leat are so powerful.

In England and Wales, for example, there are two main entry routes into the teaching profession. The first route is by gaining a Bachelor of Education (BEd) degree. The course structure of the BEd degree varies among institutions, ranging from two-year courses for mature students to four-year courses covering two years study of a main subject e.g Mathematics, English, Science etc, then a further two years study of educational issues. The second route is by completing a one-year course leading to the Post Graduate Certificate in Education (PGCE). The PGCE course provides a one-year professional preparation for teaching for those with a degree or graduate equivalent qualification. After obtaining their academic qualifications newly qualified teachers are granted a 'qualified teacher status' after successfully completing their first year of teaching. What is evident from the kind of training given to trainee teachers prior to their qualified teacher status is that not enough time and opportunity is provided for any sustained reflection on the

practical and theoretical issues regarding teaching and learning. As a result, teaching is treated as a "second-choice profession" by many graduate students and attracting young talented students into it is proving very difficult for various reasons including the apparent low status of the profession in spite of its vital role in the education of the population. Far from the popular notion that teaching is easy, it is in fact a very difficult job to perform well and this requires that reasonable time is spent in training to become a teacher.

One of the key arguments in this thesis is that knowledge and courage among other considerations form the bedrock of effective thinking, and therefore in order to begin to support pupils in learning to think effectively it is necessary that teachers not only have a substantive body of worthwhile knowledge and thorough understanding but also know how to communicate these in ways that encourage effective thinking.

The question that remains to be answered is: what kind of training must the trainee teacher undergo in order to support pupils in learning to think effectively? To begin with, the requirement that all student teachers have a substantive body of worthwhile knowledge and understanding implies that all trainee students initially study to graduate level a subject of their choice. At present this is only true for those who take the PGCE route into the profession. Finally, to qualify as a teacher the trainee student must then undergo a number of years training covering in detail all aspects of teaching and learning. It

is essential that much time is spent on the cycle of theory, practice and reflection in order to train confident, well-informed and well-trained teachers.

Let us consider the case in the field of medicine. Just as medicine generally deals with the affairs of the body so education deals with the affairs of the mind. In the medical field it would be considered unacceptable and indeed highly dangerous for a person to attempt to perform a heart surgery after only one or two years training in medicine. In fact no mentally alert heart patient would be willing to undergo this. However, in education a one or two year training is considered sufficient to become an expert in matters of the mind and learning. The overtness of medical problems and their solutions naturally places importance on how doctors are trained, whereas the covertness of the difficulties in education obscures the importance of an extensive and thorough period of training for teachers. Education possibly stands to gain by adopting the medical model of training for teachers.

Adopting an extensive period of training will provide the opportunity to integrate the topic of teaching and learning to think into teacher training programmes. But in addition to thorough teacher preparation improvement in teacher support is equally important. Teacher support programmes could be improved by firstly, disseminating relevant educational research findings to all teachers, and secondly, providing assessable and ongoing refresher courses, seminars and conferences for the discussion of curriculum and general educational issues among teachers.

### **SUMMARY OF PART THREE**

In Part Three of the thesis the discussion focused on two of the important factors that aid thinking. These factors were considered important because of our interest in not merely thinking but thinking well.

In Chapter 11 the discussion focused on the importance of knowledge in thinking. It tried to demonstrate the need for relevant knowledge in thinking well. The complex relationship between thinking and knowledge was highlighted. In Chapter 12 the importance of courage in thinking well was discussed. This discussion was based on the notion that having knowledge does not necessarily lead to its application; hence courage among other things is required. In Chapter 13 the role of the various types of thinking and considerations for their promotion in formal education were discussed. Finally the importance of teacher preparation was highlighted, since the fact that possession of knowledge and courage can be used for evil ends requires competent and well-motivated teachers to work on the moral sensitivities of the pupil.

## CONCLUSION

In this thesis it has been argued that thinking is central to our existence and doing it well is necessary if we are to live much fuller lives. Consequently the development of thinking must form an important part of education and children must be supported in the enhancement of their thinking.

