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THEORETICAL PERSPECTIVES ON APPROACHES TO DRAWING : THEIR ROLE IN THE ART CLASSROOM

A dissertation submitted to the Faculty of Education

in

Candidacy for the

DIPLOMA FOR ART AND DESIGN TEACHERS

by

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June 1996

CONTENTS

ACKNOWLEDGEMENTS

I wish to take this opportunity to express my sincere thanks to all those who aided in the completion of this dissertation.

With special thanks to Professor Iseult McCarthy for her guidance and to Dr. Deirdre Raftery for her invaluable help and direction.

I am indebted to the fifth year students who wholeheartedly participated in the various stages of this research.

Appreciation also to the staff of this sample school, in particular the art department, and Mary Canning, the art teacher for their help and understanding.

Finally, to my dear family and friends for their constant support, encouragement and patience throughout these last few months.

Warmest thanks to June, Suzanne, Anne and Johnny.

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PROFILE OF SAMPLE GROUP

The sample group chosen to participate in this drawing project were a fifth year senior cycle art class, who attended one of the largest community schools in the country. There were twenty-three students in total, seven male and sixteen female.

Art is seen as an important subject within the school curriculum, and drawing is considered to be an important element within the art department.

INTRODUCTION

This dissertation is an examination into whether or not there is a role for theoretical perspectives on approaches to drawing in the art class theoretical perspectives traditionally belong to the third level classroom and only the trainee teacher would have access to such psychology.

It is arguable, however, that second level students may benefit from insight into such theory if it is presented in a coherent and practical way. "Any subject can be taught to any child in some honest form".[1]

I have chosen the brain as a backdrop against which to build a discussion of approaches to drawing. I will examine the cerebral functions of the left and right hemispheres of the brain to show the importance of the right hemisphere when drawing. In particular I will examine the medial research of Roger Sperry, who experimented on the cerebral functions of the left and right hemispheres of the brain and is a leading researcher into split brain theory. I will also review the work of educationalist Betty Edwards who developed the implications of Sperry's research for the teaching of drawing and that of John Holt and Mona Brookes who have further refined Edward's approaches to teaching drawing.

I want to illustrate that it is possible to improve a student's understanding of and ability to draw by introducing them to Sperry's theory of the split brain and the cerebral functions of the left and right hemisphere. And by applying some of Betty Edward's practical exercises utilising the right side of the brain in the art classroom.

These exercises create an awareness of the use of the right hemisphere when drawing and the need to look at what they, the students, are drawing in that way,[2] a way that requires the drawer to observe and question differently.

Prior to the introducion of students to any theoretical perspectives on approaches to drawing, it is necessary to establish a self evaluation of the student's own ability. A questionnaire introducing important queries on how students draw, how accomplished they perceive their ability to be, how their ability has developed from early childhood and which form of drawing they rate most highly (imagination, observation or copying), is the most effective means of acquiring such information.

This knowledge will be a yardstick on which students can compare future progress in their drawing ability and it will establish the importance, if any, they attach to the brain when involved in drawing exercises.

FOOTNOTES

1 Guy R. Lefrançois, *Psychology for Teaching*, 8th ed. (USA, Wadsworth Publishing Company, 1994), p. 159.

2 Betty Edwards, *Drawing on the Right Side of the Brain, How to Unlock Your Hidden Artistic Talents* (Great Britain : Souvenir Press Ltd., 1981) preface.

CHAPTER 1

INTRODUCTION TO THE BRAIN

INTRODUCTION

Before discussing how the cerebral functions of the brain influence the ability to draw, it is necessary to give an overview of the structure and functions of the brain. Additionally there are certain areas or landmarks of the brain that need to be named, located and their functions discussed as they will be referred to on numerable occasions throughout the course of this dissertation. Broadly speaking we can discuss the brain under two headings: Firstly the structure of the brain which observes the physical make up of the brain and secondly the functions of the brain which isolate various sections of the brain and suggest how they influence and are responsible for the movement or actions of various parts of the human body.

i) The structure of the brain

> The cerebrum is more highly developed in human beings than in any other organism. The cerebral cortex is the layer of nerve cell bodies about 3 millimeters thick covering the cerebrum, in Latin, cortex means *bark.*[1]

The cerebral cortex of a lower mammal such as a mouse is relatively smooth. As we move to higher mammals in the phylogenetic scale, the amount of cortex relative to the amount of total brain tissues increases accordingly and the cortex will become more wrinkled and convoluted. It has been implicated that "there is a general correlation between the cortreal

development of a species, its position on the phylogenetic scale, and the complexity of its behaviour".[2]

Our sensory systems, vision, audition and touch, for example project information to specific areas of the cortex. The motor responses (movement of body part) are controlled by another area of the cortex. The rest of the cortex consists of association areas, which are concerned with more complex aspects of behaviour, memory, thought, and language. These occupy the largest area of the cortex.

The brain comprises of two cerebral hemispheres:

> The two hemispheres are basically symmetrical with a deep division between them, running from front to rear. So, our first classification is the division into right and left hemispheres.[3]

These hemispheres in question are divided into four lobes, the frontal, parietal, occipital and temporal (see Figure 1.1).

The frontal lobe is separated from the parietal lobe by the central fissure, running from near the top of the head sideways to the ears. The division between the parietal lobe is at the top of the brain and the occipital lobe is at the rear of the brain. The temporal lobe is known by a deep fissure at the side of the brain, the lateral fissure.

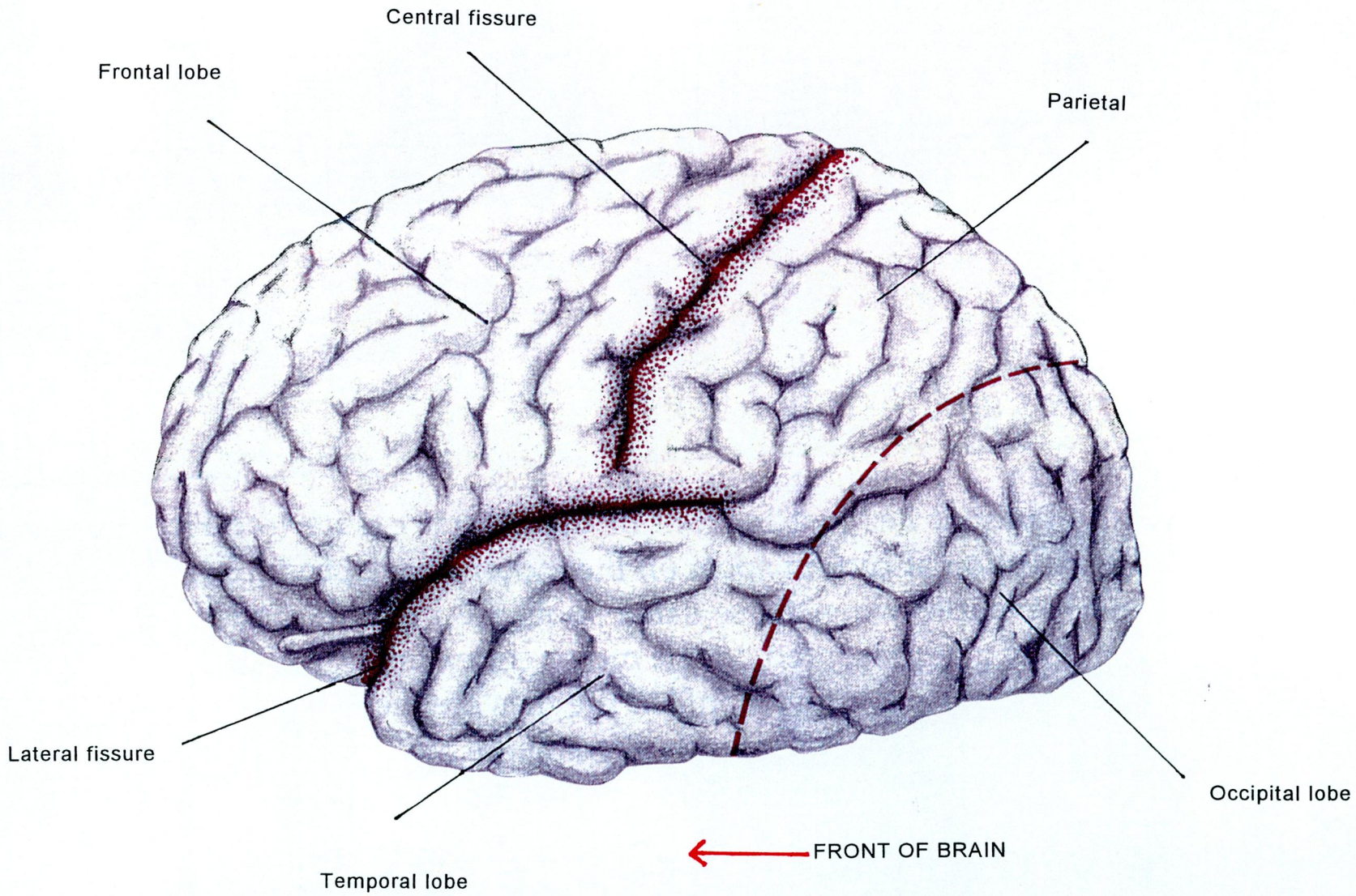

Fig. 1.1 Structure of cerebral cortex

ii) The functions of the brain

The location of the various areas may be seen in Figure 1.2.

a) Motor Area

The motor area (or motor cortex) is responsible for the voluntary movements of the body. It has been established that electrical stimulation at certain spots of the motor cortex produces movement of specific body parts; when these same spots are injured, movement is impaired.[4]

Again movements in the motor cortex within the left hemisphere results in voluntary movement on the right side of the body and vice versa (see Figure 1.2).

b) Somatosensory Area

The somatosensory (body-sense) area (or somatosensory cortex) is alerted if a part of the body is being touched or moved. Heat, cold, touch, pain and the sense of body movement are all represented here in the somatosensory cortex which is located in the parietal lobe (see Figure 1.2). It is separated from the motor area by the central fissure. If this area is stimulated electrically it produces a sensory experience some where on the opposite side of the body.

c) Visual Area

The visual area can be located at the back of each occipital lobe. Optic nerve fibres and neural pathways lead from the eye to the visual cortex (see Figure 1.2). Some fibres go from the right eye to the right cerebral hemisphere and from the left eye to the left hemisphere, other fibres cross-over at the

junction called the optic chiasma, and go to the opposite hemisphere (Figure 1.3).

> In terms of the visual field, this means that objects in the right visual field are projected to the left cerebral hemisphere, whereas objects in the left visual field are projected to the right hemisphere.[5]

d) Auditory Area

The auditory area is found on the surface of the temporal lobe at the side of each hemisphere. It is particularly concerned with the patterning of sound in time (human speech). There is also some spatial mapping, in the auditory area, one part being very sensitive to high tones and another part to low tones.

e) Association Areas

There are many large areas of the cerebral cortex that are not concerned with the motor or sensory areas (see Figure 1.1). These are called the association areas.

The frontal association areas : Those parts of the frontal lobes before the motor area (see Figure 1.1), they seem to play an important role in the thought processes required for problem solving.

The posterior association areas : Located among the various primary sensory area and seem to consist of subareas (see Figure 1.2), each one serving a particular sense. The lower portion of the temporal lobe is related to visual perception, and has the ability to recognise and discriminate form.

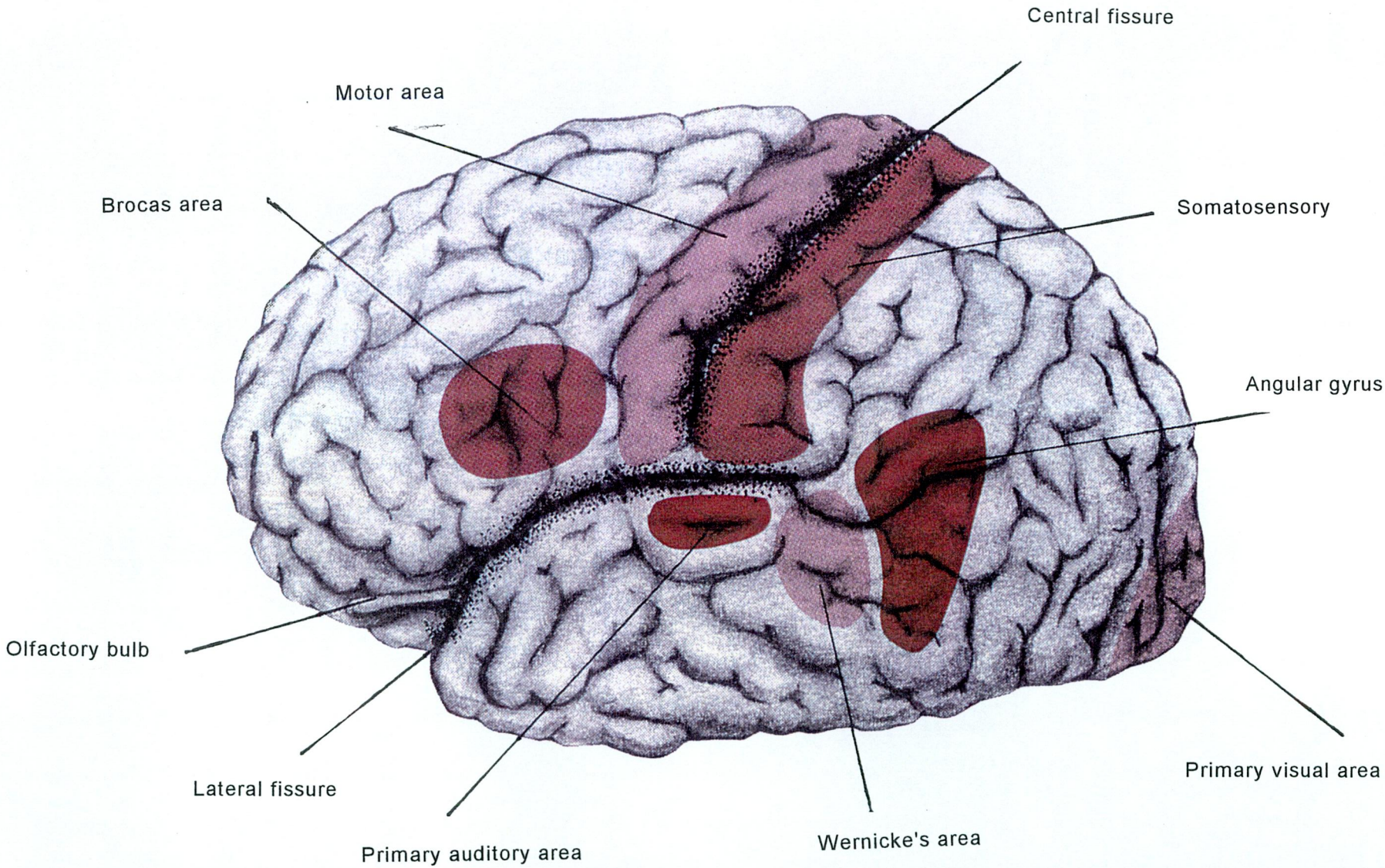

Fig. 1.2 Localisation of function in left cortex

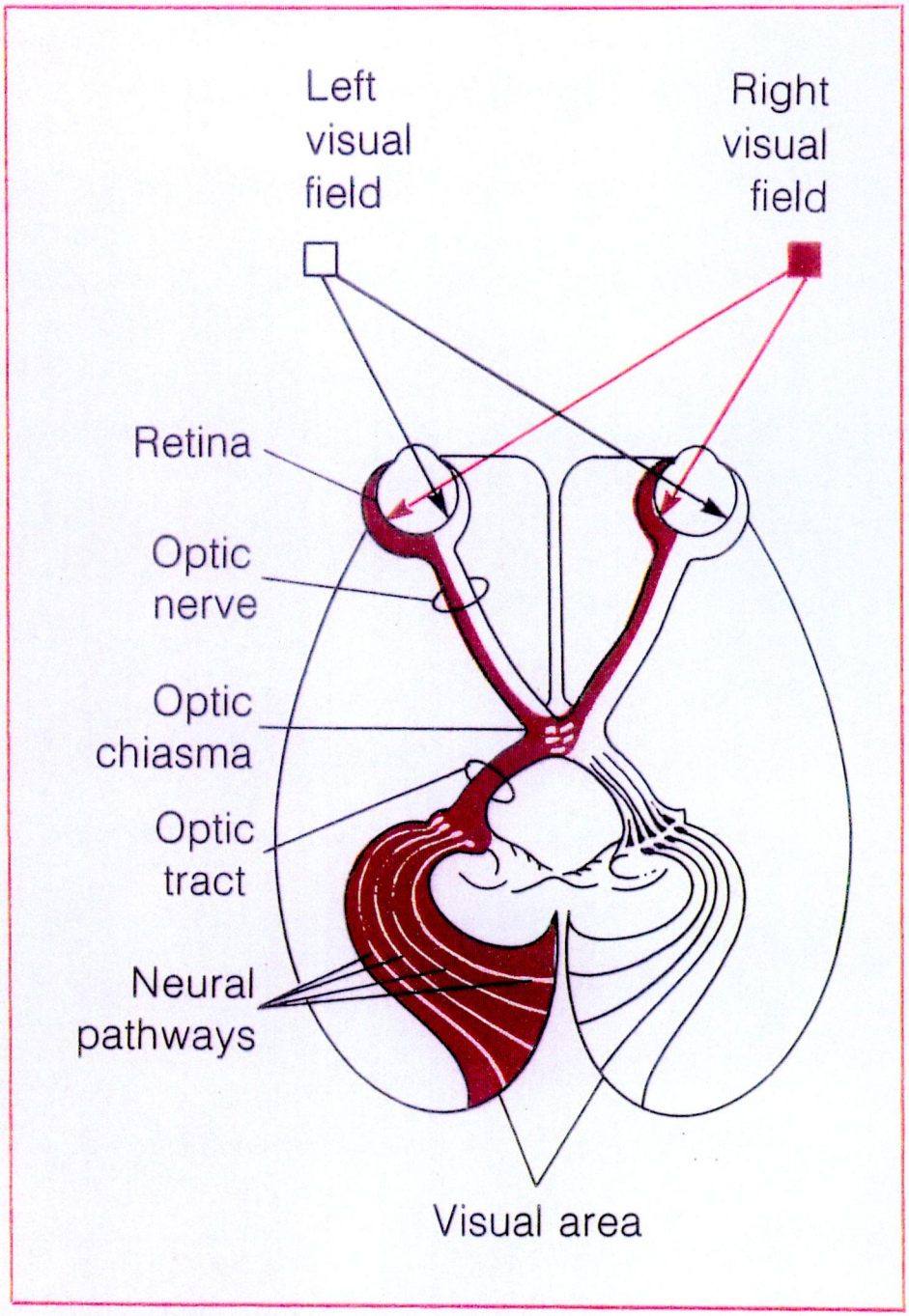

FIGURE 1.3 The visual pathways

CONCLUSION

Gaining an understanding of the structure and function of the brain is vital if one is to isolate separate sections of the brain with a view to discussing their particular potential for certain areas of human endeavour. Roger Sperry's work with split brain patients has increased our knowledge of how different areas of the brain are employed for different functions. The next chapter will examine how his experiments have indicated the special potential of the right hemisphere of the brain for artistic work: specifically drawing.

