

TABLE OF CONTENTS

| | |
|---|------|
| PREFACE | xi |
| ACKNOWLEDGEMENTS | xiii |
| CHAPTER 1/ <i>Towards a Way of Knowing</i> | 1 |
| 1.1. The conflict | 1 |
| 1.2. My task | 3 |
| 1.3. Preliminary thoughts on Mathematics education and culture | 3 |
| 1.4. Technique-oriented curriculum | 7 |
| 1.5. Impersonal learning | 9 |
| 1.6. Text teaching | 10 |
| 1.7. False assumptions | 12 |
| 1.8. Mathematical education, a social process | 13 |
| 1.9. What is mathematical about a mathematical education? | 16 |
| 1.10. Overview | 18 |
| CHAPTER 2/ <i>Environmental Activities and Mathematical Culture</i> | 20 |
| 2.1. Perspectives from cross-cultural studies | 20 |
| 2.2. The search for mathematical similarities | 22 |
| 2.3. Counting | 23 |
| 2.4. Locating | 28 |
| 2.5. Measuring | 34 |
| 2.6. Designing | 38 |
| 2.7. Playing | 42 |
| 2.8. Explaining | 48 |
| 2.9. From 'universals' to 'particulars' | 55 |
| 2.10. Summary | 59 |
| CHAPTER 3/ <i>The Values of Mathematical Culture</i> | 60 |
| 3.1. Values, ideals and theories of knowledge | 60 |
| 3.2. Ideology – rationalism | 62 |
| 3.3. Ideology – objectism | 65 |
| 3.4. Sentiment – control | 69 |
| 3.5. Sentiment – progress | 72 |
| 3.6. Sociology – openness | 75 |
| 3.7. Sociology – mystery | 77 |

| | |
|---|-----|
| CHAPTER 4/ <i>Mathematical Culture and the Child</i> | 82 |
| 4.1. Mathematical culture – symbolic technology and values | 82 |
| 4.2. The culture of a people | 84 |
| 4.3. The child in relation to the cultural group | 87 |
| 4.4. Mathematical enculturation | 89 |
| CHAPTER 5/ <i>Mathematical Enculturation – The Curriculum</i> | 92 |
| 5.1. The curriculum project | 92 |
| 5.2. The cultural approach to the Mathematics curriculum – five principles | 95 |
| 5.2.1. Representativeness | 95 |
| 5.2.2. Formality | 95 |
| 5.2.3. Accessibility | 96 |
| 5.2.4. Explanatory power | 96 |
| 5.2.5. Broad and elementary | 97 |
| 5.3. The three components of the enculturation curriculum | 98 |
| 5.4. The symbolic component: concept-based | 99 |
| 5.4.1. Counting | 100 |
| 5.4.2. Locating | 100 |
| 5.4.3. Measuring | 101 |
| 5.4.4. Designing | 102 |
| 5.4.5. Playing | 102 |
| 5.4.6. Explaining | 103 |
| 5.4.7. Concepts through activities | 103 |
| 5.4.8. Connections between concepts | 108 |
| 5.5. The societal component: project-based | 110 |
| 5.5.1. Society in the past | 111 |
| 5.5.2. Society at present | 112 |
| 5.5.3. Society in the future | 113 |
| 5.6. The cultural component: investigation-based | 114 |
| 5.6.1. Investigations in mathematical culture | 116 |
| 5.6.2. Investigations in Mathematical culture | 117 |
| 5.6.3. Investigations and values | 117 |
| 5.7. Balance in this curriculum | 119 |
| 5.8. Progress through this curriculum | 120 |
| CHAPTER 6/ <i>Mathematical Enculturation – The Process</i> | 124 |
| 6.1. Conceptualising the enculturation process in action | 124 |
| 6.1.1. What should it involve? | 124 |
| 6.1.2. Towards a humanistic conception of the process | 125 |
| 6.2. An asymmetrical process | 128 |

| | | |
|---|--|------------|
| 6.2.1. | The role of power and influence | 128 |
| 6.2.2. | Legitimate use of power | 130 |
| 6.2.3. | Constructive and collaborative engagement | 131 |
| 6.2.4. | Facilitative influence | 132 |
| 6.2.5. | Metaknowledge and the teacher | 135 |
| 6.3. | An intentional process | 135 |
| 6.3.1. | The choice of activities | 135 |
| 6.3.2. | The concept-environment | 139 |
| 6.3.3. | The project-environment | 142 |
| 6.3.4. | The investigation-environment | 147 |
| 6.4. | An ideational process | 151 |
| 6.4.1. | Social construction of meanings | 151 |
| 6.4.2. | Sharing and contrasting Mathematical ideas | 154 |
| 6.4.3. | The shaping of explanations | 157 |
| 6.4.4. | Explaining and values | 159 |
| CHAPTER 7/ <i>The Mathematical Enculturators</i> | | 160 |
| 7.1. | People are responsible for the process | 160 |
| 7.2. | The preparation of Mathematical enculturators – preliminary thoughts | 161 |
| 7.3. | The criteria for the selection of Mathematical enculturators | 164 |
| 7.3.1. | Ability to personify Mathematical culture | 164 |
| 7.3.2. | Commitment to the Mathematical enculturation process | 165 |
| 7.3.3. | Ability to communicate Mathematical ideas and values | 166 |
| 7.3.4. | Acceptance of accountability to the Mathematical culture | 167 |
| 7.3.5. | Summary of criteria | 168 |
| 7.4. | The principles of the education of Mathematical enculturators | 168 |
| 7.4.1. | Mathematics as a cultural phenomenon | 169 |
| 7.4.2. | The values of Mathematical culture | 170 |
| 7.4.3. | The symbolic technology of Mathematics | 171 |
| 7.4.4. | The technical level of Mathematical culture | 172 |
| 7.4.5. | The meta-concept of Mathematical enculturation | 173 |
| 7.4.6. | Summary of principles | 175 |
| 7.5. | Socialising the future enculturator into the Mathematics Education community | 176 |
| 7.5.1. | The developing Mathematics Education community | 176 |
| 7.5.2. | The critical Mathematics Education community | 178 |

| | |
|----------------|-----|
| NOTES | 180 |
| BIBLIOGRAPHY | 184 |
| INDEX OF NAMES | 192 |
| APPENDIX | 195 |