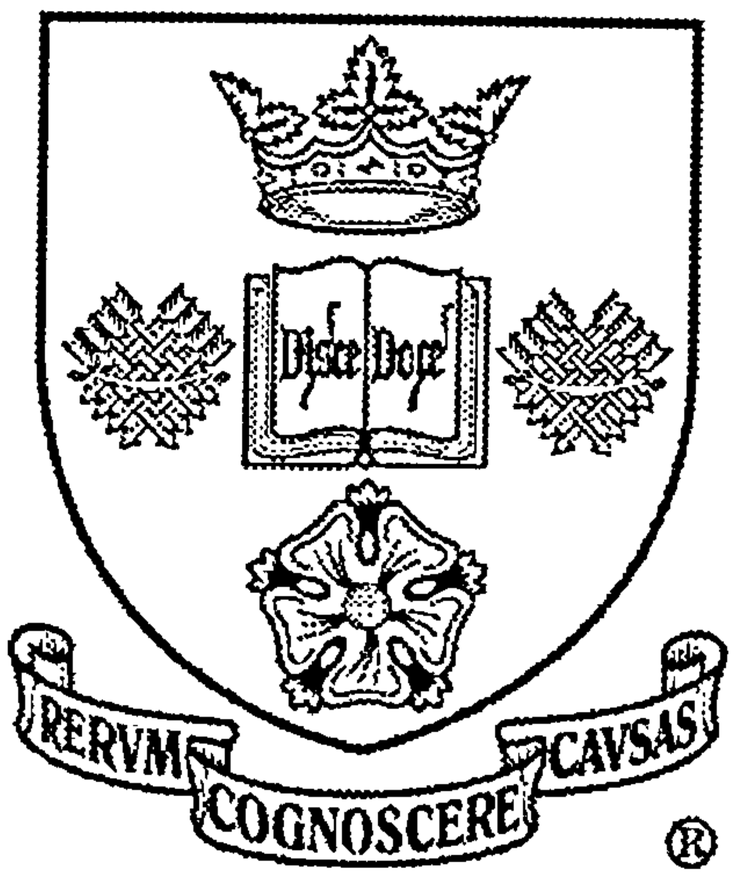
THE EFFECTS OF THE PRIMARY CLASSROOM ENVIRONMENT ON THE IMPLEMENTATION OF THE NATIONAL CURRICULUM

VOLUME 1

John Edwards BA, M Arch

Thesis submitted for the degree of
Doctor of Philosophy



School of Architecture
The University of Sheffield
May 2005

This research was funded by an Engineering and Physical Sciences Research Council Studentship between October 2001 and August 2003.

John Edwards BA, M Arch

The Effects of the Primary Classroom Environment on the Implementation of the National Curriculum

This thesis focuses on the architectural design of Key Stage 2 primary classrooms in relation to the National Curriculum, identifying physical attributes of classrooms that enable or inhibit its delivery, providing evidence of how it is possible to improve primary classroom design in the form of a Classroom Design Brief.

The National Curriculum is central to policies to raise standards, determining the content of what should be taught and the research focuses on primary school classrooms, a very specific school environment in which teachers and pupils interact during the process of learning. Initially the study describes the ways in which the class and classroom are structured to facilitate teaching and learning and analysis of the National Curriculum and how it is put into effect in the primary classroom.

Four main research instruments that addressed the research questions were developed and applied. Initially the Classroom Survey Questionnaire was used to review teachers' experiences of implementing the National Curriculum in classroom environments currently in use. This was followed by observational studies using Classroom Data Sheets, Lesson Data Sheets and Teacher Interview Sheets to analyse how existing classroom environments match current design guidelines by observing the classroom environment in use during teaching and learning activities associated with the National Curriculum.

The study indicates that there is a strong relationship between the classroom environment and the teaching and learning strategies associated with the National Curriculum, revealing that certain physical attributes of existing classroom environments inhibit the delivery of the National Curriculum and concludes that it is possible to improve the design of primary classroom environments. In order to facilitate the better design of primary classrooms a Classroom Design Brief has been developed that combines existing guidelines, regulations, research findings and Architectural Recommendations. Allowing the client team to define the brief, identifying individual needs, assessing their implications and determine priorities.