FOOTNOTES

1 Rita, L., Atkinson, Richard C., Atkinson, Ernest R. Hilgard, *Introduction to Psychology*, 8th ed. (U.S.A., Harcourt Brace Joranovich, 1981), p. 41.

2 Atkinson, R. L., Atkinson, R. C., Hilgard, E. R. *Introduction to Psychology* 8th ed., p. 41.

3 Ibid.

4 Ibid., p. 42.

5 Ibid., p. 43.

CHAPTER 2

CEREBRAL FUNCTIONING EXPERIMENTS AND IMPLICATIONS

INTRODUCTION

The normal human brain functions as one unit. Both hemispheres are connected by a central bridge the *coprus callosum*. However it has been discovered that each hemisphere is more responsible for some functions than the other. Roger Sperry pioneered research into these aspects of how the brain works and his finding has important implications for the teaching of art, particularly drawing.

i) The double brain

> Seen from above, the human brain resembles the halves of a walnut - two similar appearing convoluted, rounded halves connected at the centre.[1]

These two halves of the brain in question are the right hemisphere and the left hemisphere, known as the cerebral hemispheres. The area that connects these two halves is often referred to as "the great interhemispheric bridge, the "*Corpus Callosum* (meaning thick skinned body)".[2] It is referred to as a bridge because it transfers information from the left side of the brain to the right side and it is made up of "some 800 million nerve fibres that connect one half of the cerebral cortex with the other".[3]

At a glance the cerebral hemispheres of a human look alike or symmetrical, like that of an animal's brain. However, animals' brains are essentially symmetrical in function, whereas human brains develop asymmetrically in function. (The most obvious outward effect of the asymmetrical function in humans is handedness.)

The left hemisphere controls the right side of the body, the right hemisphere controls the left side. Within the *corpus callosum* there is a cross-over in nerve pathways which means the left hand is connected to the right hemisphere of the brain and the right hand is connected to the left side of the brain. This is also the case with the rest of the body. Therefore if a person was to suffer accidental brain damage or a stroke, depending on which hemisphere is damaged, the opposite side of the body may be paralysed. A person's speech is also likely to suffer if the left hand side of the brain is damaged in an area known as the Broca's area (see Figure 1.2). Knowledge of this is derived from observations of the effects of brain injuries as has been noted.

> It was apparent for example, that an injury to left side of the brain was more likely to cause a loss of speech capability than an injury of equal severity to the right side.[4]

Because language, reasoning and the written word are mainly associated with the left hemisphere (and these are seen as the functions that set us apart from animals), it was the view of many nineteenth century scientists that the left hemisphere was the most dominant or major hemisphere and the right the inferior or minor hemisphere. This view of the cerebral hemisphere prevailed until quite recently. The right hand side

of the brain has been seen as less advanced or -"a mute twin with lower level capabilities, directed and carried along by the verbal left hemisphere".[5]

ii) The split brain

> In the normal brain, stimuli entering one hemisphere are rapidly communicated by way of the *corpus callosum*, to the other, so that our brain functions as a unit. We will see what happens when the *corpus callosum* is severed, called a split brain - so that the two hemispheres cannot communicated.[6]

Famous psychologists G.T. Fechner and William McDougall wondered what would happen if the brain was divided in this way. Cerebral commissurotomy, the split brain operation was carried out during the mid-1940s always in the hope of "checking crippling epilepsy, to stop the non-functional neural discharges reverberating between the hemispheres and severely damaging the cortical tissues".[7] The breakthrough in what kind of mental effects these operations could have came from investigations in Roger Sperry's laboratory at the California Institute of Technology. Various experiments were carried out on monkeys and cats to see what effects the commissurotomy was having.

> The split-brain animals were found to have totally divided perception of learning. When free, their movements, alertness and general motivation were entirely normal.[8]

It was not until the 1960s, in Los Angeles USA, that the commissurotomy was performed on humans. The neurosurgeons, Philip Vogel and Joseph Bogen, came to the

conclusion that certain patients who suffered from severe epilepsy "would benefit from the surgery and suffer no serious mental loss".[9] During 1962-1968 they performed and completed nine commissurotomies, all of which resulted in success, in that the patient's fits were reduced. Controlled tests were carried out on split-brain patients by Roger Sperry, Joseph Bogen and Michael Gazzaniga in Sperry's laboratory at the California Institute of Technology, USA.

Commissurotomy, division of the *corpus callosum* to relieve crippling epilepsy, does however cause separate awareness in the left and right halves of the visual field and for objects in the left and right hand (see Figure 2.1). Intergrations through the brain stem keep the behaviour of the person coherent, but do not permit unification of consciousness.

> Testing a split brain involves control of orienting movements, with one eye covered and stimuli flashed for one tenth of a second on a screen, or objects felt out of sight on a carpet so no tell-tale sounds are fed back to the subject's ears. Using conflicting auditory stimuli in earphones, division of hearing may be demonstrated.[10]

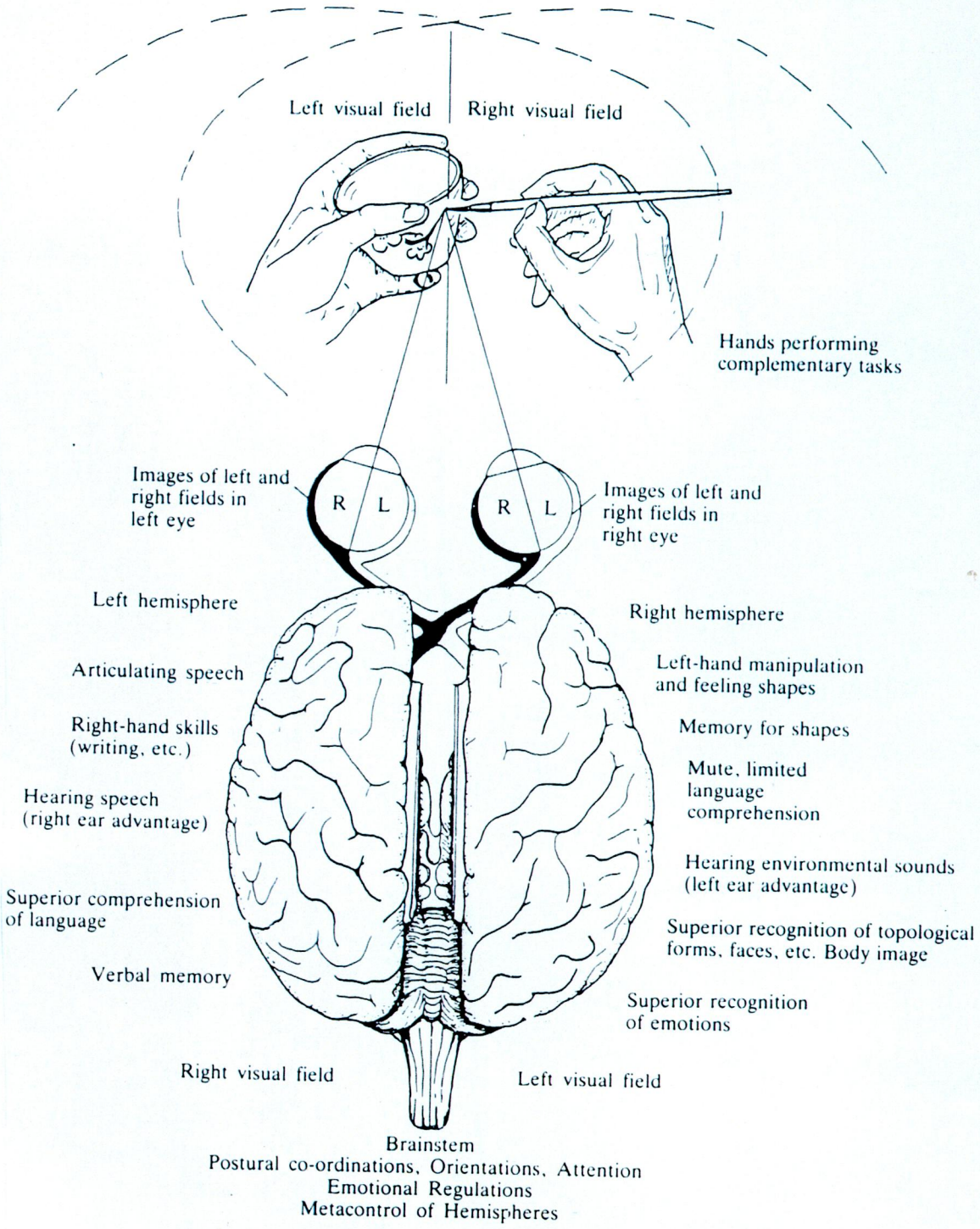

FIGURE 2.1 Visual fields (left and right)

The results of these tests and experiments only confirm a division of awareness, but more importantly they raise questions for debate, in clinical neurology since the discovery, over a century ago, that brain injuries confined to the left hemisphere can result in muteness or disturbance of language comprehension. This raised further issues:

> Could the right hemisphere comprehend spoken or written language at all? Could it express itself to any degree in signs, by writing, or by gesture? Could it make an utterance? Could it reason and think? Was it really conscious? The commissurotomy patients offered a wonderfully direct approach to these questions.[11]

More ingenious experiments were designed by Sperry and his students Jerre Levy, Robert Nebes, Harold Gordon, and Dahlia and Evan Zaidel. Their aim was to interrogate the unspeaking right hemisphere. Levy applied non verbal intelligence tests, the results indicated that there were some functions for which the left hemispheres did not dominate and for some modes of thinking the right hemisphere was superior.

These intelligence tests also involved touch and visual perception of the right brain, and judgements involving exploration of shapes by hand or manipulative construction of geometric assemblies or patterns. The findings suggested:

> . . . idea that the right hemisphere is better at talking in the structure of things synthetically, without analysis, assimilating all components at once in an ensemble or figure.[12]

Additionally it was suggested that:

> The speaking, major hemisphere, in contrast, seems to operate in a more logical analytic, computer-like fashion.

> Its language is inadequate for the rapid complex syntheses achieved by the minor hemisphere.[13]

Nebes, student of Sperry, also carried out intelligence tests that involved visual and touch perceptions. His results concluded that the right hemisphere of the brain may have a clearer memory of the appearance of things, in that it is better able to recognise familiar objects with incomplete pictorial data, and better able to perceive whole shapes from parts seen or felt in the hand.

Studies with split-brain subjects have made clear the striking differences between the function of the two hemispheres:

> The left hemisphere governs our ability to express ourselves in language. . . . The right hemisphere appears to have a highly developed spatial and pattern sense. It is superior to the left hemisphere in constructing geometric and perspective drawings.[14]

Studies with normal individuals also tend to confirm the different specialisations of the two hemispheres. The left hemisphere controls speech, reading, writing and arithmetic. It operates in a logical, analytical mode, focuses on details, and perceives in terms of individual features rather than holistic patterns. The right hemisphere, on the other hand, plays a special role in musical and artistic abilities, in imagery and dreaming, and in perception of complex geometric patterns. Its perceptions are also holistic, and it is particularly effective on tasks that require the visualisation of relationships. The right hemisphere also shows more emotion and impulsiveness than its companion: the left hemisphere.

In conclusion, a key theme emerged:

> is that there appears to be two modes of thinking, verbal and non verbal, represented rather separately in the left and right hemispheres respectively, and our educational system, as well as science in general, tends to neglect the non verbal form of intellect. What it comes down to is that modern society discriminates against the right hemisphere.[15]

Roger Sperry pioneered research in this field and was awarded the Nobel Prize in 1981 for his research.

CONCLUSION

Sperry's research revealed the very different potentials of the two hemispheres and helped to highlight the heavy bias in favour of the logical, analytical mode. However research inspired art teacher Betty Edwards to develop teaching techniques that forced students to use the right side of the brain the musical and artistic mode.

FOOTNOTES

1 Betty Edwards, *Drawing on the Right Side of the Brain, How to Unlock Your Hidden Artistic Talents* (Great Britain : Souvenir Press Ltd., 1981), p. 26.

2 Richard L. Gregory, *The Oxford Companion to the Mind* (U.S.A.N.Y., Oxford University Press, 1987), p. 740.

3 Gregory, *The Oxford Companion to the Mind*, p. 740.

4 Edwards, *Drawing on the Right Side of the Brain*, p. 27.

5 Ibid., p. 29.

6 Gregory, *The Oxford Companion to the Mind*, p. 742.

7 Ibid., p. 741.

8 Ibid.

9 Ibid.

10 Ibid., p. 742.

11 Ibid., p. 743.

12 Ibid. pp. 743-4.

13 Jerre Levy, Differential perceptual capacities in major and minor hemispheres, *Proceedings of the National Academy of Science*, vol. 61, 168, p. 1151.

14 Rita, L., Atkinson, Richard C., Atkinson R. Hilgard, *Introduction to Psychology*, 8th ed. (U.S.A., New York, Harcourt Brace Joranovich, 1981), p. 47.

15 F. J. McGuigan and R. A. Schoonover (eds.), *Lateral Specialization of Cerebral Function in the Surgically Separated Hemisphere. The Psychophysiology of Thinking* (New York : Academic Press, 1973), pp. 209-29.

CHAPTER 3

TOWARDS AN UNDERSTANDING OF DRAWING ABILITY AND THE LEARNER

INTRODUCTION

A concise understanding of drawing abilities is necessary in order to make art teachers more effective. Why do some people draw well while others find the activity very difficult? Educationalist Betty Edwards contends that everybody can draw and she has perfected teaching techniques into a system that enables anyone to acquire real skill in this area. Edwards' book *Drawing on the Right Side of the Brain*, which harnesses medical research of the split brain has influenced other educationalists particularly John Holt and Mona Brookes.

Holt's main concern is how we value drawing and how children's drawing and approaches to drawing change as they develop. Brookes like Edwards is concerned with providing everyone with the knowledge that they do have the ability to draw but the inability to realise this fully.

Learning to draw is an integral part of the development of the creative process in children. It is considered by teachers of art as an essential skill. The more teachers understand about the psychology of learning the more effective they can be as educators. Problems associated with teaching and learning to draw are explored in detail in Betty Edwards" *Drawing on the Right Side of the Brain*. Edwards (1981) briefly tells us about her history as an artist. She describes as "that"[1] the means by which she was able to draw from a very early age never knowing what "that"[2] was. She wrote:

> . . . I was aware of having to gaze at whatever I wanted to draw for a time until that[3] occurred . . . I knew that drawing was easy and that all anyone had to do was look at things in that certain way.[4]

Edwards recounts efforts as a teacher to show her students how to do what it is she does when she draws. These frustrations with teaching students to draw could be considered as the starting point for *Drawing on the Right Side of the Brain* (1981).

Edwards argues that everyone of us has the ability to draw but that it is not the drawing skill that is difficult, it is the fact that we cannot see in "that"[5] certain way. She uses the simile that teaching someone to draw, is like teaching someone to ride a bicycle.

> . . . In many ways, teaching drawing to someone is like teaching someone to ride a bicycle. It is very difficult to explain in words.[6]

As an art teacher one must first show students how to see what they are drawing. "The problem is that this different way of seeing is as hard to explain as how to balance a bicycle".[7] Art teachers encourage their students to continue looking and that eventually they will succeed. Although most people learn to master riding a bicycle, not as many individuals master the art of drawing.

Edwards observed, during drawing class demonstrations, how she would stop speaking in the middle of a sentence and start to draw, but if she started to talk again, she was unable to concentrate on the task of drawing and "that"[8] certain way of seeing. On impulse one day during a figure drawing class she

gave the students a photocopied line drawing of a figure and asked the students to turn this photocopy upside down and draw what they saw. The quality of the drawings was of a higher standard then work that had been produced hitherto. Edwards described this as unusual orientation, later, using it as an exercise in Chapter 4, "Crossing Over : Experiencing the Shift from Left to Right".[9]

During the 1950s and 60s she developed her interest in "the split brain",[10] discovering how the two hemispheres of the human brain are involved in higher cognitive functions. These two hemispheres are responsible for different methods or modes (as she refers to them throughout the book) of processing information. L-mode refers to the left hand side of the brain and the R-mode refers to the right hand side of the brain, which is the side that enables us to draw well. The individual can shift from L-mode to R-mode when processing visual information. To draw properly one must use the R-mode. This involves a shift from the verbal, logical thinking (L-mode) to a more global intuitive right mode. Having explained this process in Chapter 4 Edwards presented a series of exercises designed to help the student make the shift from left to right. Edwards emphasises that everyone has the ability to draw if they have good eye and hand control, good eyesight and can write or print their name legibly. Edwards reinforced the point that learning to "see"[11] is the most important lesson in drawing. Looking at something is not enough, one must learn to see it the way that accomplished artists have, like Leonardo or Albert Dürer.

Edwards illustrated that from infancy, the left hand side of the brain records words for objects and stores a symbol for each

of these words. Up to the age of eight or nine, when children draw, they repeat the same set of symbols in a drawing or painting and each picture is not complete until all the various symbols have been included. For this she concluded that most children who do not pursue art after primary, in later life as adults, will draw a house or person as they did when they were in a pre-adolescent stage.

Children who continue in art into their teens become obsessed with realism and detail, labouring over stylised images of the world around them. This is also a time when they become obsessed with their signature or monograms. At this stage they also become very critical of their childhood drawings and suddenly the type of pictures that they had been very happy to create as a child no longer hold any value in their eyes. This is a critical stage for children if they do pursue art, because it is essential that they be taught how to really "see"[12] in order for them to be able to draw well.

Having taught students how to see using the R-mode, in the remainder of the book, Edwards explains the classic stages through which every art student must pass in order to perfect their drawing skills.

> The business of turning real objects into flat pictures is a convention, like language and like language it must be learned.[13]

Holt has discussed Edwards' research in how children learn (Holt 1983). He agrees with many of the issues previously mentioned, in particular, two areas: symbolism in early childhood drawing, and the desire to create pictures of "real"[14] life likeness, the

adolescent stage. "There are tricks, or many tricks, that have to be learned, practised and perfected".[15] Holt admits that he has never been able to draw the likeness of people or things and describes the ability to do so as "a mysterious almost magical talent".[16] However having read Betty Edwards' *Drawing on the Right Side of the Brain*, he was able to understand why he and most other people drew so badly, while others drew so well. Edwards' book convinced him that he could learn to draw well in a short space of time. He claims "that we fill our minds so full of visual symbols for things that for the time being we are unable to see their true shapes".[17] Holt uses the example of the mindful symbols we have for a human face. The symbols require words, nose, mouth, eye. When we are asked to draw the human face we therefore call up from our memory bank these various elements of the face and it is the symbols for these that we put on the page, not the particular nose on the person in front of us and we always seem disappointed with our results because it does not look like the person. Holt discusses how children learn from each other, and that art is a way for children to express what it is they are learning about life.