In very recent times the growing interest in the promotion of thinking in education has seen the development of a large number of curriculum programmes for teaching thinking skills. The thesis has focused particularly on a number of the most prominent programmes worldwide. The critique of these programmes formed the basis for further critical discussion of the notion of teaching general thinking skills. The examination of these programmes highlighted the programme originators' over-simplification of what thinking involves, thus presenting inadequate models for teaching thinking.

The proliferation of thinking skills programmes is in a sense an acknowledgement of the importance of teaching thinking. The justifications given by the originators of the various programmes for seeking to improve pupils' thinking skills are very significant. But what remain problematic are the means by which the originators seek to achieve their objectives. In view of the difficulties associated with the various programmes care must be taken in efforts to find ways to promote thinking.

In order to provide a foundation for the examination of the thinking skills programmes, the nature of thinking was discussed in Part One of the thesis, which covered the work of a variety of writers, with particular attention to Dewey and Ryle, as their conceptions of thinking provided relevant views for the discussion of thinking in education. Thinking was described in the thesis as a complex phenomenon that can occur as a mental or physical act involving intentionality and attention and requiring particular contexts for its full description. The complexity of thinking was further discussed by considering the various types of thinking and their inter-relationships. The multi-facetedness of the notion of thinking means that viewing it purely in terms of reasoning, for example, can only result in a less than satisfactory account of what thinking involves. It is in such terms that the thinking skills programmes discussed in the thesis tend to view the nature of thinking.

However, viewing thinking in all its multi-facetedness as indicated in the thesis raises issues that require further investigation beyond its immediate concerns. The arguments presented here focused on thinking as an activity that requires attention and intentionality. In other words some sort of awareness or consciousness is called for. The importance of consciousness in providing us with a deeper understanding of thinking highlights the need for further investigation into its nature.



The major difficulty concerning our precise understanding of what the nature of consciousness involves is due to the lack of objective, scientific definition that is able to encapsulate the essence of consciousness (Papineau,2000). However, attempts have been made to provide explanations for the nature of consciousness and these have led to the production of various philosophical theories from Descartes's dualism, which supports the separateness of mental and physical existence, through to the physicalist position which equates mental occurrences to brain states, and finally to the 'mysterian' view that consciousness is a complete mystery (Papineau,2000).

If thinking is a form of consciousness, we need to establish whether consciousness is physical or non-physical. If it is non-physical, this means that our incomplete knowledge of the nature of thinking will continue to persist. On the other hand if it is physical, then this may make possible the construction of a thinking machine, with far-reaching consequences regarding the nature of thinking and our relationship with man-made machines. For example will machines be considered equal to human beings as a result? While it is not the aim to present a detailed explanation of what consciousness involves, the thesis regards the philosophical investigations of related questions to be highly relevant in contributing further to our understanding of thinking.

The discussion of the nature of thinking in Part One of the thesis established the important implication that any attempt to promote thinking must take into account its

complex nature. It is this comprehensiveness of the concept of thinking that the most prominent programmes for teaching thinking fail to address.

In Part Two, the central part of this thesis, a number of the leading programmes for teaching thinking were considered. These programmes were critically examined together with the various empirical studies connected to them. The rationale for discussing these programmes is that firstly, they are the most well established programmes; secondly, they have been tested and their developers have made claims about their effectiveness in teaching general thinking skills. However, the examination of the programmes did not yield any substantial evidence in support of the claims which developers make regarding the effectiveness of their programmes. The various methods guiding the four programmes examined are as follows:

1. In Philosophy for Children programme Lipman attempts to teach children to think by engaging them in philosophical discussions based wholly on stories written by him. In using such a method Lipman assumes that children's thinking can be improved by simply engaging them in his novels. In supporting his claim about the effectiveness of his programme, Lipman cites a number of quantitative studies. Two of these studies were evaluated and it was argued that they do not provide conclusive evidence in support of the programme.