CONTENTS

Page

VOLUME 1

ABSTRACT i
CONTENTS ii-vii
LIST OF FIGURES viii-xv
ACKNOWLEDGEMENTS xvi

CHAPTER 1: INTRODUCTION
1.1 Prologue 1
1.2 Background 1
1.3 Area of Enquiry 4
1.4 Research Aims and Objectives 5
1.5 Thesis Structure 6
1.6 References 8

CHAPTER 2: THE CLASSROOM ENVIRONMENT
2.1 Introduction 9
2.2 The Environment 10
2.3 Effects on Educational Achievement 14
2.4 School Building Condition and Design 15
2.5 School Capital Investment 18
2.6 The Classroom Environment 19
2.6.1 Form and Function 22
2.6.2 Function and Flexibility 23
2.6.3 Size and Scale 25
2.6.4 Arrangement and Layout 26
2.6.5 Noise and Acoustics 30
2.6.6 Lighting 31
2.6.7 Temperature and Ventilation 33
2.7 Summary 34
2.8 References 36

CHAPTER 3: DEVELOPMENT OF THE PRIMARY CLASSROOM
3.1 Introduction 42
3.2 The School Building Stock 42
3.3 Schoolroom to Classroom 43
3.4 The 1870 Education Act 44
3.5 Pre-1919 School Buildings 45
3.5.1 Board Schools 47
3.6 School Buildings 1920-1943 51
3.6.1 Hadow Report 54
3.7 School Buildings 1944-1976 55
3.7.1 Building Bulletins 63
3.8. School Buildings 1967-1976 64
3.8.1 Plowden Report 68
3.9 School buildings 1977-2001 69
3.10 Developments in Educational Theory 73
3.11 Summary 75
3.12 References 77

CHAPTER 4: CLASS AND CLASSROOM ORGANISATION

4.1 Introduction 79
4.2 Recent Developments in Classroom Organisation 79
4.3 Research into Organisation, Task and Activity 81
4.4 Forms of Classroom Organisation 89
4.4.1 Whole-class Teaching 90
4.4.2 Individual Work 90
4.4.3 Paired Work 90
4.4.4 Group Work 90
4.5 Organisation in Relation to Teaching and Learning Strategies 91
4.6 The Use of The Classroom Environment 91
4.7 The Use of Resources 92
4.8 The Use of Time 93
4.9 Classroom Organisation and Layout 94
4.10 Summary 100
4.11 References 102

CHAPTER 5: THE NATIONAL CURRICULUM

5.1 Introduction 104
5.2 Background of the Curriculum 104
5.3 Purposes of the Curriculum 105
5.4 Framework of the Curriculum 106
5.5 Promoting Skills Across the Curriculum 106
5.5.1 Core Subjects 107
5.5.1.1 English 107
5.5.1.2 Mathematics 108
5.5.1.3 Science 108
5.5.2 Foundation Subjects 108
5.5.2.1 Design and Technology 109
5.5.2.2 Information Communication Technology 109
5.5.2.3 History 109
5.5.2.4 Geography 110
5.5.2.5 Art and Design 110
5.5.2.6 Music 111
5.5.2.7 Personal, Social and health Education and Citizenship 111
5.6 Spatial Implications of the Curriculum 111
5.7 The National Literacy Strategy 113
5.7.1 Classroom Organisation and the National Literacy Strategy 113
5.8 The National Numeracy Strategy 118
5.8.1 Classroom Organisation and the National Numeracy Strategy 118
5.9 Summary 121
5.10 References 123

CHAPTER 6: RESEARCH METHODOLOGY

6.1 Introduction 124
6.2 Quantitative and Qualitative Research 125
6.2.1 Combining Quantitative and Qualitative Research 128
6.3 Research Methods 128
6.3.1 Variables 128
6.3.2 Questionnaires 129
6.3.3 Interviews 130
6.3.4 Observation 131
6.3.5 The Ethnographic Approach 133
6.4 Behavioural Mapping 134
6.5 Research Setting 135
6.6 Sample Size 136
6.7 Research Questions 137
6.8 Summary 138
6.9 References 139