Another concern Holt was the extent to which teachers and parents value art. The pressure on teachers of curriculum and parents, often means art is abandoned for a more academic education. Parents are worried about children's "progress".[18] As a result children began to feel that there is no time for art and that it is of no real importance. Parents and teachers place more value on the written word then drawings or art work. Holt claims, that as a result, students in later life are more likely to see art as escapism from real life, doodling on corners of books and copies.

He also comments strongly about the issue of children being exposed to a real artist at work, to see how they can create reality on a flat page. Holt places a lot of importance on how we value children's art work, where and how it is exhibited: at home or in the class.

> Art can exercise the brain as well as the eye and hand. Any activity that puts together real problems for us, that we do not have answers for in books, sharpens our intellect.[19]

Art educator Mona Brookes' latest book *Drawing for Older Children and Teens* (1991) is a sequel to her successful first book, *Drawing with Children*. She describes the method for teaching drawing that is used in her chain of Monart Drawing Schools. Baseingher techniques on two simple but effective premises: first everyone can tap into his or her own creativity given proper instruction in a non-competitive, supportive atmosphere. Secondly, children can grasp the basics of good drawing through learning to observe carefully and through copying. In Chapter 1 exploring different styles, Brookes uses one of Betty Edwards' teaching techniques, drawing from an upside-down contour drawing. She suggests that this exercise can:

> . . . help people get over their fear of realistic drawing, because when the model (or picture) is upside down they aren't as concerned about the realistic content of the picture".[20]

Brookes goes on to present her methods of "seeing"[21] in Part 2 of the book. The final chapter explores special ways of

observing and methods of working for specific subject mater - landscapes, still life, vehicles and the human form.

Finally to develop a suitable methodology that would be most effective when introducing the theory of the brain, as an approach to drawing at second level. Arguments put forward by Piaget and Brurer leading psychologist (for the examination of the learner needs) suggested that Bruner's theory on discovery learning as the most effective methodology for the appreciation and introduction of theoretical perspectives on approach at drawing to senior cycle art students.

Piaget believes that children develop certain abilities at certain stages in life and that they are unable to accumulate certain information if it is applied before its stages of acceptance. Bruner disagrees and says that children can except information and complete tasks on any subject at any age, so long as the information is communicated or transferred to the level they are at.

> Bruner argues that unless the organization of the curriculum is such that it facilitates the information of structure (code systems), it will be learned with difficulty, it will not lead itself to transfer, and it will be remembered poorly . . . any subject can be taught to any child in some honest form.[22]

The Sprial Curriculum, Bruner encourages very much the idea of discovery, learning, which will be reflected within the methodology of this drawing project in that it involves the students in problem solving and self discovery. Bruner's Sprial Curriculum involves a sort of repetition that is useful for constructing knowledge. At first the learners are introduced to

the most general, most inclusive idea - followed by a series of specific simple instances of concepts. They then discover relationships among these concepts, they build knowledge that is highly conducive to transfer, recall and discover.

CONCLUSION

The evidence of Edwards', Holt's and Brooke's work suggests theoretical perspectives and approaches to drawing can be applied in the classroom. Edwards throughout her book *Drawing on the Right Side of the Brain* constantly refers to the split between the left and the right hemisphere and the need to identify for oneself which is which and how differently they operate.

Holt refers to the left side which collects symbols from a very early age. When a person is asked to draw someone's face instead of observing the face in front of them they allow the left side to call up the various symbols that would make up a face such as eyes, nose and mouth. It is these symbols suggested by left brain that are put down on paper, bearing little resemblance to the actual subject of the picture or portrait.

FOOTNOTES

1 Betty Edwards, *Drawing on the Right Side of the Brain*, how to unlock your hidden artistic talents (Great Britain, Souvenir Press Ltd., 1981) p. x, Preface.

2 Edwards, *Drawing on the Right Side of the Brain*, p. x, Preface.

3 Ibid., p. x, Preface.

4 Ibid., p. x, Preface.

5 Ibid., p. x, Preface.

6 Ibid., p. 2.

7 Ibid., p. 2.

8 Ibid., p. x, Preface.

9 Ibid., p. 45.

10 Ibid., p. xi, Preface.

11 Ibid., p. 3.

12 Ibid., p. 3.

13 John Holt, *How Children Learn* (Middlesex, Penguin Books, 1983), p. 194.

14 Ibid., p. 194.

15 Ibid., p. 194.

16 Ibid., p. 195.

17 Ibid., p. 195.

18 Ibid., p. 195.

19 Ibid., p. 196.

20 Mona Brookes, *Drawing for Older Children and Teens, A Creative Method for Adult Beginners, Too* (USANY, Jeremy P. Tarcher/Perigee, 1991), p. 28.

21 Brookes, *Drawing for Older Children and Teens*, p. 73.

22 Guy R. Lefrançois, *Psychology for Teaching*, 8th ed. (USA, Wadsworth Publishing Company, 1994), p. 159.

CHAPTER 4

APPLICATION OF THEORETICAL PERSPECTIVES ON APPROACHES TO DRAWING : ADAPTATION FOR SENIOR CYCLE ART STUDENTS AT SECOND LEVEL

INTRODUCTION

To apply the knowledge of theoretical perspective and approaches in drawing as a teaching technique to the second level classroom a strategy must be devised which is clear and coherent. The students must develop an understanding of the primary role of the brain in helping them see what they are drawing. Initially it is more effective for the students to experience using their brain in this manner rather than being told how the brain may work. A series of exercises that deal with drawing (imaginary, observational and copying) in which students participate confidently is the most effective way of achieving this. Also to ascertain exactly where the students are in terms of their views on drawing a series of questions that allows students to evaluate themselves are very helpful. The main objective in all of this is to effect a change in the student's approach to drawing and consequently their ability.

i) Methodology

There are various aspects that had to be addressed when approaching second level students with theories that are normally applied at third level. At all times students should feel at ease and confident that they are competent enough to attempt and complete the task set before them. Keeping in mind Bruner's theory of discovery learning that "any subject can be

taught to any child in some honest form",[1] reinforces this point. It is possible to present a subject so that a child can first experience it, then react to a concrete presentation of it, and finally symbolise it. This very much reflects the approach taken to implement the various stages of this project. Students would first be allowed to experience practical exercises that would activate the right side of the brain when drawing. Then having completed two of these exercises, one in imaginary the other in observation, and two self evaluation questionnaires, they were then allowed to react to a concrete presentation or introduction to the theoretical perspectives on approaches to drawing using the brain, through discussing, questioning and reflecting on what they had experienced hitherto. Students then approached the third exercise, on coping: being aware of how the right side of the brain would assist them, if they looked at their subject matter and questioned it differently. Finally they symbolised all the knowledge and experience they had gained through the various stages of the project.

Concluding the project for the students the third questionnaire allowed the respondents an opportunity to reflect on the project in its entirety and comment on what they had acquired as a result of participation.

METHODOLOGY BREAKDOWN

Classroom Application

Stage 1: Brief introduction to the project - class activity.

Stage 2 : First questionnaire - self evaluation of student's own ability to draw their view of drawing - class activity.

Stage 3 : First practical exercise - imaginary figure drawing, home activity.

Stage 4 : Second practical exercise : observation - blind contour drawing, through figure drawing, three models set up classroom activity.

Stage 5 : Second questionnaire : self evaluation of second practical exercise : observational drawing. Class activity.

Stage 6 : Introduction to brain theory - importance of the right side of the brain when drawing. Class activity.

Stage 7: Third practical exercise : copying - upside down drawing - class activity.

Stage 8: Third questionnaire : to conclude student's acknowledgement of changes in their approach to and ability of drawing as a result of the drawing project - class activity.

ii) Practical Application to the Classroom

Stage 1

- **Introduction**

Prior to the distribution of the first questionnaire (see Appendix A) students were given a brief introduction to the project, and informed that it was about different approaches to drawing. Imaginary, observation and copying, were then clarified as ways or approaches to drawing eliminating at an early stage any confusion that might arise when answering the first questionnaire. They were also informed that there would be more questionnaires and three practical exercises relating to imaginary observation and copying as ways of drawing.

Stage 2

- **The First Questionnaire (see Appendix A)**

Before students were given the questionnaire they were asked to carefully consider their replies, as they may be needed at a later stage of the project to reflect on their own progress. They were also informed that there was no right or wrong answers, it was simply to establish how they viewed art, drawing and their own ability at drawing.

Stage 3

- **First Practical Exercise**

Imagination - students were asked to draw an imaginative figure seated anywhere. This was given as a home activity so that students would not be influenced by each other's attempts. To be completed using a 2B or HB pencil (soft lead). Imaginary drawing was used at this stage to encourage students to use their brain and hand when drawing.

Stage 4

- **Second Practical Exercise**

Observation - life drawing students were introduced to a new method of observation drawing called blind contour drawing were the students are asked to draw the model standing in front of them without looking at their page. This exercise trains and heightens the student's eye and hand co-ordination. More importantly it forces the students to look at and question differently what they are drawing, allowing students to almost touch what it is they are observing with their eye. This helps to utilise the right side of the brain, because they are following lines and angles in different directions not concerned with the model as a whole person. Students are informed and can see from demonstration that this approach to drawing does not always remain on the page and may come off the edge. The results may look hideous or ridiculous at first but in time this approach to drawing will develop and improve your ability to really see and observe what it is you are drawing. This practical exercise set during class time of eighty minutes and students were given fifty minutes to complete a number of different poses. They were also asked to remain as quiet as possible so that the level of concentration required for this exercise could be achieved. The demonstration took five minutes - the end of this lesson was given so students could complete the second questionnaire in ten minutes.

Stage 5

- **Second Questionnaire**

On contour drawing exercise

Students were asked to reflect and comment on what they have just completed in the observation exercise. Student were given approximately ten minutes to complete this questionnaire. Again students were informed that they should consider the answers and that it was just as relevant to say that they had not experienced certain aspects of this exercise, as it was to say they had. They were also told to answer in sentence format not just yes or no.

Stage 6

- **Theory Introduction Application to Art Class**

During an eighty minute class, the first forty were allocated to theory. Charts on the structure and the functions of the brain were shown, explaining that the right side of the brain is for drawing because it looks and questions differently what we see. This stage is discussed in greater detail on pages 36 to 43.

Stage 7

- **Third Practical Exercise Copying**

Upside down drawing

For this exercise the student is given a black and white A4 photocopy of a figure drawn in line, and asked to tape it to their desk upside down. They are then given an A4 sheet of paper (blank) and asked to copy this photocopied image onto the sheet. All students are facing in the same direction so that no one in the room at any stage can see what the image is. This follows the explanation given to students during the theory introduction that in order to shut the left side of the brain out

they must not allow it to identify any symbols that it might recognise. Students were instructed to start on the right hand top corner and work their way through - all the time looking and allowing the right side of the brain to draw this picture by questioning what it is they are drawing, is that line the same length as that? what kind of shape is this? how big is that curve? is that angle the same as this one? and so on. Students were given a full forty minutes to complete this copying exercise and only at the end of the lesson where they allowed to walk around the room and observe what they had drawn upside down, from the right side up.

Stage 8

- **Third Questionnaire**

In light of the various exercises, questionnaires and discussions that the student had taken part in, the final questionnaire was used to acknowledge any changes in their approach and ability to draw, that was a consequence of participating in this drawing project. This also questioned how important they now considered the brain as an element along side the eye and hand when approaching drawing. Finally inquiring if students considered the introduction of the brain theory beneficial as an approach to drawing at second level for senior cycle art students.

iii) Theory Introduction Application to Art Class

The theory behind this drawing project is to discover how the brain should be used to develop our drawing ability. It is important to establish at this stage if students have any knowledge of the brain as a result of studying aspects of it in

biology or social and scientific class within the curriculum (students revealed that they had no knowledge of the brain). With the aid of a chart (see Figure 4.1) which shows the structure of the brain, students were then informed about the physical make up of the brain. The human brain resembles the halves of a walnut (using visual aid an actual walnut to be passed among the students for examination). The two halves of the brain are called the left hemisphere and the right hemisphere, known also as the central hemispheres, joined by "the great interhemisphereic bridge,"[2] the *Corpus Callosum.* This is referred to as a bridge because it transfers information from the right side of the brain to the left and vice versa. It is made up of "some 800 million nerve fibres which connect the cerebral hemispheres to each other".[3] Students were then asked if they were aware that the left side of the brain is responsible for all the movement that occurs down the right side of the body and vice versa (see Figure 4.2). Handedness was explained, a term which refers to whether one is left or right handed. Most students respond to this information with surprise, yet they are still unsure of its significance to drawing. Making sure at this stage that students had familiarised themselves with the relevant information about the brain, it was now time to approach the right side of the brain as an approach to drawing.

Students were informed that it had been scientifically proven under laboratory conditions that the left and right hemispheres of the brain are concerned with very different aspects of human functions. The left side responds most effectually to words, language, writing symbols and is more successful at arithmetic and in processing information. This side

of the brain, the left hemisphere, is known as the verbal side or analytical side.

In contrast the right side of the brain is more concerned with pattern, spatial and perspective issues, is more intuitive, is better at global processing, music and drawing. The right side of the brain is known as the non-verbal side, or the creative side. After early childhood most people develop the left side of the brain, and for most people the right side of the brain remains an unknown unemployed and under developed area (see Figure 4.2).

Drawing on the Right Side of the Brain written by Betty Edwards, a teacher and educationalist, suggests teaching techniques designed to encourage and utilise the right side of the brain when drawing, to tap into our more creative side

> . . . you only have to turn to the creative side of your brain - the right side - and you will be able to draw accurate and imaginative portrait, landscapes and still lifes . .[4]

Edward's teaching techniques are based on recent brain research conducted by Professor Roger W. Serry, on split brain parents. What is a split brain patient? A person who has undergone an operation that severs or cuts in half the interherephic bridge (*corpus collason*) that connects the left hemisphere and the right hemisphere. Cutting off any information or interaction that would have normally occurred prior to the operation. These operations originated to reduce suffers of fits, brought on by epilepsy. After numerous tests and experiments carried out at Sperry's laboratory in California, results proved that the left hemisphere was more respondent to

words, language, numbers, symbols and processing information. Whereas the right hemisphere reacted to pattern spatial, musical drawing and intuitive perspectives aspects that make up our human characteristics.

The implications of this revealed that the left side of the brain was not superior to the right, nor its equal, but in fact showed the right to be more capable in some aspect of human endeavours as have just been mentioned.

Explaining that society on the whole, rewards the left hand side of the brain more, therefore it is not surprising that the left brain is more recognised and developed. For example the school curriculum that the students are presently part of, how many hours a day or week are allocated to developing the left side of the brain?, and how few are given over to the right side of the brain? Even our exam systems or job interviews are all credited on the written or spoken word.

How is the right hemisphere stimulated in order to help improve our drawing ability? Before learning to use your brain you must first learn to look at what you are drawing properly. "Learning to draw is really a matter of learning to see - to see correctly - and that means a great deal more than merely looking at the eye".[4] The most important element within drawing is the ability to "see",[5] one must force oneself to really look and examine the subject matter one is attempting to draw. Only when one has learned to see in a particular way can one's ability to draw develop or change. Then and only then can you start to question what it is you are looking at, now one is at the stage of tapping into the more creative side of the brain, the right hemisphere and allowing it to be an aid drawing.

Learning to identify the left and right hemispheres at work can take some time, remember that each of us has the ability to switch from the left to the right when required. But understanding which is which can be done by the way you allow the brain to question what exactly one is seeing.

If asked to draw a cup one normally allows the left side of the brain to question what one is looking at. Firstly the left side, identifies it as a cup and sends from the brain's memory bank, the symbol of a cup that has been stored or processed these from an early age (which does not resemble the perceived cup) (see Figure 4.3). Therefore if one draws the symbol that the brain gives the drawing would bear no similarity to the actual cup. If the right side of the brain, was questioning the cup, the right side of the brain would not identify it as a cup - but would be more interested in the cup as an object that is made up of various components, observing its appearance, size and shape. The right side of the brain would ask questions like, is that a curve? Is this a straight line? Is it parallel to this one? What is the distance from the top to the bottom? Questions of enquiry that investigate exactly what one is seeing. Never make a mark on the page unless one is absolutely sure it exists, so that when the drawing of the cup is completed it is more likely to resemble this cup than any symbol that the left brain might have conjured up.

Before the end of the introduction students were encouraged to voice their feelings and opinions on what elements they thought were most at work when drawing, the eye - brain or hand, during the two practical exercises in which they had already participated, imagination and observation.

At the end of the discussion students were informed that the next drawing exercise was one of Betty Edwards' teaching techniques to help utilise the right side of the brain when drawing.