2. In CoRT thinking programme DeBono attempts to teach thinking based simply on the use of mnemonics. The technique requires learning keywords by rote and then applying them to any context whenever the need arises. It was argued that DeBono's programme lacked a coherent theoretical framework. However, DeBono supports the effectiveness of his programme by reference to a study by Edwards(1991) and the general popularity of his programme. After evaluating Edwards's study it was concluded that the study does not provide a clear evidence of the effectiveness of the programme.
3. Feuerstein's Instrumental Enrichment programme was developed as a strategy for assisting retarded performers but has since been considered as a thinking skills programme for all. It was argued that it is not appropriate to simply extend the programme to normal school children. Furthermore two studies by Weller and Craft(1980) and Blagg(1991) were examined and the indication was that there is no substantial evidence for the effectiveness of the programme in mainstream education.
4. CASE is a thinking skills programme developed and evaluated by the originators. The evaluation of the programme was examined and there was no clear evidence to suggest that the programme is as successful as the programme developers claim. It was argued that the successes claimed for the programme by the developers were due more to the basic good

quality of teaching expected in the provision of any substantial education rather than to the teaching of thinking skills.

The examination of these programmes highlighted the simplistic way by which they attempt to teach thinking.

The comprehensive examination of these programmes in this thesis is a significant contribution to our knowledge of teaching thinking. Although other writers such as McPeck(1981) and Schrag(1988) have considered issues concerning the teaching of thinking, their discussions do not provide such a comprehensive account. McPeck's critique of teaching thinking highlights some of these programmes with particular attention to Edward DeBono's programme. Although McPeck provides a detailed analysis of the programme, he focuses mainly on the weaknesses in the arguments that DeBono uses to advance the reliability of his programme in promoting effective thinking skills. McPeck does not provide any comments on the empirical evaluations of the programme. In discussing his proposals for teaching thinking, Schrag also comments on the programmes and in particular highlights DeBono's and Feuerstein's programmes. However, his analysis also does not provide any comments on the various empirical studies associated with the programmes.

Having provided a critical assessment of thinking skills, the argument was generalised to consider the existence of general thinking skills. It was argued that the term 'general thinking skills' is a source of confusion

since developers (and supporters) of thinking skills programmes are often not clear about what they mean.

If writers supporting general thinking skills refer to them as skills that are only applicable across closely related contexts, this provides an acceptable definition of what we should take such skills to mean. It was argued that empirically there is evidence to support the transfer of thinking skills between closely related contexts. However, discussions of thinking skills by such writers as Sternberg(1986) and DeBono(1976) suggest that they can be applied across any learning or problem solving situation without regard for knowledge specific to any context.

The notion of general thinking skills that can be applied in any context is very problematic. What supporters of such skills need to provide but persistently fail to provide is substantial evidence in support of the existence of such skills. However, supporters of general thinking skills such as Higgins and Baumfield(1998) for example, hold the view that because it is possible to conceptualise general thinking skills then such skills must exist and therefore every effort must be made to find appropriate methods of teaching them. It was argued that general thinking skills are not theoretically impossible but what remains problematic is that there is no conclusive evidence to support their existence. The objection, therefore, to the existence of such general thinking skills is based on empirical grounds. It was argued further that to provide a sensible basis upon which the encouragement of thinking can be undertaken we must do so from a context-specific

perspective since such context(s) are required in thinking. The fact that skills are important in specific contexts means that the promotion of thinking must pay attention to the acquisition of knowledge within specific contexts together with the appropriate dispositions.

In Part Three, the thesis offered a different perspective on how thinking can be promoted. This was considered initially from the point of view that to think well requires relevant knowledge. The necessity of knowledge in thinking was indicated by its role in the various types of thinking. However, it was argued that although knowledge is crucial in thinking well this does not guarantee its application by the possessor in instances where knowledge is to be applied. In such instances courage also plays an important role in thinking well. But there may be limits to the analysis of this presented earlier in the thesis.