CHAPTER 7: DATA ANALYSIS FRAMEWORK

7.1 Introduction 141
7.2 Data Collected 141
7.3 Data Analysis 142
7.3.1 Multi-strategy Research 143
7.3.2 Categorical Data Analysis 144
7.3.3 Grounded Theory Analysis 145
7.4 Data Entry System 146
7.5 Validity and Reliability 146
7.6 Limitations 147
7.7 Summary 149
7.8 References 150

VOLUME 2

CHAPTER 8: RESEARCH INSTRUMENTS

8.1 Introduction 151
8.2 Pilot Studies 151
8.3 Research Instruments 155
8.3.1 Classroom Survey Questionnaire 155
8.3.2 Observation Schedules 157
8.3.2.1 Classroom Data Sheet 157
8.3.2.2 Observational Data Sheet 159
8.3.2.3 Teacher Interview Sheet 161
8.4 Summary 163
8.5 References 164

CHAPTER 9: DATA ANALYSIS: CLASSROOM SURVEY QUESTIONNAIRE

9.1 Introduction 165
9.2 Categorical Data Analysis 165
9.3 Classroom Characteristics 166
9.3.1 Age of Original School Building 166
9.3.2 Number of Key Stage 2 Classrooms 167
9.3.3 Number of Key Stage 2 Pupils 167
9.3.4 Class Size 168
9.4 How well do the classrooms work as a teaching and learning environment? 169
9.4.1 Ability to alter the layout of the classroom 169
9.4.2 Teacher access to resource/storage areas 170
9.4.3 Pupil access to resource/storage areas 171
9.4.4 Access to the outside form the classroom 172
9.4.5 Integration of technology within the classroom 173
9.5 How are classrooms used? 174
9.5.1 Can pupils access outside the building directly from all the classrooms? 174
9.5.2 Do children have a designated space for their belongings within all the classrooms? 175
9.6 Positive and Negative Features 176
9.6.1 Classroom Size 178
9.6.2 Classroom Organisation and Layout 180
9.6.3 Classroom Acoustics 181
9.6.4 Classroom Lighting 181
9.6.5 Classroom Temperature and Ventilation 182
9.7 Summary 183
9.8 References 185

CHAPTER 10: DATA ANALYSIS: OBSERVATION SCHEDULES

10.1 Introduction 186
10.2 Observational Data Analysis 187
10.3 Classroom Age 188
10.4 Classroom Area 188
10.5 Class Size 189
10.6 Classroom Density 191
10.7 Classroom Layout 191
10.8 Lesson Structure 195
10.9 Pupil Activity 199
10.10 Teacher Activity 201
10.11 Learning Support Staff Activity 202
10.12 Class Organisation 202
10.13 Classroom Interactions 206
10.14 Location and Movement 206
10.14.1 Pupil Location and Movement 207
10.14.2 Teacher Location and Movement 207
10.14.3 Learning Support Staff Location and Movement 207
10.15 Observational Studies Summary 208
10.16 Teacher Interview Sheets Data Analysis 210
10.16.1 Impressions of the Classroom Environment 211
10.16.2 Classroom Requirements 212
10.16.2.1 Classroom Size 213
10.16.2.2 Classroom Organisation and Layout 213
10.16.2.3 Classroom Acoustics 214
10.16.2.4 Classroom Lighting 214
10.16.2.5 Classroom Temperature and Ventilation 214
10.16.2.6 Specific Features within the Classroom 215
10.17 Comparison of Responses 216
10.18 Teachers Interview's Summary 217
10.19 References 218