FIGURE 4.1 Visual aid to demonstrate the physical make up of the brain

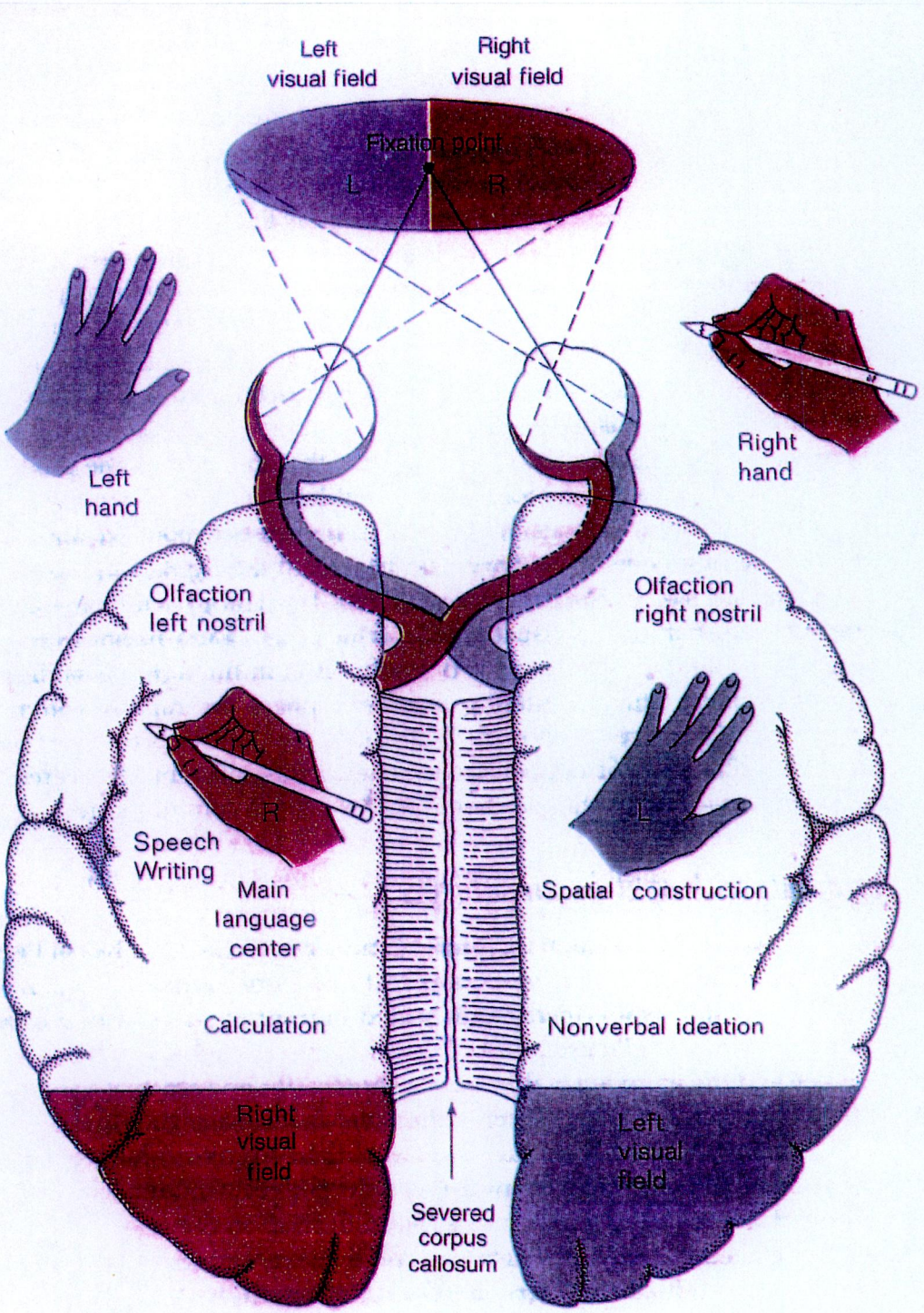

FIGURE 4.2 Visual aid to demonstrate handedness

FIGURE 4.3 Visual aid to learn how one can learn to identify the left and right hemispheres of the brain at work

CONCLUSION

Having successfully designed an eight stage drawing project based on Bruner's theory of discovery learning, as a way to introducing senior cycle students to theoretical perspectives or approaches to drawing, one then set about its application into the classroom. The first five stage dealt with the student experiencing exercises developed to utilise the right side of the brain, students had not been exposed to any theoretical perspectives on approach to drawing during this period.

Stage six set about giving students concrete evidence of Sperry's theory of the split brain and the separate areas in operation within the left and right hemispheres. Stages seven then allowed students to apply this theory through a practical exercise that designed to utilise the right hemisphere.

Finally stage eight students were given an opportunity to acknowledge whether or not they felt the introduction of theoretical perspectives into the classroom was benefited as an approach to drawing for senior cycle art students at second level.

FOOTNOTES

1 Richard L. Gregory, *The Oxford Companion to the Mind* (USANY, Oxford University Press, 1987), p. 740.

2 Gregory, *The Oxford Companion of the Mind*, p. 740.

3 Betty Edwards, *Drawing on the Right Side of the Brain, How to Unlock Your Hidden Artistic Talents* (Great Britain : Souvenir Press Ltd., 1981). p. x, Preface.

4 Kiman Nicolaides, *The National Way to Draw* (USA, Boston, Houghton Mifflin, 1941), p. 5.

5 Nicolaides, *The Natural Way to Draw*, p. 5.

CHAPTER 5

RESEARCH FINDINGS AND ANALYSIS

Stage 1

Prior to the distribution of the first questionnaire (see Appendix A) during the introduction to the drawing project, students engaged in a discussion to establish their understanding and put forward their views on imaginary observation and copying as approaches to drawing. The students established "imaginary" was the use of your imagination or mind, being creative, non realistic dream like - using your mind's eye when drawing. Observation, was the drawing of objects, places or people, together or isolated by looking at them and trying to render them as realistically as possible. And finally copy, seen as the unoriginal of taking other artist's ideas, not using real sources (own sources) but found images in books and magazines. Copying was the one way of approaching drawing that the students found most arguable. Some said that it was similar to observation because one is still trying to render or copy what is before one. Other students gave copying very little weight for consideration as an approach to drawing, arguing that it was much more difficult to draw the actual object in front of you then it was to copy it from a photograph or book. This discussion showed that students had very strong feelings and opinions about drawing before taking part in this drawing project.

figure draw. The results of Question 6 (see Figure 5.2) produced evidence that all students had room for improvement within the area of figure drawing. None of the students felt their ability to draw the human figure to be poor or excellent. Thirty-five percent said their ability was fair, 56 per cent said good while only 9 per cent considered their ability at figure drawing to be very good.

Question 7 (see Appendix A) investigated the difficulties that students face within figure drawing in relation to proportion and likeness.

Thirteen per cent of the students found it difficult to achieve proportion while a much larger percentage (87 per cent) felt they had difficult achieving likeness indicating a large group felt they could improve in this area of figure drawing. This information echos John Hold's suggestion that adolescents are obsessed by: ". . . the desire to create pictures of "real" life likeness".[1]

Question 8 enquires about students' familiarity and experiences of different medium when figure drawing. To classify if they favoured more the traditional medium (pencils - chalk - charcoal) at second level or if they preferred oil pastels and paint a medium normally associated with third level.

The outcome of this question revealed that 35 per cent of the students showed a preference for pencils, while 61 per cent chose chalk and charcoal. Only 4 per cent of the group picked oil pastels. Curiously enough none of the students opted for paint as a medium when approaching figure drawing. This was mainly due to the fact that they had never experienced figure drawing through paint.

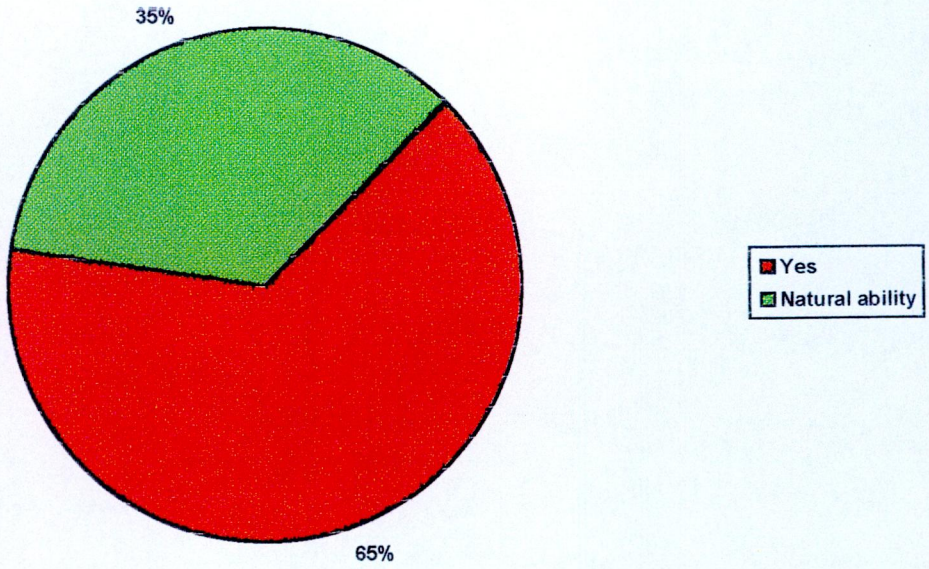

FIGURE 5.1 Q. 4 Stage 2 of project 1st Questionnaire

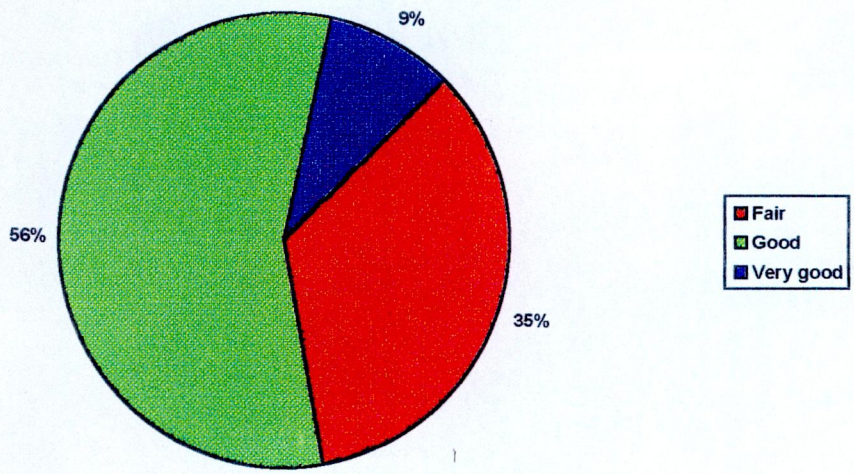

FIGURE 5.2 Q. 6 Stage 2 of project 1st Questionnaire

Question 9 (see Appendix A) asks whether or not students could assess themselves and evaluate the improvement of their drawing ability since entering second level.

Thirteen per cent admitted that there has been some improvement, yet 87 per cent felt that there had been a great deal of improvement since entering second level. This revealed that every student was capable of identifying self improvement in drawing ability. This question also encouraged students to self evaluate and consider the changes in their ability at draw, on leaving primary education and entering second level. It is important that students familiarise themselves at this stage with the skills of self evaluation and recognise changes within their drawing ability, as they will complete two more questionnaires during the course of this drawing project that will call on their ability to self assess their own progress within the practical exercises.

Questions 10 and 11 (see Appendix A) were to focus students towards further self evaluation of their drawing ability and to consider how other class mates might evaluate, their drawing ability.

The results of Question 10 (see Figure 5.3) suggests that, 14 per cent of students reflected their own ability to draw as below average, 69 per cent professed to being average and only 17 per cent considered themselves to be above average.

The reason for these two questions was to allow students time to reflect on how their drawing ability might be rated within the art class and to compare their ability against that of other fellow class mates.

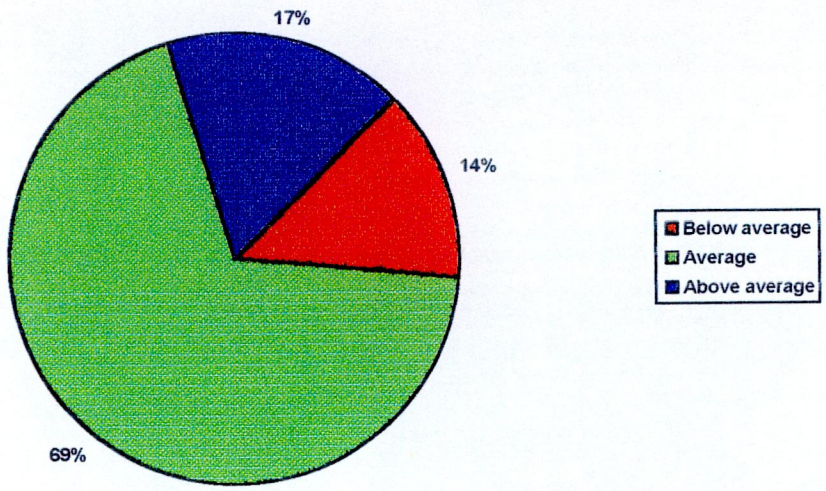

FIGURE 5.3 Q. 10 Stage 2 of project 1st Questionnaire

In Question 11 (see Figure 5.4), 4 per cent felt that their ability would be perceived as below average, 79 per cent saw their ability as average while 17 per cent felt their work would be perceived as above average.

The results of Questions 10 and 11 (see Appendix A) show that a higher percentage of students considered themselves to have an average drawing ability, and the exact same number of students saw their ability to be above average on both accounts. Students who considered themselves on their own self evaluation to be below average did not think that they were perceived as below average by their fellow class mates.

Questions like these promote students' self esteem, by making them reflect on their abilities and qualities.

Question 5 (see Appendix A) is the only question at this stage that refers to the brain. It was strategically placed in the middle of those other questions to direct attention from it. It is interesting to discover at this early stage of the project if students consider the brain to be a component or element that assists them when drawing.

The results of this question suggest (see Figure 5.5) that 13 per cent of the students felt the brain to be most in use when drawing. Seventeen per cent thought that the hand was the most used and the highest percentage of students (69%) considered the eye as the most important element when drawing. Interesting to note that two students who considered the brain as being more in use then the eye or hand when drawing also answered that they considered imagination as the most highly rated and

most regularly used form of drawing (Questions 3 and 4 (see Appendix A)).

The effect of the first questionnaire was very successful. Students answered honestly and the results overall show pretty much as had been anticipated.

Most students consider themselves between good an excellent in their drawing ability yet, only considered their ability within figure drawing to be between fair and very good. The reason being that the majority of the students in the class had little or no experience in figure drawing. This fact had to be considered before designing the layout of the drawing project, that this particular class would participate in.

More interesting was the high percentage (see Figure 5.1) of students who felt that the ability to draw well was one that could be developed, Question 4 (see Appendix A) through learning skills.

Also important to note was the fact that students were very capable and willing to self evaluate their own drawing ability, a skill they would have to employ throughout the project so they could assess improvement.

Finally Question 5 (see Appendix A) which very briefly and and unintrusively mentions the brain, showed that most students did not at this stage consider the brain.

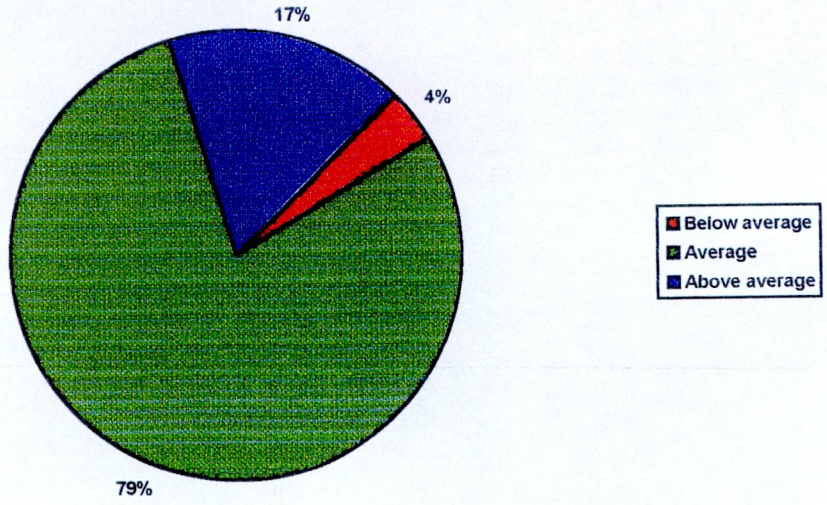

FIGURE 5.4 Q. 11 Stage 2 of project 1st Questionnaire

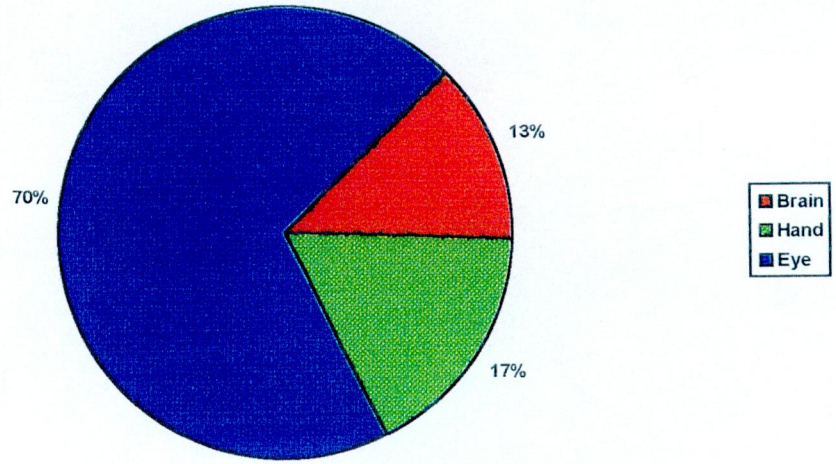

FIGURE 5.5 Q. 5 Stage 2 of project 1st Questionnaire

Stage 3

First Practical Application : Imaginative Drawing

This was purposely set as a home activity so that students would not influence each other's ideas. Students were asked to draw an imaginative figure (not necessarily human) in a seated position (not necessarily on a chair). The work produced for this exercise was very varied and original. A selection of illustrations has been chosen to demonstrate the different and ranges in ability, within this sample group.

It in important to note at this stage that the following work has been analysed in light of student's own self evaluation in first questionnaire. Figure 5.6 shows a student who considers her ability to draw as good, in Question 1 stating that she used observational drawing more regularly and rates observational drawing most highly in Questions 2 and 3. She also considers herself as average on both accounts in Questions 10 and 11. This student considered the eye to be most in use when drawing in response to Question 5.

Figure 5.7, again this student considered his ability to draw as good, they however rated imaginatory drawing most highly and used imaginative drawing more regularly, in Question 2 and 3. In response to Questions 10 and 11 they answered average on both accounts. In reply to Question 5 (see Appendix A) consequently he considered the brain to be most in use when drawing.