Is courage always important in thinking? For example, is it vital in making a decision on the choice of shoes that one purchases? Clearly in this case it is not. Similarly, the thinking that a car mechanic applies in carrying out a quick and successful diagnosis and repair of a faulty vehicle may not necessarily involve courage where the fault is very straightforward, but where the problem is not so simple and straightforward this may require some courage from the mechanic in tracking the fault since there may be some element of risk in failing to make the correct diagnosis. This element of risk becomes much clearer in the classroom where pupils, for example, are called upon to

produce the correct answer or comment in the presences of their classmates. In such cases courage is required to overcome the fear of failure and ridicule by their classmates. In thinking well courage plays some part but it may not be necessary on every occasion. Clearly the kind of courage that is envisaged is not that of the warrior facing physical hardships and death in battle, but it is the courage that one requires in facing situations where one is exposed to ridicule or disgrace for example.

Courage is needed in thinking through or providing solutions to unfamiliar and difficult problems. For instance, in thinking that leads to imaginative result(s) having courage is important due to the risk of failure attached to such thinking. The courage to endure such risks involves, for example, patience, perseverance, effort and care. These are dispositional qualities. The involvement of courage in thinking further establishes the complex nature of thinking, as dispositions cannot be taught in the same way as writing the alphabet.

Considering the arguments presented above, is there a difference between thinking well and being a good thinker? Thinking well could be considered as involving skills and the ability to use those skills, but this tells us nothing about one's readiness to apply such skills. For example, one may be able to think well in manipulating mathematical equations involving algebra, but this does not give any indication of one's inclination to apply the skill whenever the need arises. Being a good thinker, on the other hand, points to this inclination. In other words it involves

one's *disposition* to think well. A good example to illustrate the distinction being made can be drawn from school examinations. It is not too difficult to find pupils who perform well in their final school examination in mathematics, say, but not too long afterwards forget much of what they learnt through complete lack of use of their knowledge. In education we clearly do not want pupils to be equipped with skills that they fail to use in their everyday life when the need arises. Preferably we want them to use their skills in thinking in a habitual way. This means that the inculcation of the appropriate dispositions must be considered an important element in the enhancement of pupils' thinking. This raises questions about whether the approach of teaching thinking skills is sufficient for the development of pupils into habitual thinkers.

The role of teachers in the development of pupils' thinking cannot be overemphasised as they can provide valuable examples to guide pupils in becoming habitual thinkers. It was also argued that being able to think effectively can be directed towards good or evil ends, so the teacher's role is crucial in working on the moral sensitivities of his or her pupils. These considerations highlight the importance of the grounding that teachers receive.

Overall, the thesis has highlighted three major claims as follows:



- 1) The various thinking skills programmes fail to produce substantial evidence in support of their effectiveness.
- 2) Thinking is a very complex notion, and this must be taken into account when considering its promotion.
- 3) Knowledge is necessary, and courage as a disposition is important in thinking well and being a good thinker.

An important question to be answered is why do general thinking skills programmes fail to provide reliable evidence to support their programmes? The answer can be located in the simplistic ways in which the nature of thinking is presented in the various programmes. McGuinness (1999), for instance, in her report on teaching thinking, treats general thinking skills programmes as a package that can deliver these skills without any specific context. The approach is attractive for various reasons to various agencies. For example, programme developers may be attracted to this approach because it appears to promise a straightforward way of becoming an effective thinker across domains without the need to acquire specific skills or knowledge. Policy-makers may also be attracted to the approach as a result of their desire and eagerness to raise educational standards nationwide. In England thinking skills have become part of the curriculum. It is stated in the new National Curriculum (1999) handbook for teachers that the following thinking skills are embedded in the National Curriculum:

*Information-processing skills*

These enable pupils to locate and collect relevant information, to sort, classify, sequence, compare and contrast, and to analyse part/whole relationships.

*Reasoning skills*

These enable pupils to give reasons for opinions and actions, to draw inferences and make deductions, to use precise language to explain what they think, and to make judgments and decisions informed by reasons or evidence.

*Enquiry skills*

These enable pupils to ask relevant questions, to pose and define problems, to plan what to do and how to research, to predict outcomes and anticipate consequences, and to test conclusions and improve ideas.

*Creative thinking skills*

These enable pupils to generate and extend ideas, to suggest hypotheses, to apply imagination, and to look for alternative innovative outcomes.

*Evaluation skills*

These enable pupils to evaluate information, to judge the value of what they read, hear and do, to develop criteria for judging the value of their own and others' work or ideas, and to have confidence in their judgments (p.23-24).