CHAPTER 11: CONCLUSIONS AND RECOMMENDATIONS

11.1 Introduction 219
11.2 Summary of Study 219
11.3 Responding to the Research Questions 222
11.4 Classroom Design Brief 225
11.4.1 Form and Function 228
11.4.1.1 School Premises Regulations 228
11.4.1.2 Guidelines 228
11.4.1.3 Research Findings 228
11.4.1.4 Summary 228
11.4.1.5 Architectural Recommendations 229
11.4.2 Class Organisation 231
11.4.2.1 School Premises Regulations 231
11.4.2.2 Guidelines 231
11.4.2.3 Research Findings 231
11.4.2.4 Summary 231
11.4.2.5 Architectural Recommendations 232
11.4.3 Layout 234
11.4.3.1 School Premises Regulations 234
11.4.3.2 Guidelines 234
11.4.3.3 Research Findings 234
11.4.3.4 Summary 235
11.4.3.5 Architectural Recommendations 235
11.4.4 Area Requirements 237
11.4.4.1 School Premises Regulations 237
11.4.4.2 Guidelines 237
11.4.4.3 Research Findings 237
11.4.4.4 Summary 238
11.4.4.5 Architectural Recommendations 239
11.4.5 Circulation and Accessibility 241
11.4.5.1 School Premises Regulations 241
11.4.5.2 Guidelines 241
11.4.5.3 Research Findings 241
11.4.5.4 Summary 241
11.4.5.5 Architectural Recommendations 242
11.4.6 Acoustics 244
11.4.6.1 School Premises Regulations 244
11.4.6.2 Guidelines 244
11.4.6.3 Research Findings 245
11.4.6.4 Summary 245
11.4.6.5 Architectural Recommendations 245
11.4.7 Lighting 248
11.4.7.1 School Premises Regulations 248
11.4.7.2 Guidelines 248
11.4.7.3 Research Findings 249
11.4.7.4 Summary 249
11.4.7.5 Architectural Recommendations 249
11.4.8 Heating and ventilation 252
11.4.8.1 School Premises Regulations 252
11.4.8.2 Guidelines 252
11.4.8.3 Research Findings 252
11.4.8.4 Summary 252
11.4.8.5. Architectural Recommendations 253
11.4.9 ICT Integration 255
11.4.9.1 School Premises Regulations 255
11.4.9.2 Guidelines 255
11.4.9.3. Research Findings 255
11.4.9.4 Summary 255
11.4.9.5 Architectural Recommendations 256

11.4.10 Storage 258
11.4.10.1 School Premises Regulations 258
11.4.10.2 Guidelines 258
11.4.10.3 Research Findings 258
11.4.10.4 Summary 258
11.4.10.5 Architectural Recommendations 259
11.4.11 Furniture and equipment 261
11.4.11.1 School Premises Regulations 261
11.4.11.2 Guidelines 261
11.4.11.3 Research Findings 262
11.4.11.4 Summary 262
11.4.11.5 Architectural Recommendations 262
11.5 Further Research 264
11.6 References 265

BIBLIOGRAPHY 266

APPENDIX A: CLASSROOM SURVEY QUESTIONNAIRE 278
APPENDIX B: CLASSROOM SURVEY QUESTIONNAIRE RESPONSES 280
APPENDIX C: CLASSROOM SURVEY QUESTIONNAIRE FREQUENCY TABLES 286
APPENDIX D: CLASSROOM DATA SHEET 297
APPENDIX E: OBSERVATIONAL DATA SHEET 299
APPENDIX F: OBSERVATIONAL DATA SHEET CATEGORIES 301
APPENDIX G: TEACHER INTERVIEW SHEET 302
APPENDIX H: CLASSROOM DATA 303
APPENDIX I: OBSERVATIONAL DATA FREQUENCY TABLES 313

DIARY OF RESEARCH 324

Page

Volume 1

Figure 1.1: Research process 7
Author

Figure 2.1: Structure of literature review 9
Author

Figure 2.2: Climate factors for educational effectiveness 12
Figure 2.1, Creemers, B. P. M. and Reezigt, G. J. (1999) *The Role of School and Classroom Climate in Elementary School Learning Environments,* in H. J. Freiberg, (1999) *School Climate: measuring, Improving and Sustaining Healthy Learning Environments*, London: Falmer Press.

Figure 2.3: A model of determinants of classroom climate 20
Figure 16, Moos, R. (1979) *Evaluating Educational Environments*, New York: Jossey-Bass.

Figure 3.1: Age of existing schools building stock 42
Author

Figure 3.2: A typical schoolroom in Whitechapel, East London 43
Figure 4, Clark, C. (1995) Educational History of School Design in Britain, in C. Clark and M. Seaborne (1995) Beacons of Learning: Urban Schools in England and Wales, London: Save Britain's Heritage.

Figure 3.3: Plan of school showing layout suggested in 1851 by the Committee of Council on Education 44
Figure 1, Seaborne, M. (1971) *Primary School Design*, London: Routledge & Kegan Paul.

Figure 3.4: Jonson Street Board School, Stepney, 1873 46
Figure 2, Seaborne, M. & Lowe, R. (1977) *The English school: its architecture and organization (Vol.2): 1870-1970,* London: Routledge and Kegan Paul.