Figure 5.8 is work by a student who considers her ability at drawing to be good. In Questions 2 and 3 she replied rated observational drawing on both accounts. Curiously she considered her own ability as below average in Question 10 and

FIGURE 5.6 Stage 2 of drawing project - imaginary drawing
Sample of female student's work

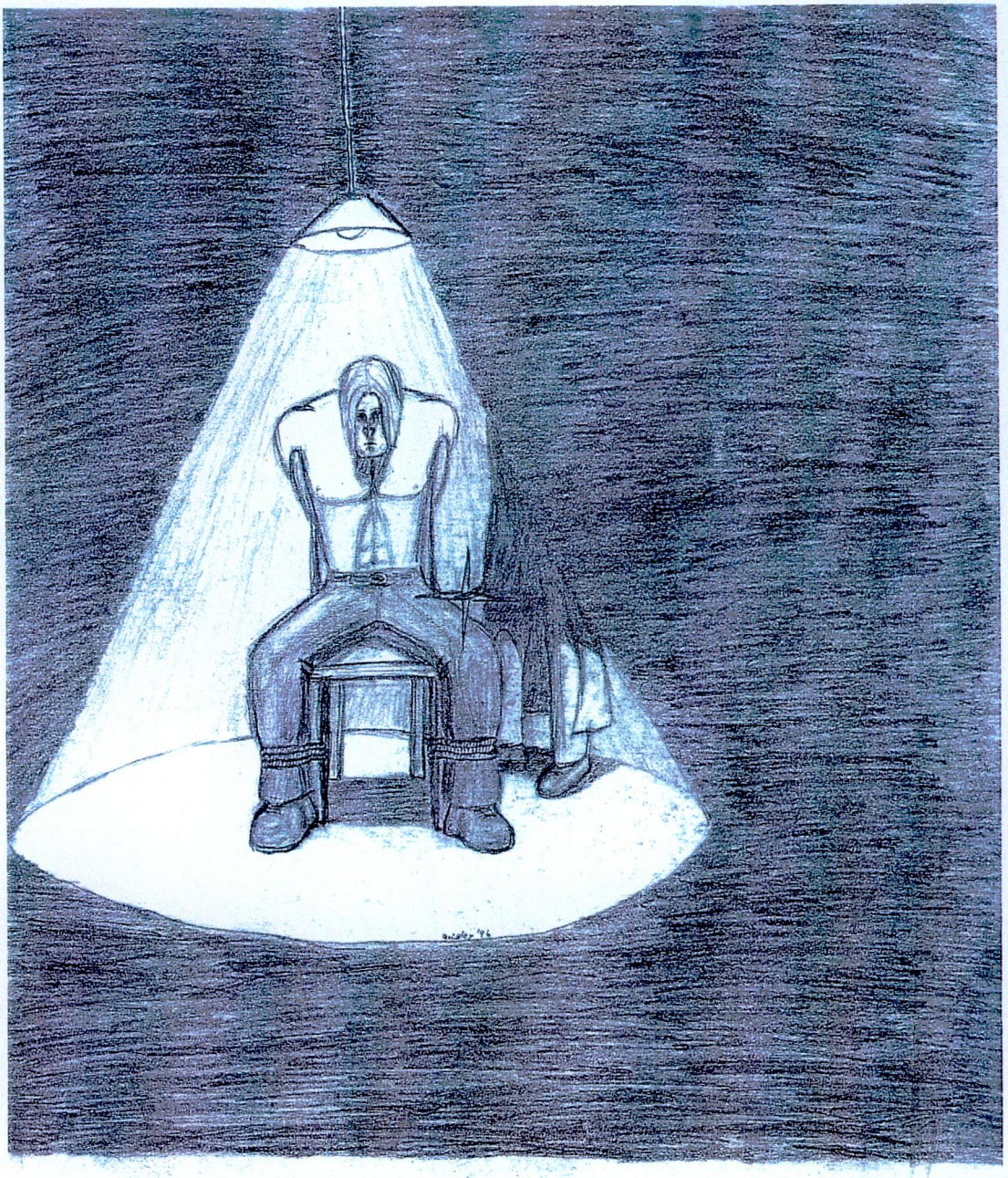

FIGURE 5.7 Stage 2 of drawing project - imaginary drawing
Sample of male student's work

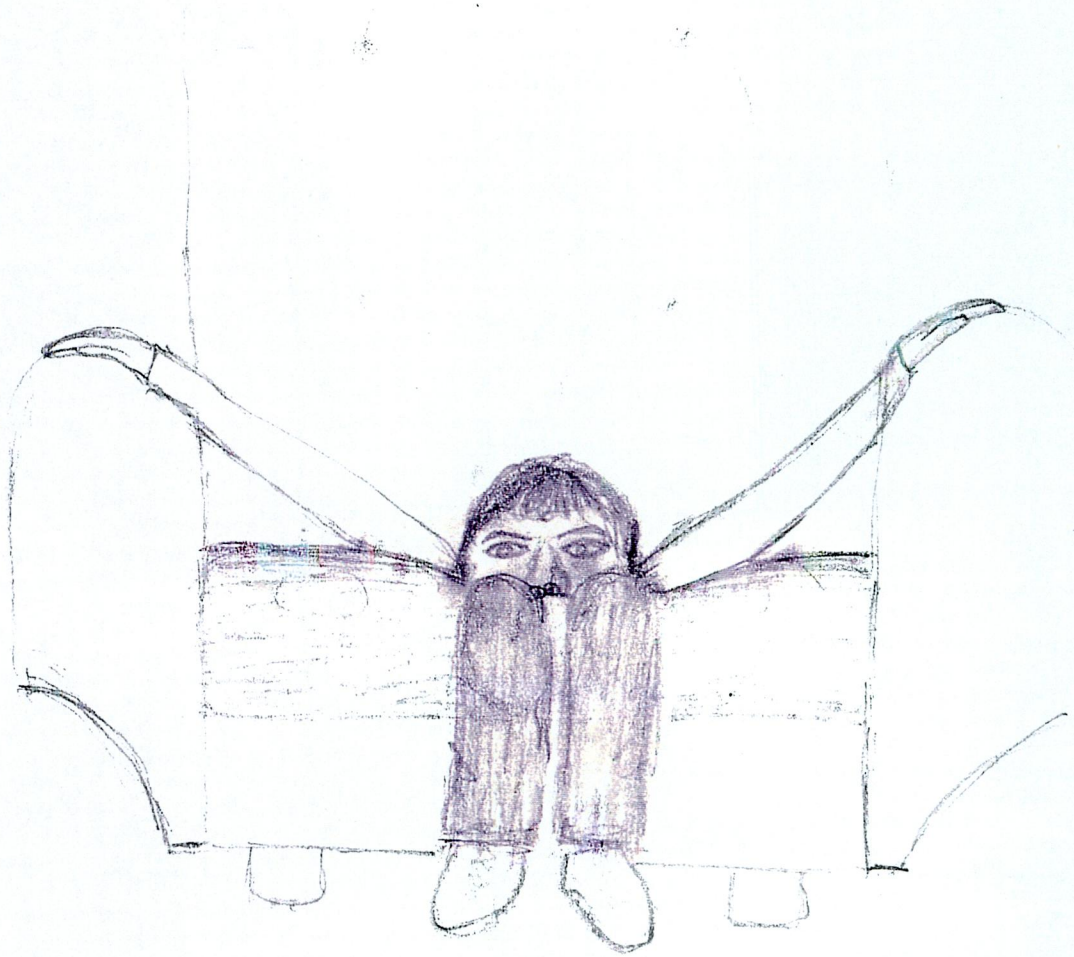

Fig. 5.8 Stage 2 of drawing project - imaginary drawing
Sample of female student's work

as average in Question 11. She also felt that the hand was most in use when drawing.

Figure 5.9 answered similarly to all the questions as the student in Figure 5.8 except she viewed the eye as being most in use when drawing.

Finally Figure 5.10 described his ability at drawing to be excellent, he rated imagination most highly and used observational most regularly. He saw himself as above average on both account in response to Questions 10 and 11. Stating that the eye was most in use when drawing in reply to Question 5.

On reflection the majority of students of the imaginative drawing exercise, did not diverge too far from the human figure in their drawings.

It was interesting to note that some girls used colour in their work - while none of the boys did, instead working a lot more in tone, with soft leaded pencil.

It is curious to note that the pictures produced by male and female students have very different contents within them, the girls have used elaborate objects within their composition, while the boys have used elements of cruelty or torture within theirs.

Fig. 5.9 Stage 2 of drawing project - imaginary drawing
Sample of female student's work

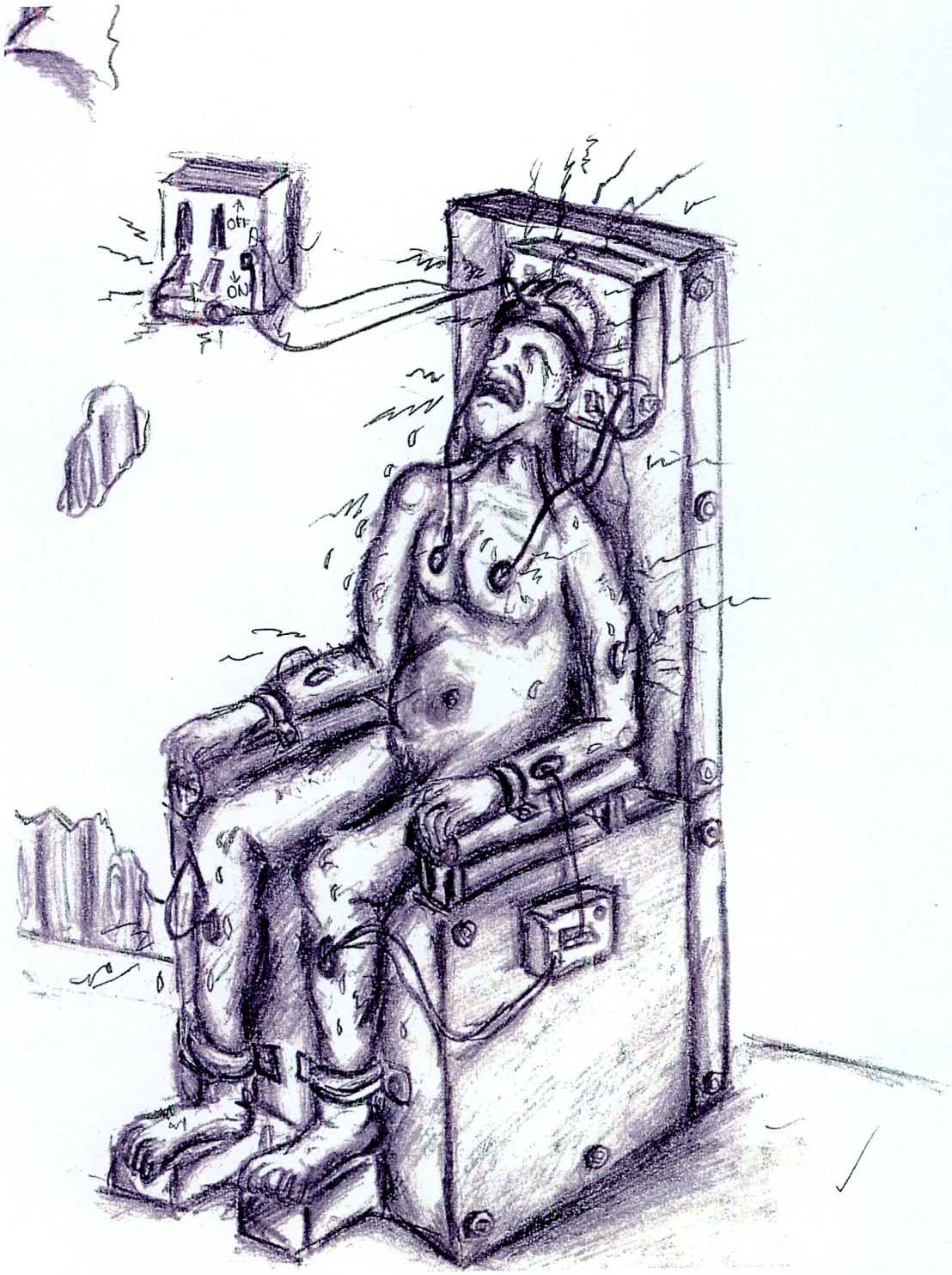

Fig. 5.10 Stage 2 of drawing project - imaginary drawing
Sample of male student's work

Stage 4

Second Practical : Observation using Blind Contour Drawing

This second practical exercise is to heighten students' awareness of how important it is to really observe one's subject matter and to familiarise oneself with it in great detail. There were three models used in this exercise with seven students to each model (see Figure 5.1 and 5.2). A brief introduction informed students that they were going to participate in the next practical exercise of the project, observational drawing. Taking a different approach, students were questioned about their knowledge of blind contour drawing. One student explained that he had seen his brother (who was in art college) doing it, "you're not allowed to look down at your page when you're drawing a model". His fellow students listened in disbelief drawing something without looking. So without any further discussion, a demonstration took place, showing students how to approach the exercise, and to observe how one's eye never leaves the model, to look down and see what the drawing is like. Students laughed at the end result of the demonstration They were then informed that the result of this exercise, may seem funny or ridiculous, at first, but that the exercise was an approach to drawing that will enhance their observation skills and in turn improve their ability to draw.

As students left the demonstration area one could see there were mixed feelings about the purpose of such an exercise as this. Some were captivated by the idea of not looking down, and wanted to try it for themselves. Others seemed unsure about drawing something that resulted in such a hideous and unrealistic observation of the model. The later of these feelings

subsided as the exercise progressed. Students became aware of how difficult it was to stop themselves from looking down at the page. Students were also asked not to laugh out loud when they finished their drawing and looked down at it; this they were informed that this would break their fellow students' concentration levels.

The first drawing took about four to five minutes for every student to complete and the results were quickly reviewed, and commented on. Again students were reassured that the object of the exercise was to develop their observation skills and not to produce a drawing that resembled a highly realistic impression of the model. The models were changed around for each pose so students did not become too familiar with what they were observing. These students who had completed their first drawing in under two minutes were told to slow down and observe more carefully every tiny detail they could observe of the model's contour. Having completed approximately three drawings using blind contour, the class was stopped and models were changed. Students were then introduced to inside contours, which meant that they would now draw the outline contour again without looking at the page and on completion of this drawing then, and only then, were they allowed to look down at the page in order to relocate their pencil and realign their eye to that position on the model. Now they would draw the inside contour. The standard of work was already starting to improve and the level of concentration increased in the room as the class settled down to work and became more relaxed with the exercise, yet much more intense about what they were looking at (see Figures 5.11 and 5.12).

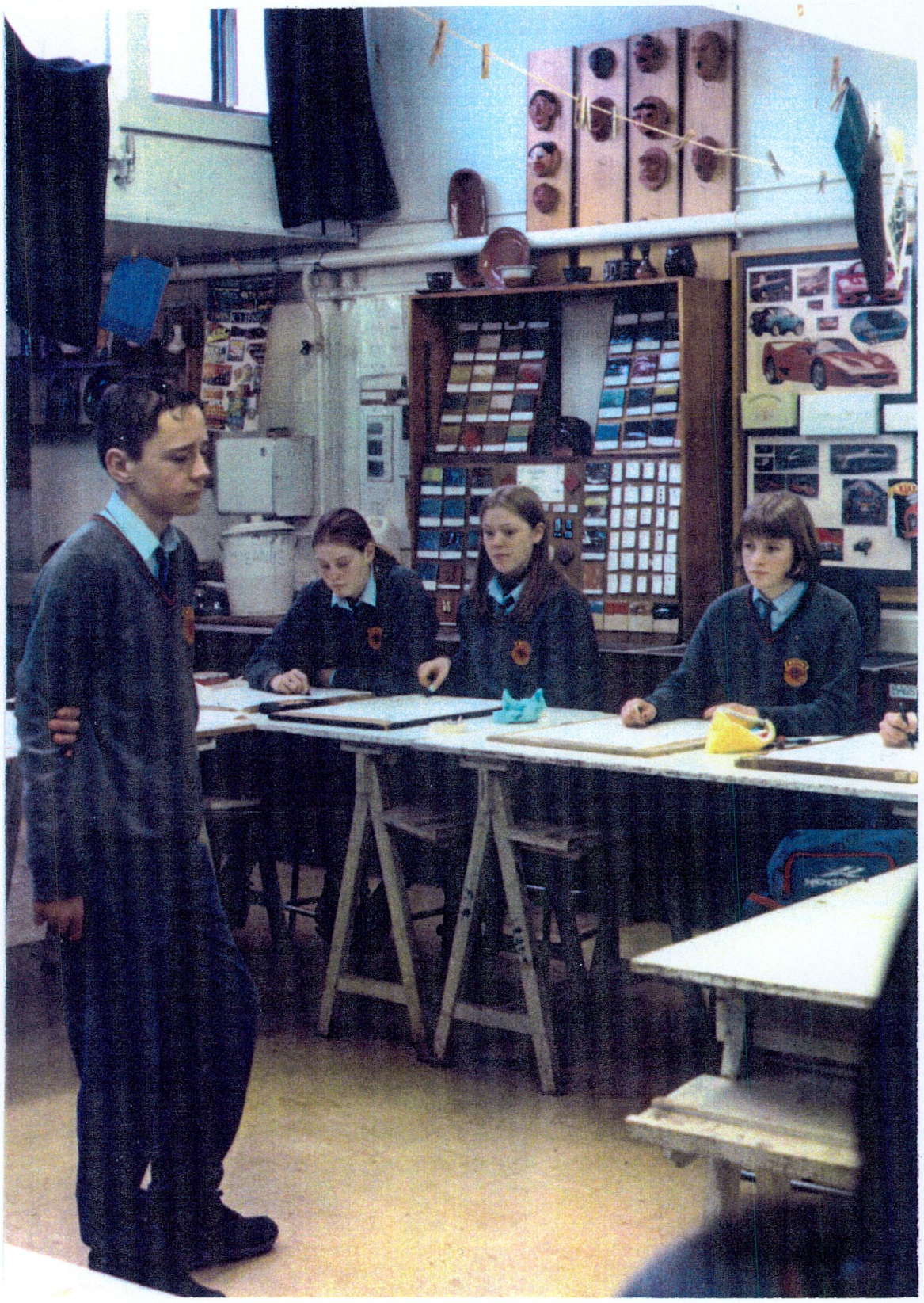

FIGURE 5.11 Stage 4 of drawing project - observational using blind contour drawing
Students at work

FIGURE 5.12 Stage 4 of drawing project - observational using blind contour drawing
Students at work

The last ten minutes of this practical exercise was designated to Stage 5 of this drawing project. The work produced in Stage 4 of the project will be analysed in light of students' responses to, the second questionnaire (see Appendix B) is a self evaluation of Stage 4 of the drawing project.

Questions 1 and 5 of the second questionnaire set out to investigate how the students felt about the second practical exercise: observational drawing of the human figure using blind contour as an approach.

The responses had very mixed feelings about what they were being asked to do, this was revealed in their self examination. The following are just some of their responses:

"A bit of a strange idea"

"I thought it was a bit daft but when I came away (from the demonstration) I thought I might be able to do it"

"Humoured and ready to draw"

"It's strange not looking at the page and sometimes your eyes go along faster at certain stages. I thought it was weird, the way you told us to draw with your eye ".

For more of the responses to Question 1 (see Appendix C).

Question 5 was more concerned about how the students felt about the work they had produced during the second practical exercise. Again they had very mixed views.

The following are just some of the students' responses to Question 5:

"They are silly, but interesting! and very artistic looking".

"Some were good but some were ridiculous, I liked doing them". "It is like a child's drawing with no proportion, and very expressive".

A number of students responded with disappointment, felt the work was not successful (see Appendix D) for more responses to Question 5.

Questions 2, 3 and 4 of the second questionnaire (see Appendix B) were more of an inquiry into what the student's themselves had just experienced during the second practical exercise on observational drawing. Keeping in mind that the students are still unaware of how the brain can assist them as an approach to drawing. These three questions had been designed to gain information about the use of the left and right hemisphere when students were drawing to be used at a later stage for discussion. Students were unaware of what these questions are really examining, and they responded honestly and openly. Questions 2, 3 and 4 will be discussed again in greater detail with the students after they have been introduced to the theory of the brain as an approach to drawing. The significance of these three questions will be explained towards the end of Stage 6 of the project.

A study of the findings of Question 2 shows that 69 per cent of the students said yes they did lose awareness of time passing during the second practical exercise on observation drawing, while 31 per cent admitted to being aware of time passing (see Figure 5.13).

For Question 3, 43 per cent of the students said yes they found it very difficult not to look down at the page when they were drawing, while a further 26 per cent only found it difficult at

first, 31 per cent of the students had no difficulty in not looking at the page while they were drawing (see Figure 5.14).