A close observation of the above listed thinking skills in the National Curriculum touches on issues already raised in the thesis. There is no indication here that these are anything but general skills. Also, the framing of the above

skills largely in terms of problem solving suggests that contemplative thinking for example, is of a lesser value.

The practice of defining thinking skills simply in terms of problem solving crosses international boundaries. For instance in the Chinese special region of Hong Kong the promotion of thinking skills has taken centre stage in the development of their new curriculum framework. In identifying the various types of generic skills in the framework The Curriculum Development Council (Consultation document, Nov.2000) stated that:

*Creativity is the ability to produce original ideas and solve problems appropriate to the contexts.*

*Critical thinking skills help students to draw out meaning from given data or statements, generate and evaluate arguments, and make their own judgments.*

*Problem solving skills help students to use thinking skills to resolve a difficulty and determine the best course of action (p36-37).*

The desire to enhance the thinking skills of pupils is a worldwide phenomenon. For that reason we must not approach their promotion from a simplistic position. We must not merely seek to produce a list of skills or promote one type of thinking to the exclusion of others. The various types of thinking are not mutually exclusive. However, if it is the intention to focus on the promotion of a particular type of thinking then care must be taken to clarify the sort that is being aimed at and to acknowledge the

limitations of doing so. The view presented does not claim to offer a complete system for teaching thinking but a critical analysis of some of the most influential programmes and recommends that in any attempt to promote and enhance thinking it is important that knowledge and courage are taken into consideration.

In promoting thinking from a non-simplistic perspective the development of the various types of thinking may well offer the best possible opportunities of supporting pupils to learn to think well in the diverse situations in which they may find themselves. However, making decisions on which types of thinking we choose to promote and how we prioritise them cannot be determined by the nature of thinking but only by references to the aims of education. These are concerned with the items that we want to form the cornerstone of education and the values that we attach to them. Priorities are in the main ethical questions and in order to properly discuss priorities we have to go into issues of human wellbeing and other ethical matters that lie behind it.

The aims of education in the new National Curriculum for England (QCA,1999) embody the values underpinning compulsory education and these values bring with them a political framework which assumes a liberal democratic society. The values underpinning the new National Curriculum are described as follows:

Foremost is a belief in education as a route to: the wellbeing and development of the individual; equality of opportunity for all; a healthy democracy; a productive economy; and a sustainable environment. Education should reflect the enduring values that contribute to these ends. These include valuing ourselves, our families, our relationships and the wider groups to which we belong, together with virtues such as justice, truthfulness and a sense of duty (p.4).

The values support two main categories of aims as follows:

- i) To provide opportunities for all pupils to learn and achieve. In order to achieve this it should develop pupils' enjoyment of, and commitment to, learning to encourage and stimulate the best possible progress and the highest attainment for all pupils. It should build on pupils' strengths, interests and experiences and develop their confidence in their capacity to learn and work independently and collaboratively.
- ii) The school curriculum should aim to prepare all pupils for the opportunities, responsibilities and experiences of life. To realise this aim it should pass on the enduring values of society, develop pupils' integrity and autonomy and help them to be responsible and caring citizens capable of contributing to the development of a just society.

The fact that the underpinning values and aims of the new National Curriculum place the wellbeing, autonomy and

responsibilities of the individual at the center of the curriculum clearly highlights the importance of the promotion of the various thinking skills, among other things. We cannot aim to prepare all pupils for the opportunities, responsibilities and experiences of life without considering how the various thinking skills come into it. For example, if we want pupils to develop a love of works of art as part of their spiritual wellbeing then there is the need for the promotion of contemplative thinking in this area. Similarly, if we are going to prepare pupils to become independent and caring adults, we may need to promote such areas of thinking as reasoning and imagining in the appropriate domains. What is crucial is that since we do not know what kinds of thinking pupils might use in their lives, we must aim to develop all the various types of thinking in order to provide the opportunities for all to learn and to achieve. Our ability to think well as already indicated is crucial and this in many ways is also suggested by the new National Curriculum, but how we promote it depends on our conception of it.

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