Figure 3.5: Worington Road Board School, Portobello; boys' department on first floor, 1874 46
Figure 24 Seaborne, M. & Lowe, R. (1977) *The English school: its architecture and organization (Vol.2): 1870-1970,* London: Routledge and Kegan Paul.

Figure 3.6: Scotland Street School, Glasgow, 1904 47
Author

Figure 3.7: Upper Lloyd Street School, Manchester, 1894 48
Case studies, Clark, C and Seaborne, M (1995) Beacons of Learning: Urban Schools in England and Wales, London: Save Britain's Heritage.

Figure 3.8: Walkley School, Sheffield, 1874 48
Case studies, Clark, C and Seaborne, M (1995) Beacons of Learning: Urban Schools in England and Wales, London: Save Britain's Heritage.

Figure 3.9: Board School, Orange Street, London, 1873 49
Figures 234 & 236 Robson, E., R. (1877) *School Architecture: being practical remarks on the planning, designing, building and furnishing of school houses* (2nd ed.), London: Murray

Figure 3.10: Board School, Angler's Gardens, London, 1873 49
Figures 224 & 227, Robson, E., R. (1877) *School Architecture: being practical remarks on the planning, designing, building and furnishing of school houses* (2nd ed.), London: Murray.

Figure 3.11: Senior department, Walton Hall Avenue Elementary School, Liverpool, 1927 52
Figure 31, Seaborne, M. & Lowe, R. (1977) *The English school: its architecture and organization (Vol.2): 1870-1970,* London: Routledge and Kegan Paul.

Figure 3.12: Classroom about 1900 55
Ministry of Education (1947) *The story of post-war school building: Ministry of Education pamphlet no.33.* London: HMSO.

Figure 3.13: Classroom about 1928 55
Ministry of Education (1947) *The story of post-war school building: Ministry of Education pamphlet no.33.* London: HMSO.

Figure 3.14: Post-war classroom, 1949 55
Ministry of Education (1947) *The story of post-war school building: Ministry of Education pamphlet no.33.* London: HMSO.

Figure 3.15: Large more informal classroom about 1957 55
Ministry of Education (1947) *The story of post-war school building: Ministry of Education pamphlet no.33.* London: HMSO.

Figure 3.16: Aboyne Lodge, St Albans, 1950 57
Figure 31 and 32, Saint, A, (1987) *Towards a Social Architecture, The Role of School Building in Post-War England*, New Haven and London: Yale University Press.

Figure 3.17: Evolution in the planning of the post-war primary school in Cheshire 58
Figure 29, Manning, P (Ed.)(1967) *The primary school: an environment for education*, by the Pilkington Research Unit, University of Liverpool: Department of Building Science.

Figure 3.18: Sketch plan of typical teaching unit adopted for the Hertfordshire County Council programme 60
Figure 41, Godfrey, J. A. & Castle Cleary, R. (1953) *School Design and Construction*, London: The Architectural Press

Figure 3.19: Amersham Junior School, ground plan, 1958 61
Figure 39, Figure 1, Seaborne, M. (1971) *Primary School Design*, London: Routledge & Kegan Paul.

Figure 3.20: Amersham Junior School, external view, 1958 61
Figure 5.36, Saint, A, (1987) *Towards a Social Architecture, The Role of School Building in Post-War England*, New Haven and London: Yale University Press.

Figure 3.21: Amersham Junior School, classroom, 1958 61
Figure 5.37, Saint, A, (1987) *Towards a Social Architecture, The Role of School Building in Post-War England*, New Haven and London: Yale University Press.

Figure 3.22: Teachers' most frequently voiced complaint is the lack of storage space 64
Figure 51, Manning, P (Ed.)(1967) *The primary school: an environment for education*, by the Pilkington Research Unit, University of Liverpool: Department of Building Science.