In Question 4, 52 per cent of the students said they had experienced this feeling of being unaware of people and other things in the room when drawing, while 48 per cent said they had not experienced this (see Figure 5.15).

Question 4 was the most important within the second questionnaire (see Appendix B). As it revealed that those student who had experienced the feeling of being unaware were the students, who unknown to themselves had switched over to drawing with the right side of their brain, the more creative side. While those students who did not experience any feeling of being unaware, allowed the left side of the brain to dominate - the real purpose of this second practical exercise was to utilise the right side of the brain, as well as developing student's eye and hand co-ordination when drawing. Students were not informed about what had happened during the observational exercise until after the introduction of the brain theory had been revealed.

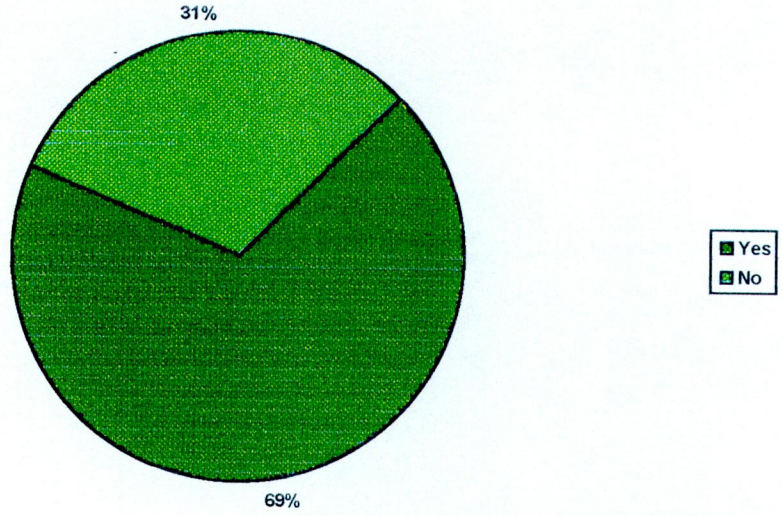

FIGURE 5.13 Q. 2 Stage 5 of project 2nd Questionnaire

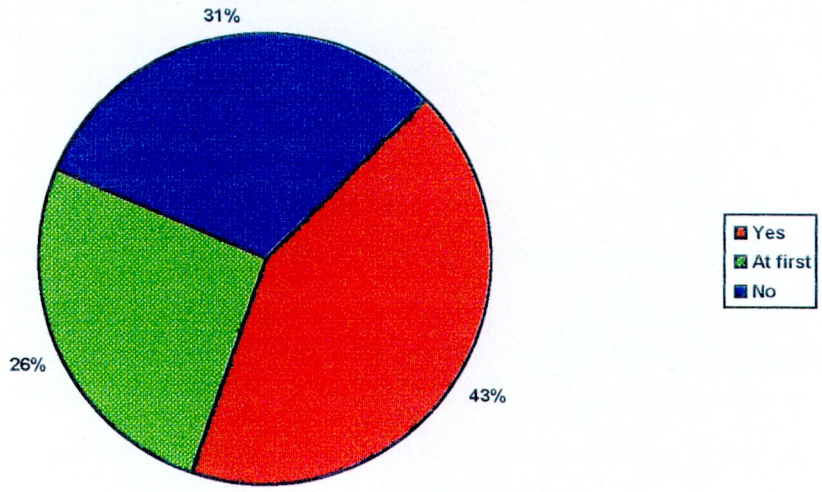

FIGURE 5.14 Q. 3 Stage 5 of project 2nd Questionnaire

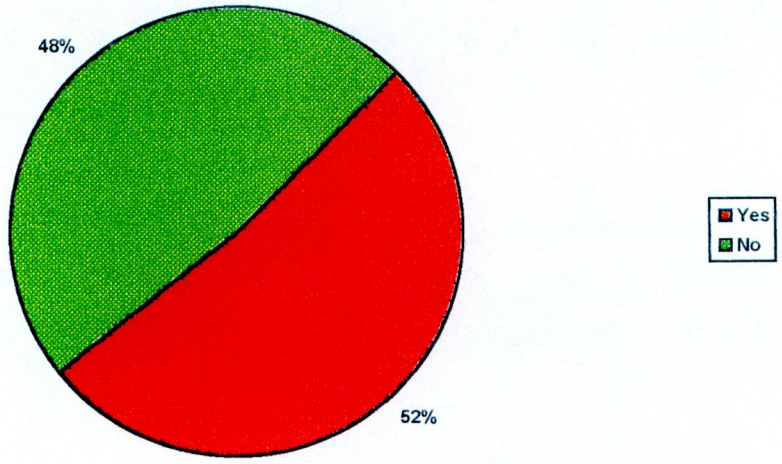

FIGURE 5.15 Q. 4 Stage 5 of project 2nd Questionnaire

Stages 4 and 5

Before going on to discuss in Stage 6, the theory of the brain it is important to reflect on the actual work that was produced during Stage 4, of the second practical exercise.

A selection of work has been chosen that portrays the range of abilities and different problems that some students encountered during the exercise. Students will be identified by letter during the course of this analysis. Student X - first attempt of blind contour drawing of model (see Figure 5.16). This student considered his own drawing ability as excellent and describe his ability to draw the human figure as very good. His response to Question 1 was as follows

> Having seen my brother doing this same exercise in college I was interested in trying it for myself. I expected my drawings to be very poor. The idea of not being able to look at the page was very hard.

This student replied positively to Questions 2, 3 and 4 about what they had experienced during the exercise. His response to Question 4 was as follows. "Yes like the passing of time I didn't notice the happenings around me". Student X had experienced the right side of the brain in action, even though he was unaware of it at the time. For a later development of Student X's work during this exercise (see Figure 5.17).

Finally Question 5 wanted this student to self evaluate what he felt at the end of the exercise to which the respondent replied: "I was pleasantly surprised at my hand and eye co-ordination".

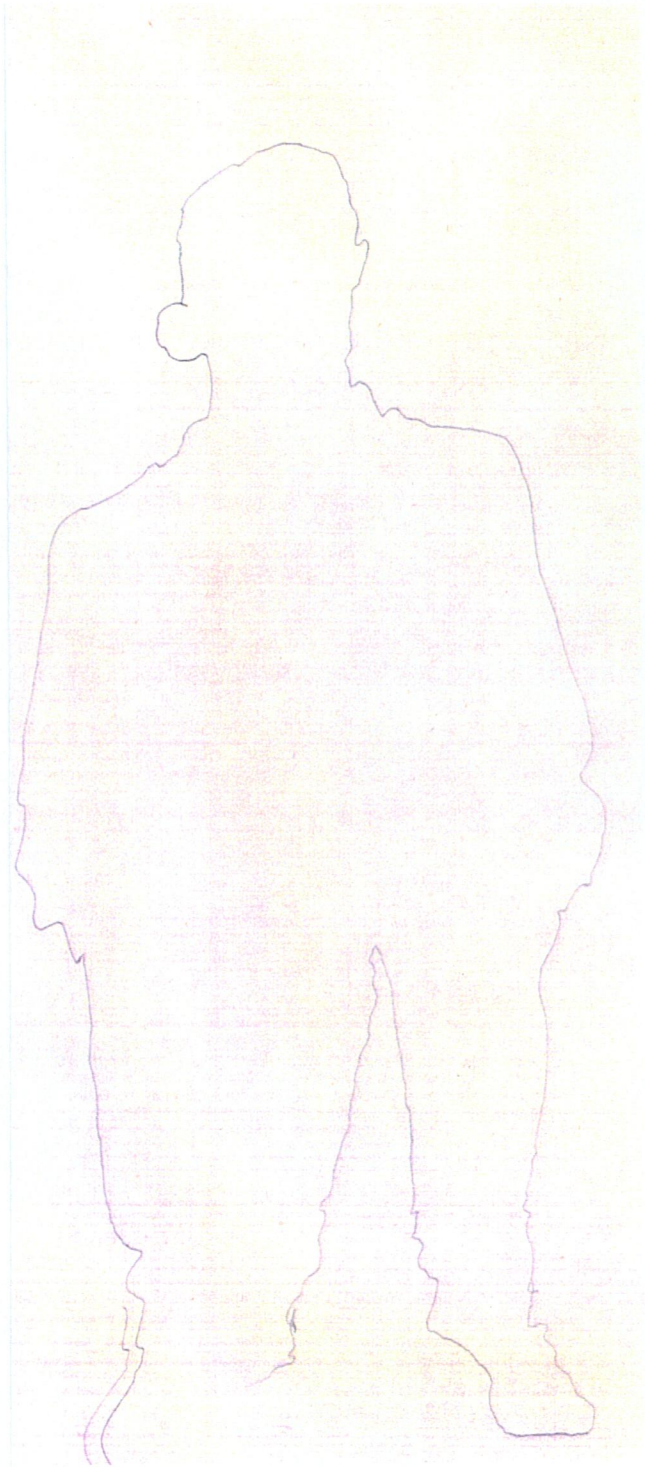

FIGURE 5.16 Stage 4 of drawing project
Observational - blind contour drawing
Student X's first attempt

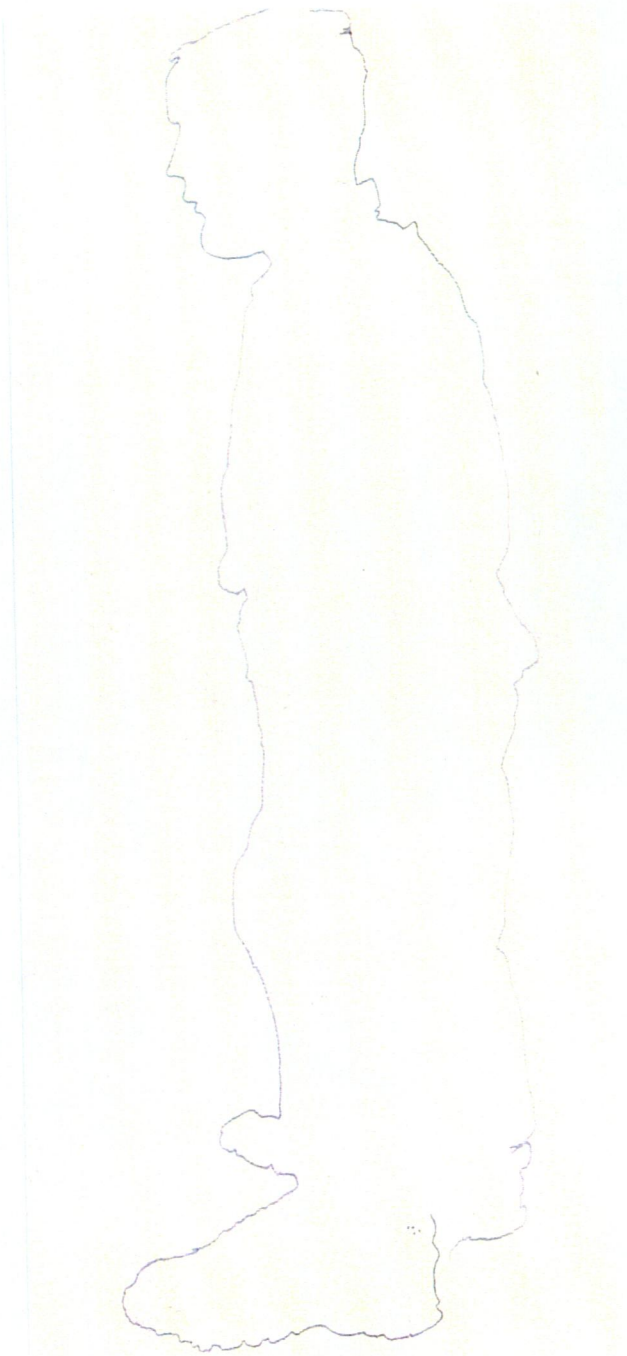

FIGURE 5.17 Stage 4 of drawing project
Observational - blind contour drawing
Student X's second attempt

Student X's response is an example of how successful this second practical exercise proved to be in developing how the students observed what they were looking at, and how their drawing ability is proved in such a short space of time.

Student Y's first attempts at blind contour drawing (see Figure 5.18). Here Student Y who described her ability to draw as good, and considered herself as having a fair ability at drawing the human figure.

Her response to Question 1 was not very positive, she felt "stupid, no understanding, hard to concentrate on". Her questionnaire showed that experience to Questions 2, 3 and 4 were all very negative. This student did not experience the right side at work for along in fact what she was experiencing was the confusion of the left side of the brain trying to complete a task set to utilise the right side when drawing. In her self evaluation of Question 5 she replied that she was "ashamed, mortified, the state of it."

To see Student Y's final attempts in this second practical experience see Figure 5.19.

For Student Z's first approach to blind contour drawing of the human figure see Figure 5.20.

Student Z considered his ability to drawing in general and his ability of drawing the human figure to be the same, good. Student Z's reply to Question 1 was as follows: "I felt it was going to be relatively easy, although it turned out to be quite hard".

For Question 2 Student Z revealed that he did lose awareness of time passing. In Question 3 he admitted that he found it very hard not to look down at the page when he as

drawing. But described in Question 4 that he did not at any point in the exercise experience a feeling of being unaware of anyone in the room? He considered his final result as simple "not good".

To view Student Z's final attempts at this second practical exercise see Figure. 5.21.

What is interesting to note about Student Z's work is that in both drawings the student has place, an imaginative quite stylised images to the corner of the page. In his first attempt (see Figure 5.20) the image is that of a racing car and in the second (see Figure 5.21) he was drawing in the Nike Air symbol.

Student Z shows signs of conflict in his drawing. He is unhappy with his first attempt (see Figure 5.20) and reassures himself that he can really draw by allowing the left side of the brain to take control. Yet the right side is being forced to react to this particular drawing exercise and the student's final attempt suggests that the student is still switching from the left to right side of the brain even though he is unaware of it at this point.

All students were very eager to proceed with the remainder of the project.

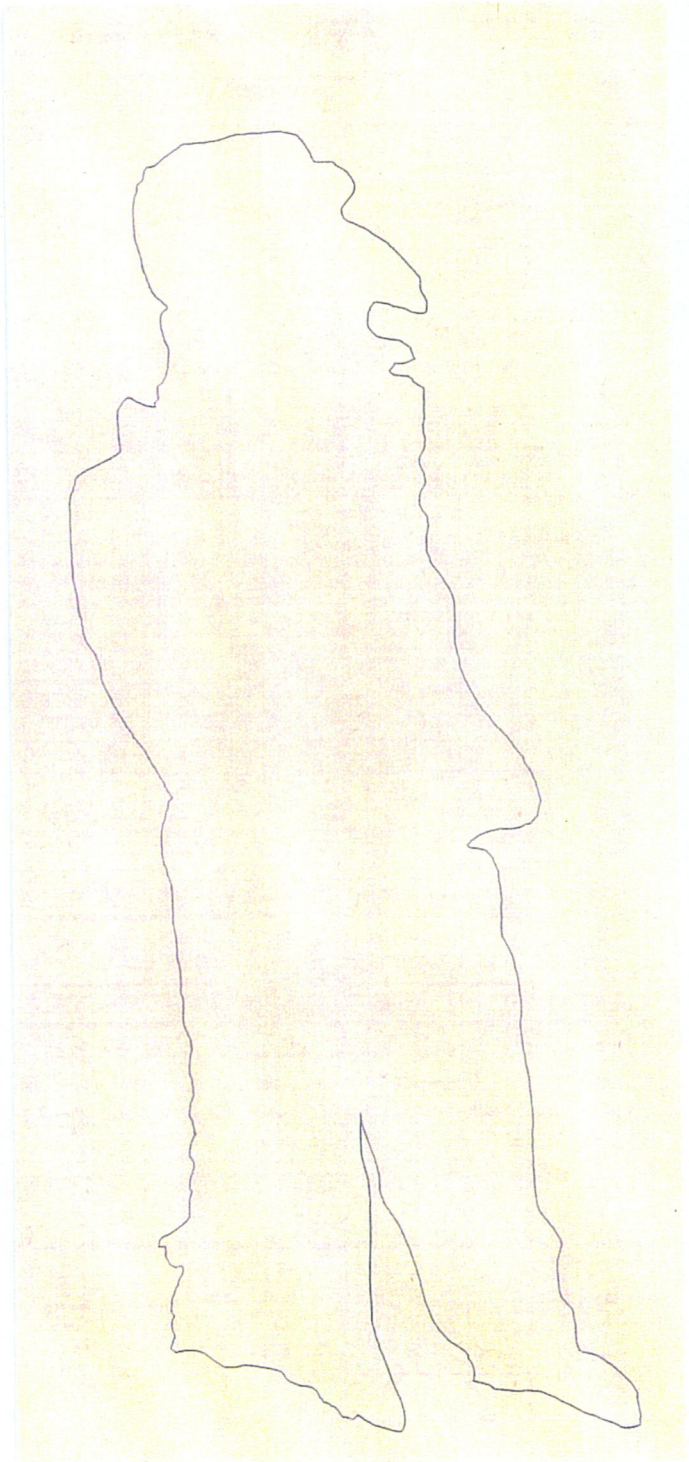

FIGURE 5.18 Stage 4 of drawing project
Observational - blind contour drawing
Student Y's first attempt

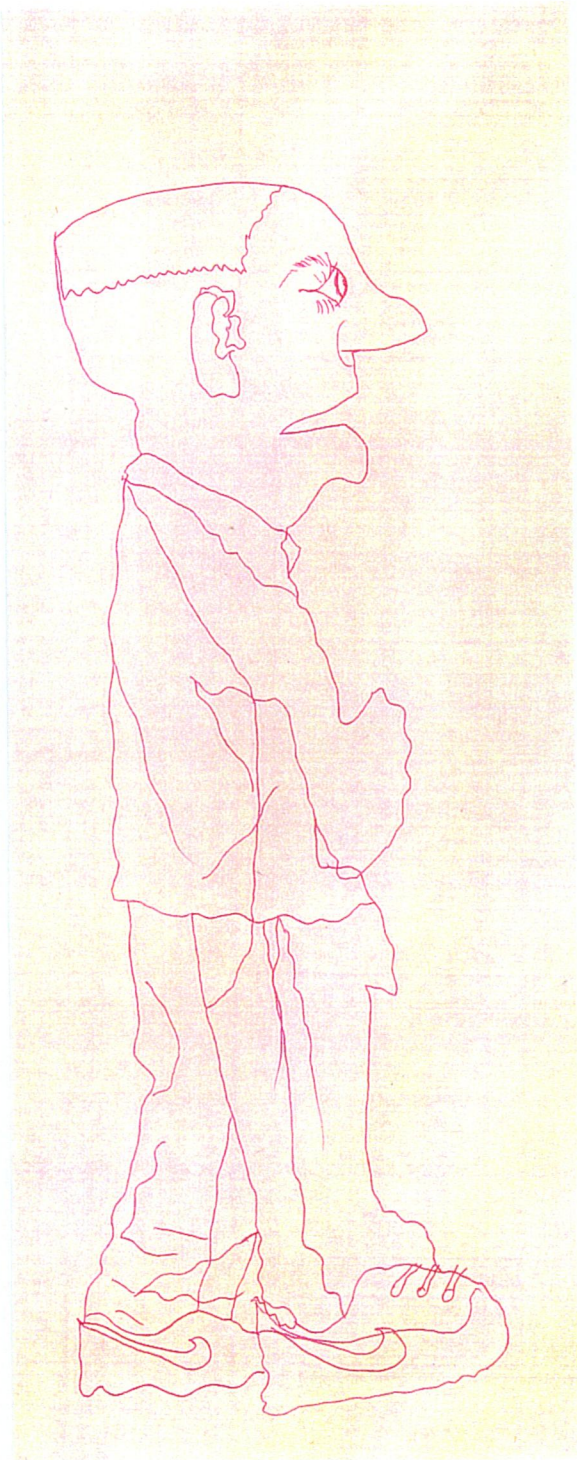

FIGURE 5.19 Stage 4 of drawing project
Observational - blind contour drawing
Student Y's second attempt

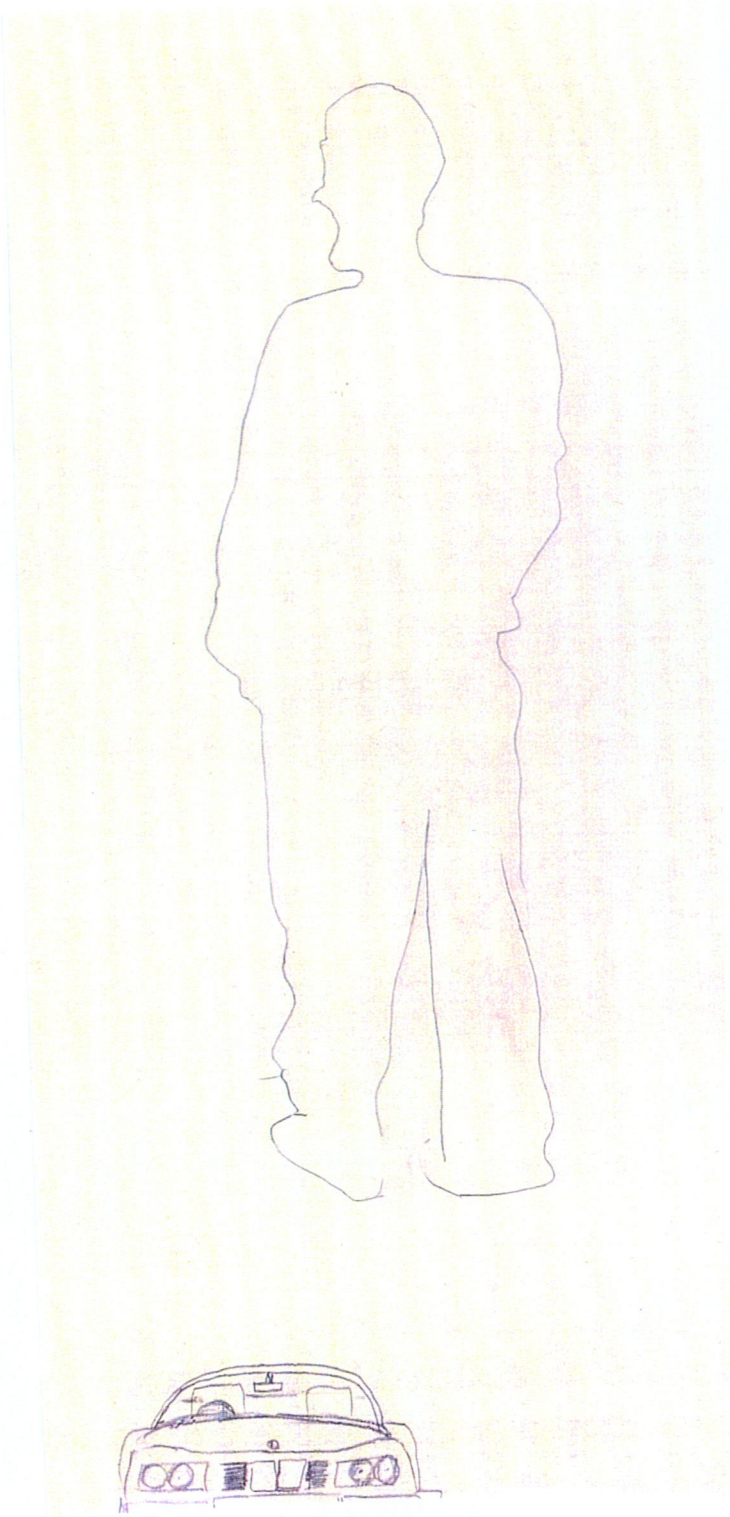

FIGURE 5.20 Stage 4 of drawing project
Observational - blind contour drawing
Student Z's first attempt

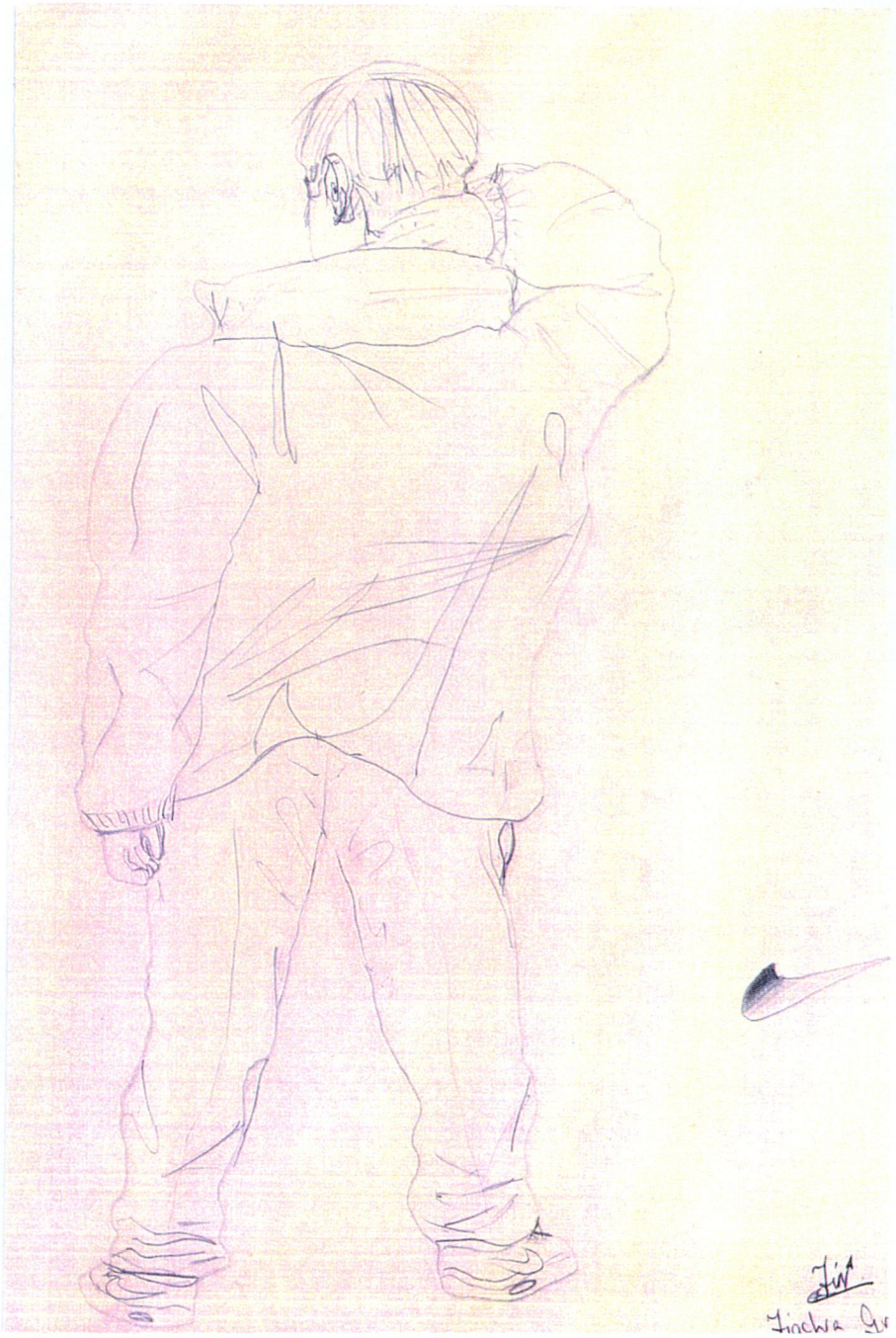

FIGURE 5.21 Stage 4 of drawing project
Observational - blind contour drawing
Student Z's second attempt

Stage 6

Introduction to theory of the use of the brain as an approach to drawing

The information of theoretical perspectives as an approach to drawing in the classroom, was successful. Students observed the data about the structure and the functions of the brain with great enthusiasm and voiced their opinions about what they had learnt up to this point of the drawing project. They were surprised and excited about what they had taken part in, and wanted to draw again as soon as possible, in order to try the brain theory out again on themselves.

Students were first asked to reflect on what they had or had not experienced during the second practical exercise on observation. This allowed students to combine the knowledge they had just been given about how the right side of the brain can assist us when drawing and what they had experienced during the blind contour drawing. There was an open discussion and argument. Students had no problems expressing themselves because they were speaking from experience.

Those who had not experienced a feeling of being unaware of other people or things around them during the observational blind contour drawing, were still sceptical of the theory at this early stage, whereas those who had experienced this feeling felt confident about their understanding of the theory.

Students were asked to comment in light of the brain theory as an approach to drawing which side of the brain was in use during the observational blind contour drawing exercise. Respondent claimed: "The right side, because you were looking at the edge of the figure or model and following it line by line

curve by curve." Another student responded: "Yes, the right side, when it was quiet, I even forgot I was looking at a person". It was interesting to note that only those students who had experienced something were now commenting. For the students who were still puzzled, an explanation was due. Those who did not experience this feeling were asked what they were looking at when drawing? - a person!? Yes, but what was your brain doing (reminding them of the cup explanation - which demonstrated the left and right hemispheres at work). It was identifying that what you were drawing was a person. Finding it difficult because the left side of the brain was at work. The exercise was designed to activate the right side of the brain. Although students were unaware of it at the time the left and right sides of your brain were in competition with each other, some were made to feel uneasy about what you were drawing because of the confusion that the left side of the brain was experiencing.

Those who did experience this feeling of not being aware were not identifying their subject matter as a person for long, instead they shut down the left side of the brain and allowed the right to draw. That is how they experienced this trance-like state, of being totally engrossed. The following comments were made by students:

"Yes I did experience this feeling, because I was concentrating on the subject and studied each line in detail".

"Yes, a few times when it was very quiet it seems like it was your eye and your marker following an object not a person".

By the end of the introduction all students had gained an understanding of how their brains could assist them when drawing if they learn to look at and question things differently

using the right side of the brain. This introduction and discussion was directly followed by one of Betty Edwards, exercises, which helped to utilise the right side of the brain when drawing.

During the introduction of the brain theory into the art class, students were taped which allowed one to reflect at a later point on what had been said.

Students were very attentive throughout the whole introduction, fascinated by the idea of using their brains with which to draw. They were also very interested about the way society rewards mainly the left side of the brain, the verbal, and that the right side, the non verbal, is so badly neglected, even within the school system.

Stage 7

Copying - Upside down drawing

The third practical exercise

Copying was the third and final practical exercise within this set drawing project. It was very different from the first and second in that now the students were aware of how they should look at and question things differently. They knew how to activate the right side of their brains, to assist them when drawing. The upside down task was the perfect drawing exercise at this point, to allow the students to test the brain theory. Students became engrossed with the exercise instantly and the whole room fell into complete silence.

The results of this exercise were very rewarding in particular for one student, who had not up to this point experienced the right side of the brain at work when drawing. During the second practical observation, Student Y was bitterly disappointed with her result (see Figures 5.18 and 5.19). Yet, after the introduction and discussion on the left and right sides of the brain, she set about the third practical exercise with great determination; at the end of the lesson she was so surprised at how successful her drawing was. She walked around the room, just to see what other students had achieved. This was a wonderful ego boost for this student. She was now a right brain achiever, which gave her great satisfaction. Her work was among the best five in the class (see Figure 5.22).

Student R's work was also among the top five in the class (see Figure 5.23). He was also very surprised at how well his drawing looked when he viewed it the right way up.

Photocopy

Student's work

FIGURE 5.22 Stage 7 of drawing project - copying
Student Y's attempt at upside down drawing

Photocopy

Student's work

FIGURE 5.23 Stage 7 of drawing project - copying
Student R's attempt at upside down drawing

Student S completed her upside down drawing (see Figure 5.24) and although she set out at the beginning of the exercise using the right side of the brain (note all students started on the body) as the student moved up towards the head and face, the left brain started to identify the various elements of the face and the student starts symbolising what she thought the month should look like, etc.

This exercise surprised students, because those who would rate themselves as above average in the class did not produce particularly riveting results, whereas students who would have rated themselves below average completed some very good strong drawings.

For more examples of the results of this third practical exercise see Appendix E).

Photocopy

Student's work

FIGURE 5.24 Stage 7 of drawing project - copying
Student S's attempt at upside down drawing

Stage 8

Third and Final Questionnaire

The third questionnaire (Appendix F) was to act as a conclusion and self evaluation of the drawing project for the students, allowing them time to reflect and comment on what they had learned or experienced during the course of the project.

The first questionnaire (Appendix A) was to investigate, now at this, the last stage of the project, which of the following eye, brain or hand do the students consider most important when drawing in light of what they now know about the brain.

Thirteen per cent said that they considered the brain to be the most important, 87 per cent said it was the eye. None of the students at this point felt the hand was the most important. It is interesting to note that of the 13 per cent that said the brain, two of these students had also said the brain when asked this question in the first questionnaire (see Appendix A).

What these results suggest is that the students are now aware of how important it is first to really look at what it is one is drawing and then question it differently, by using the right side of the brain.

Question 2 was to examine which of the three practical exercises the students found most rewarding: imaginary, observation or copying, the results suggests (see Figure 5.25) that 27 per cent found the imaginary exercise the most beneficial while 60 per cent considered the observational exercise the most rewarding and 13 per cent of the students felt that copying was the most rewarding result they achieved.

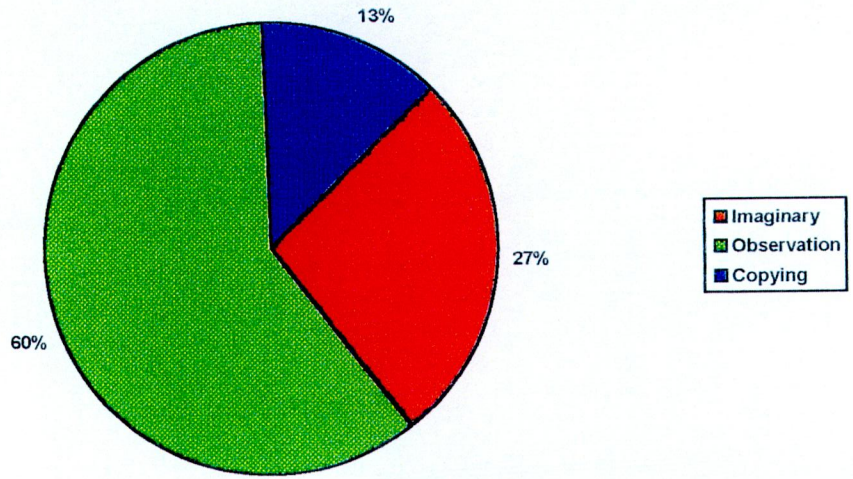

FIGURE 5.25 Q. 2 Stage 8 of project 3rd Questionnaire

The outcome of this examination shows that the second practical exercise, observation (blind contour drawing) was the most successful and rewarding part of this drawing and project.

Question 3 is a study to find out which of the three practical exercises the students found least rewarding, the research suggests (see Figure 5.26) 34 per cent found the imaginary least rewarding, 13 per cent say that the observation was least rewarding while a larger percentage of 53 per cent claimed that copying was the least beneficial for them.

Again this result shows the observation exercise to have been the most rewarding of all the practical exercise in which the students participated.

Question 4 was to establish if the students' approach to drawing had changed as a result of being exposed to the brain theory and the function of the right brain when drawing, the results indicate that this is the case (see Figure 5.27). Twenty per cent of the students said that their had been no change, while 67 per cent found some change, and the remaining 13 per cent said that they had experienced a great deal of change in their approach to drawing in light of what they had learnt from this drawing project.