Figure 3.23: It is noticeable that buildings which have an intimate small scale usually have domestic height ceilings, clerestory windows used above adjoining corridors raise the internal height
Figure 53, Manning, P (Ed.)(1967) *The primary school: an environment for education*, by the Pilkington Research Unit, University of Liverpool: Department of Building Science. 64

Figure 3.24: Key plan and Groups B, D, E and F (160 pupils)
Diagram 12, DES (1967b) *Eveline Lowe Primary School, London Building Bulletin 36*, London: HMSO. 66

Figure 3.25: A view from room F looking to E and B, showing the linked general working areas
Figure 17, DES (1967b) *Eveline Lowe Primary School, London Building Bulletin 36*, London: HMSO. 66

Figure 3.26: Looking towards the carpeted and raised reading area room F and into the quiet room
Figure 18, DES (1967b) *Eveline Lowe Primary School, London Building Bulletin 36*, London: HMSO. 66

Figure 3.27: Queens Enclosure, Plan, 1989
Page 83, Weston, R (1991) *Schools of Thought: Hampshire Architecture 1974-1991*, Winchester: Hampshire County Council 69

Figure 3.28: Queens Enclosure, Entrance, 1989
Page 82, Weston, R (1991) *Schools of Thought: Hampshire Architecture 1974-1991*, Winchester: Hampshire County Council 70

Figure 3.29: Queens Enclosure, Shared space, 1989
Page 85, Weston, R (1991) *Schools of Thought: Hampshire Architecture 1974-1991*, Winchester: Hampshire County Council 70

Figure 3.30: Hampden Gurney C of E Primary School, external night view, 2002
Building Design Partnership 71

Figure 3.31: Hampden Gurney C of E Primary School, classroom, 2002
Building Design Partnership 71

Figure 3.32: Hampden Gurney C of E Primary School, section, 2002
Building Design Partnership 71

Figure 3.33: Hampden Gurney C of E Primary School, second floor, 2002
Building Design Partnership 71

Figure 4.1: Children at work, 1937
Plate 2, DES (1967) Children and their Primary Schools. A Report of the central Advisory Council for Education (England). Vol. 1: The Report. (Plowden Report), London: HMSO. 80

Figure 4.2: Children at work, 1966
Plate 3, DES (1967) Children and their Primary Schools. A Report of the central Advisory Council for Education (England). Vol. 1: The Report. (Plowden Report), London: HMSO. 80

Figure 4.3: Children at work, 1966 80
Plate 44, DES (1967) Children and their Primary Schools. A Report of the central Advisory Council for Education (England). Vol. 1: The Report. (Plowden Report), London: HMSO.

Figure 4.4: Children at work, 1966 80
Plate 19, DES (1967) Children and their Primary Schools. A Report of the central Advisory Council for Education (England). Vol. 1: The Report. (Plowden Report), London: HMSO.

Figure 4.5: Composition of base of pupil during observation sessions 82
Table 4.3, Galton, M., Hargreaves, L., Comber, C., Wall, D. and Pell, A. (1999) *Inside the Primary Classroom: 20 Years On*. London: Routledge & Keegan Paul.

Figure 4.6: Changes in audience categories 1976 –1996 83
Table 3.3, Galton, M., Hargreaves, L., Comber, C., Wall, D. and Pell, A. (1999) *Inside the Primary Classroom: 20 Years On*. London: Routledge & Keegan Paul.

Figure 4.7: The Context of pupil-teacher interaction in1996 83
Table 3.8, Galton, M., Hargreaves, L., Comber, C., Wall, D. and Pell, A. (1999) *Inside the Primary Classroom: 20 Years On*. London: Routledge & Keegan Paul.

Figure 4.8: Percentages of interaction with different audience categories 84
Table 3.9, Galton, M., Hargreaves, L., Comber, C., Wall, D. and Pell, A. (1999) *Inside the Primary Classroom: 20 Years On*. London: Routledge & Keegan Paul.

Figure 4.9: Summary: observational studies of teacher-pupil interaction 86
Figure 3.1, Galton, M., Hargreaves, L., Comber, C., Wall, D. and Pell, A. (1999) *Inside the Primary Classroom: 20 Years On*. London: Routledge & Keegan Paul.

Figure 4.10: Shoebox layout 94
Figure 2.3, Galton, M., Hargreaves, L., Comber, C., Wall, D. and Pell, A. (1999) *Inside the Primary Classroom: 20 Years On*. London: Routledge & Keegan Paul.