Question 5 was to further investigate if the students had identified any change in their ability to draw as a result of this drawing project, the outcome shows (see Figure 5.28) that 6 per cent admitted to having noticed no change in their ability, a further 67 per cent claimed that they had experienced some change in their ability to draw, while 27 per cent found a great deal of change in their ability to draw as a result of participating in this drawing project and being exposed to theoretical

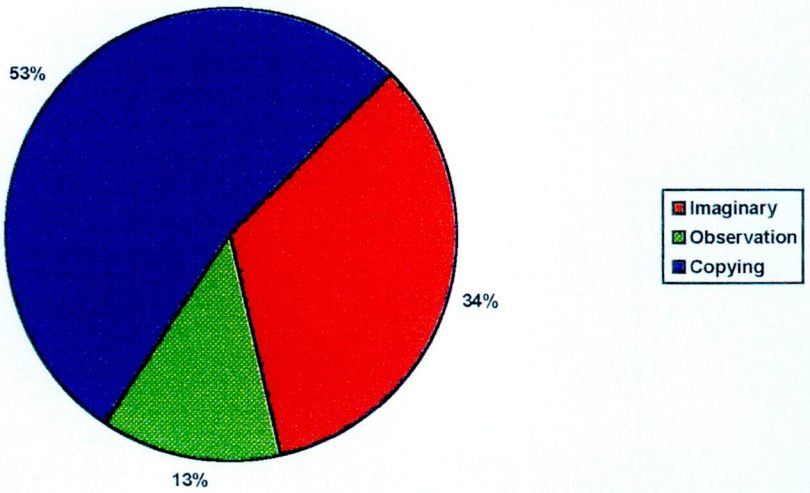

FIGURE 5.26 Q. 3 Stage 8 of project 3rd Questionnaire

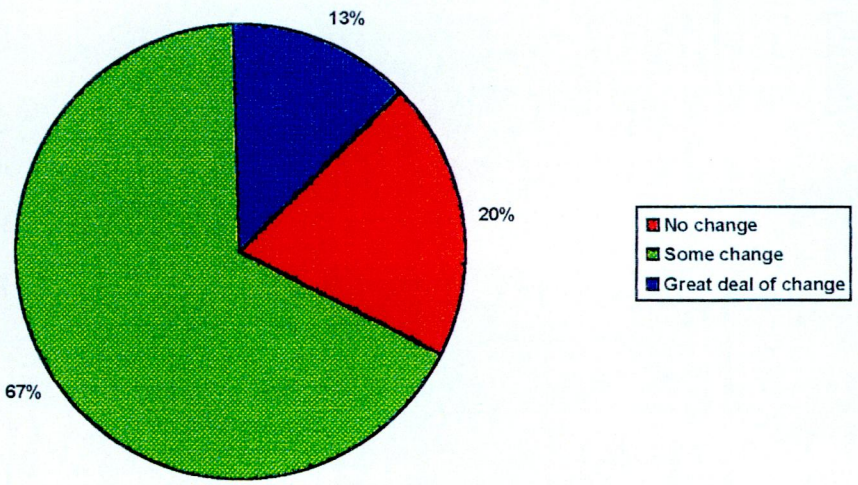

FIGURE 5.27 Q. 4 Stage 2 of project 2nd Questionnaire

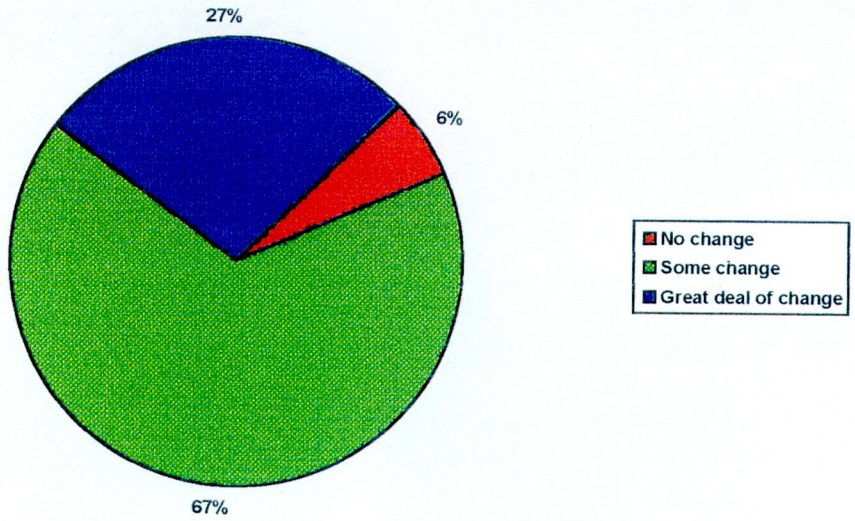

FIGURE 5.28 Q. 5 Stage 8 of project 3rd Questionnaire

perspective on the brain as an approach to drawing. This evidence clearly suggests that the introduction of the brain theory into the art class can have a profound effect on student approach and ability to drawing.

Question 6 was to enquire how the students themselves felt about the introduction of such theoretical perspectives into second level and senior cycle art class, and whether or not they considered it to have been a beneficial experience, as an alternative approach to drawing (see Figure 5.29).

The results clearly portray that the students considered this introduction to have had a positive effect on their drawing ability. Eighty per cent of the students said yes they felt it should be introduced while only 20 per cent indicated they did not think it made a difference. Students has been asked to discuss why they said yes or no and the following are some of their responses to Question 6:

"It makes no difference"

"It doesn't make much difference - the improvement was just cos of practice".

"It opens your mind to a different perspective on drawing. It makes you think about what drawing is and what you are using while you are drawing - your brain, eyes and hand. Before doing these exercises I always forgot that my brain had anything to do with drawing but sections like observation has changed that completely."

"The subject of the right and left side of the brain is the entire basis of drawing, so to leave it out of the art curriculum is criminal. By senior cycle, students are

intelligent enough to understand the concept of right and left, and in ways their drawing will improve."

"It showed me that you can have a picture of something in your head and you draw that and not what you really see. After these exercises I noticed that I am looking at what I am drawing and drawing what I see. It has been a great advantage to me to find out about the left and the right side of the brain. It only took a few classes to teach me about it and if everyone in senior cycle knew about it then the quality of art handed up would be a lot better.

For more of the respondents' views see Appendix G).

The evidence of the final questionnaire was compelling, students really have benefited and shown their acknowledgement of the introduction of theoretical perspectives as very rewarding and informative. They had enjoyed the various exercises and indicated that their approach and ability to draw has changed as a result of participating.

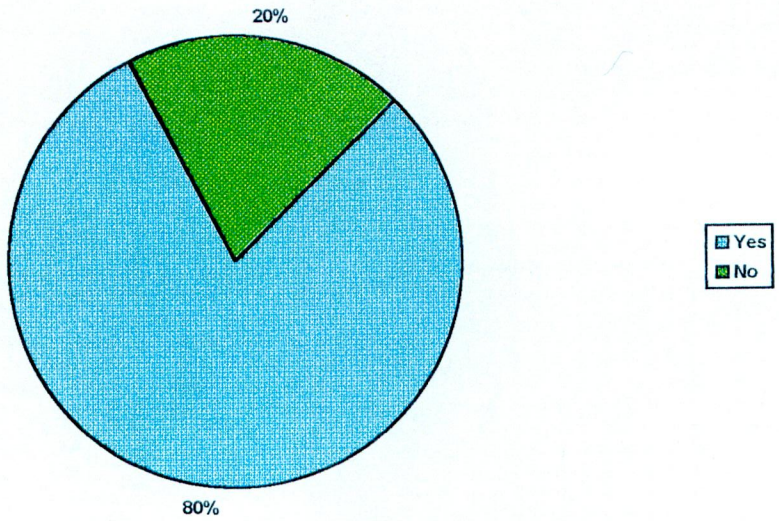

FIGURE 5.29 Q. 6 Stage 8 of project 3rd Questionnaire

CONCLUSION

Throughout this dissertation I have focused on the introduction of theoretical perspectives on approaches to drawing, to second level senior cycle students with the intention of examining the potential for developing the student's drawing ability. The objective was to study the cerebral functions of the left and right hemisphere of the brain, in order to show the importance of the right hemisphere when drawing and how an understanding of this can improve the quality of students' art work.

The human brain is a highly developed sophisticated organ, and it is difficult to appreciate its full potential or even the characteristics of how it works. However, pioneering research, of Professor Roger Sperry in the 1960s, produced evidence that the two halves of the brain, right and left operate in different ways. The left side of the brain was seen as the verbal logical side, while the right was more concerned with the non-verbal creative side. Sperry's research influenced educationalists, in particular Betty Edwards, who understood the implication of it for the pedogogy of art specifically drawing. She developed teaching techniques that solely utilise the right side of the brain, the creative side, when drawing.

Before illustrating that it was possible to improve students' ability to draw by introducing them to the implications of Sperry's split brain theory and the cerebral functions of the left and right hemisphere it was necessary to find a suitable methodology. In the context of introducing complex cerebral theory to the second level classroom the most effective methodology which allowed

this proved to be Bruner's theory of discovery learning. In effect students would be allowed experience the potential of the right hemisphere before the theory behind that potential was explained to them.

A series of specially designed practical exercises in different drawing styles, imaginary, observational and copying encouraged students to utilise fully the right hemisphere. Having completed these tasks, students were asked to engage in self evaluation and reflection, in order to assess the development of their ability. At this stage students were introduced to the theoretical background of the brain's cerebral functions and asked to consider it in the light of their previous experience.

The final stages of the project were undertaken with the theoretical knowledge of the potential of the right hemisphere which enabled students to evaluate fully a practical application of the theory.

An analysis of their drawing and efforts of self evaluation clearly affirms that there is a role for theoretical perspectives on an approach to drawing within the second level art class. Eighty per cent of the participating students acknowledged that their experience of theoretical perspectives had changed their approach to and ability at drawing in a positive way. They confirmed the introduction of theoretical perspectives into the second level art room was an effective means of improving their drawing skills.

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APPENDIX A

First Questionnaire

Date..... Name.....

1. How would you describe your ability at drawing?

Poor ☐ Fair ☐ Good ☐ Very Good ☐ Excellent ☐

2. Which form of drawing do you rate most Highly?

Imagination ☐ Observational ☐ Copying ☐

3. Which form of drawing do you use most regularly?

Imagination ☐ Observational ☐ Copying ☐

4. Do you think the ability to draw well is a skill that can be developed?

Yes ☐ No ☐ It is a natural ability ☐

5. When drawing which of the following do you use the most?

Your Brain ☐ Your Hand ☐ Your eye ☐

6. How would you describe your ability at drawing the Human figure?

Poor ☐ Fair ☐ Good ☐ Very Good ☐ Excellent ☐

7. When drawing the human figure. which of the following would you consider most difficult to achieve?

Proportion ☐ Likeness ☐

8. When drawing the Human figure what medium do you prefer to work with?

Pencil ☐ Chalk / Charcoal ☐ Oil Pastels ☐ Paint ☐

9. How has your ability to draw improved since entering 2nd level schooling

No change ☐ Some change ☐ A great deal of change ☐

10. Compared to the other students in your class how would you rate your ability to draw?

Below average ☐ Average ☐ Above average ☐

11. How do your fellow students view your standard of drawing?

Below average ☐ Average ☐ Above average ☐

APPENDIX B

Second Questionnaire

Stage 5 : Post Contour Drawing

Date : _____ **Name :** _____

1 How did you feel at the beginning of the contour drawing ?

2 Did you lose awareness of time passing?

3 How difficult did you find it, not to look at the page?

4 Did you at any point experience a feeling that you were unaware of anything or one in the room? Describe.

5 How do you feel about your final result?

APPENDIX C

Responses to Question 1 of Second Questionnaire

Question : How did you feel at the beginning of the contour drawing?

- A bit stupid because you were not sure what or how you were doing. But you feel relaxed and your hand goes with the flow!

- I felt strange at not bein able to look down at the paper I thought it would just look like a bunch of squiggles on the page.

- I was happy to do it, looking forward to seeing the results.

- It was stupid and frustrating to draw, you could not judge your drawing.

- Not looking forward to seeing what kind of result I'd get. Not comfortable with not looking at the page at all. Basically - uncomfortable and reluctant.

- That it would be hard to get the right shape. I thought it was a good way to get usto look at what we're drawing.

APPENDIX D

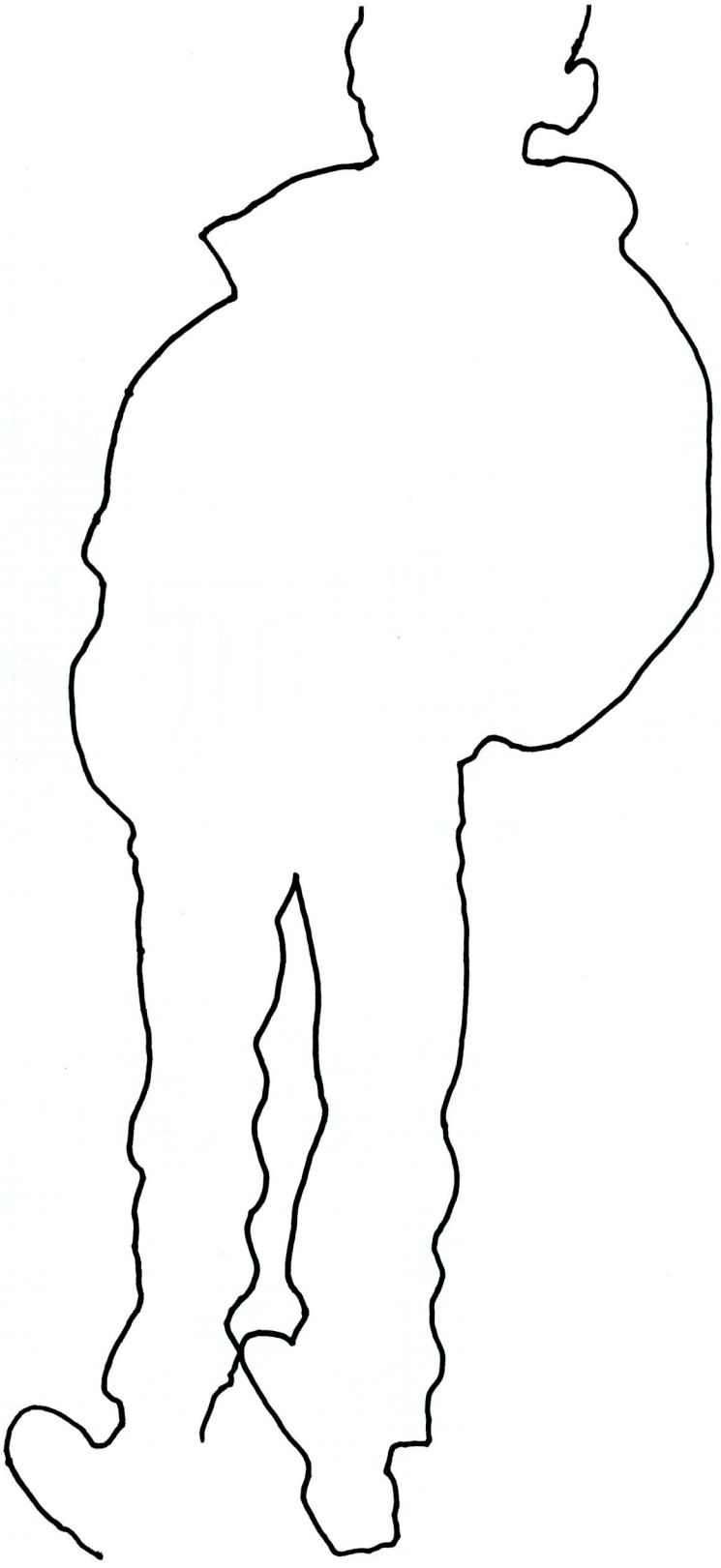
Responses to Question 5 of Second Questionnaire

Question : How do you feel about your final result?

- Thought it was good for first time but his head was the only section out of proportion.
- Not the best!
- Amused. Legs and arms all over the place, it is funny especially when you are drawing exactly what you see and it looks completely different.
- Surprised. An improvement of first result.
- I thought the picture looked good.
- Badly, where I started and where I finished are in the wrong places.
- Some were quite good - one was woeful.

APPENDIX E

Student's work from third practical exercise



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APPENDIX F

Third Questionnaire

Stage 8 of Drawing Project

Date : _____ **Name :** _____

1 When drawing which of the following do you use the most?

Brain ❑ Hand ❑ Eye ❑

2 Which of the three drawing exercises did you find the most rewarding? and why?

Imaginary ❑ Observation ❑ Copying ❑

3 Which of the three drawing exercises did you find the least rewarding? and why?

Imaginary ❑ Observation ❑ Copying ❑

4 In light of discovering how to look at and question more carefully with the right side of the brain, when drawing how much has your approach to drawing changed?

No change ❑ Some change ❑

A great deal of change ❑

5 As a result of what we have discussed and you have experienced in these various drawing exercises, has there been any improvement in your drawing ability?

No improvement ❑ Some improvement ❑

A great deal of improvement ❑

6 Do you think the functions of the left and right sides of the brain should be introduced at second level to senior cycle art students, as an approach to drawing?

Yes ❑ No ❑

Discuss . . .

APPENDIX G

Responses to Question 6 of Third Questionnaire

Question : Do you think the functions of the left and right sides of the brain should be introduced at second level, to senior cycle art students, as an approach to drawing?

Results : See Figure 5.29

- I think that students should realise how their brain is working and the mechanics of drawing because if anything, it would give them a better understanding of the subject (at least), if not improve their drawing and their attitude towards it.

- It lets you shut out what is around you and concentrate on the drawing. You just draw what you see, not what you think you see.

- No, because you draw what you feel, it comes naturally and no one can tell you which way to draw. You have your own talents which develop to suit you and no one else.

- I think they should, as I feel that this has helped me to improve my drawing slightly and if it was introduced it could help a lot of other peole also.

APPENDIX H

Introduction to Theory - Sperry's Experimental Left and Right Hemisphere

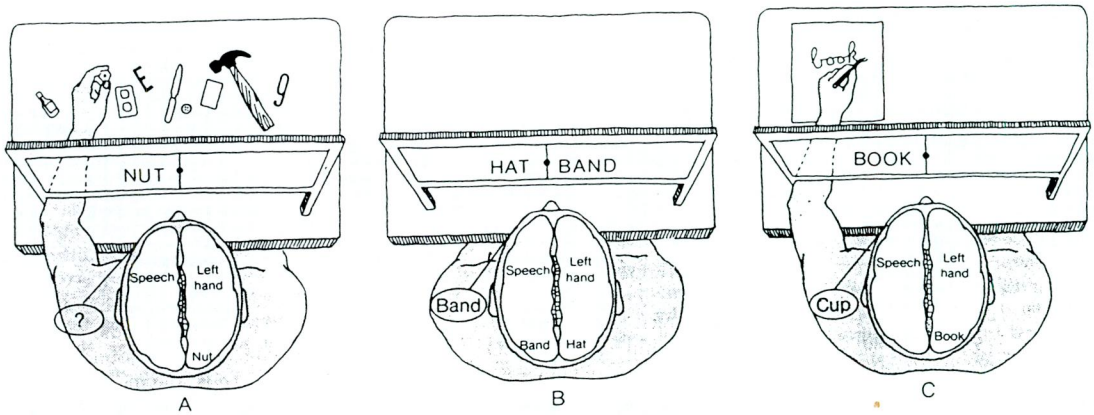

Figure 2-12
Testing the Abilities of the Two Hemispheres
A. The split-brain subject correctly retrieves an object by touch with the left hand when its name is flashed to the right hemisphere, but he cannot name the object or describe what he has done. B. The word *hatband* is flashed so that *hat* goes to the right cerebral hemisphere and *band* goes to the left hemisphere. The subject reports that he sees the word *band* but has no idea what kind of band. C. A list of common objects (including *book* and *cup*) is initially shown to both hemispheres. One word from the list (*book*) is then projected to the right hemisphere. When given the command to do so, the left hand begins writing the word *book*, but when questioned the subject does not know what his left hand has written and guesses "cup." (After Sperry, 1970; and Nebes and Sperry, 1971)

Although the right hemisphere cannot speak, it does have some linguistic capabilities. It recognized the meaning of the word *nut*, as we saw in our first example, and it can write a little. In the experiment illustrated in Figure 2-12C, a split-brain subject is first shown a list of common objects such as cup, knife, book, and glass. This list is displayed long enough for the words to be projected to both hemispheres. Next, the list is removed and one of the words (for example, *book*) is flashed briefly on the left side of the screen so that it goes to the right hemisphere. If the subject is asked to write what he saw, his left hand will begin writing the word *book*. If asked what his left hand has written, he has no idea and will guess at any of the words on the original list. The subject knows he has written something because he feels the writing movements through his body. But because there is no communication between the right hemisphere that saw and wrote the word and the left hemisphere that controls speech, the subject cannot tell you what he wrote.

APPENDIX I

Student's Work - Stage 7 - upside down drawing