Figure 4.11: L-shaped layout 95
Figure 2.4, Galton, M., Hargreaves, L., Comber, C., Wall, D. and Pell, A. (1999) *Inside the Primary Classroom: 20 Years On*. London: Routledge & Keegan Paul.

Figure 4.12: Horeshoe layout 95
Figure 2.2, Galton, M., Hargreaves, L., Comber, C., Wall, D. and Pell, A. (1999) *Inside the Primary Classroom: 20 Years On*. London: Routledge & Keegan Paul.

Figure 4.13: Typical open-plan classroom showing quiet rooms 98
Figure 2, Bennett, N., Andreae, J., Hegarty, P. and Wade, B. (1980) *Open plan schools: teaching, curriculum, design,* Windsor: NFER Publishing for the Schools Council.

Figure 4.14: Typical open-plan classroom showing location of practical areas. 97
Figure 3, Bennett, N., Andreae, J., Hegarty, P. and Wade, B. (1980) *Open plan schools: teaching, curriculum, design,* Windsor: NFER Publishing for the Schools Council.

Figure 4.15: Typical open-plan classroom showing location of practical areas 98
Figure 4, Bennett, N., Andreae, J., Hegarty, P. and Wade, B. (1980) *Open plan schools: teaching, curriculum, design,* Windsor: NFER Publishing for the Schools Council.

Figure 4.16: Typical open-plan classroom showing location of practical areas 98
Figure 5a, Bennett, N., Andreae, J., Hegarty, P. and Wade, B. (1980) *Open plan schools: teaching, curriculum, design,* Windsor: NFER Publishing for the Schools Council.

Figure 6.1: Model of Research Methodologies 124
Author

Figure 7.1: Model of data analysis framework 141
Author

Figure 7.2:Summary of data collected 142
Author

Volume 2

Figure 8.1: Process of research instruments development 151
Author

Figure 8.2: Example of data from first pilot studies 152
Author

Figure 8.3: Example of data from second pilot studies 153
Author

Figure 8.4: Example of data from third pilot studies 154
Author

Figure 8.5: Examples of classroom data sheet 158
Author

Figure 9.1: Classroom Survey Questionnaire analysis 165
Author

Figure 9.2: Frequency table showing age of school buildings 166
Author

Figure 9.3: Frequency table showing number of Key Stage 2 classrooms 167
Author

Figure 9.4: Frequency table showing number of Key Stage 2 pupils 167
Author

Figure 9.5: Frequency table showing class sizes 168
Author

Figure 9.6: Frequency table showing ability to alter the layout of the classroom (Total) 169
Author

Figure 9.7: Chart showing ability to alter the layout of the classroom 169
Author

Figure 9.8: Frequency table showing teacher access to resource/storage areas (Total) Author 170

Figure 9.9: Chart showing teacher access to resource/storage areas Author 170

Figure 9.10: Frequency table showing pupil access to resource/storage areas (Total) Author 171

Figure 9.11: Chart showing pupil access to resource/storage areas Author 171

Figure 9.12: Frequency table showing access to the outside from the classroom (Total) Author 172

Figure 9.13: Chart showing access to the outside from the classroom Author 172

Figure 9.14: Frequency table showing integration of technology within the classroom (Total) Author 173

Figure 9.15: Chart showing integration of technology within the classroom Author 173

Figure 9.16: Frequency table showing access to outside the building directly from all the classrooms (Total) Author 174

Figure 9.17: Chart showing access to outside the building directly from all the classrooms Author 174

Figure 9.18: Frequency table showing designated space for belongings (Total) Author 175

Figure 9.19: Chart showing designated space for belongings Author 175

Figure 9.20: Frequency table showing coding of responses. Author 177

Figure 10.1: Observation schedules data analysis Author 186

Figure 10.2: Frequency table of age classroom and number of lessons observed Author 188

Figure 10.3: Classroom areas compared to area guidelines Author 189

Figure 10.4: Class sizes compared to national average Author 190

Figure 10.5: Frequency table of classroom/classroom density 191
Author

Figure 10.6: Classroom layouts, rows, groups and combination 192
(classrooms: C6, C14 and C8)
Author

Figure 10.7: Frequency table of classroom/layout 193
Author

Figure 10.8: Standard lesson structure (Lesson: 12) 195
Author

Figure 10.9: Dual activity lesson structure (Lesson: 31) 196
Author

Figure 10.10: Multiple activity lesson structure (Lesson: 26) 196
Author

Figure 10.11: Lesson structure variation 1 197
Author

Figure 10.12: Lesson structure variation 2 197
Author

Figure 10.13: Lesson structure variation 3 197
Author

Figure 10.14: Pupil movement between activities 198
Author

Figure 10.15: Internal distraction 200
Author

Figure 10.16: Whole-class teaching activity seated at desks 203
Author

Figure 10.17: Whole-class teaching activity seated on floor 204
Author

Figure 10.18: Pupils working with learning support staff 205
Author

Figure 10.19: Frequency table showing coding of responses 211
Author

Figure 11.1: Form and Function 230
Author

Figure 11.2: Class Organisation 233
Author

Figure 11.3: Layout 236
Author

Figure 11.4: Area Requirements 240
Author

Figure 11.5: Circulation and Accessibility 243
Author

Figure 11.6: Acoustics 247
Author

Figure 11.7: Lighting 251
Author

Figure 11.8: Heating and Ventilation 254
Author

Figure 11.9: ICT Integration 257
Author

Figure 11.10: Storage 260
Author

Figure 11.11: Furniture and Equipment 263
Author

I would like to thank all those who assisted me in the preparation of this thesis, in particular to Mark Dudek and Prof. Peter Tregenza who as my PhD supervisors have given their time and experience and enabled a deeper understanding of the classroom environment to emerge. I would also like to acknowledge the help and encouragement I have received from Ian Ward and Dr Jian Kang of Sheffield School of Architecture who commented on various aspects of my research.

I am indebted to the teachers who returned my questionnaire and in particular to those schools who allowed me to observe and learn whilst visiting their classrooms. Thanks also go to the many people who have contributed to this thesis, including friends, family and colleagues who have provided ever enthusiastic support and constructive criticism.

Finally, I am grateful for an Engineering and Physical Sciences Research Council Studentship between October 2001 and August 2003 which directly supported this project, which was undertaken at the School of Architecture, Sheffield University.

CHAPTER 1: INTRODUCTION

1.1 Prologue

I first became interested in educational buildings while an architecture student. This interest continued in practice, during which practical issues and the functional requirements often unique to these types of buildings were explored in more detail. At the same time education continued to move up the table of political priorities with unprecedented change in the education system itself, including the increasing centralisation of schools curriculum combined with the continuing cycle of new initiatives and inspections based around pledges to improve school standards at both primary and secondary level.

As part of the government's social inclusions policies it is now investing heavily in school building stock. However there is a long way to go to provide every primary school with the learning environments they deserve. At the same time educational reform has sought to increase central control of both processes and outcomes, with close monitoring and evaluation of curriculum, inspection and assessment. The challenge for the investment programme will be to provide high quality school buildings, equipped with modern facilities and the best possible environments in which to teach and learn successfully.

The initial aim of this study is to stimulate informed thinking about educational environments and it is hoped that the information gained will better inform architects of what is critical to teachers and pupils when developing new or redesigning existing classroom environments. It is hoped that it will also appeal to others interested in the development of educational environments and in current issues concerning educational buildings.

1.2 Background

In England there are approximately 4 million pupils in over one hundred and sixty thousand classes accommodated in eighteen thousand primary schools (DfES, 2003). These classrooms are densely populated spaces where teachers and pupils interact with each other in the process of teaching and learning. However, there are many differences between classrooms. Many of those built in the 1870s are still in use today, their high ceilings and high windows contrasting with classrooms built in recent decades, with an emphasis on creating an open and stimulating environment.

According to current school design guidelines most of the curriculum is taught in classbases, which is the classroom or area designated as the registration base for one class (DfES, SBDU, 2002). These non-statutory guidelines are aimed at everyone who is involved in the design of new schools or the remodelling of existing ones. The guidelines are based on a maximum pupil number of thirty and a classbase of between $54m^2$ and $63m^2$ is recommended depending on how much practical work such as art, design and technology and science is preferred to be taught in the classbase. Currently the most popular configuration is enclosed, self-contained classrooms as they allow teachers to monitor the pupils more closely and provide more autonomy and privacy. However, they may be a designated part of an open or semi-open plan arrangement. In addition, general design principles recommend natural light, ventilation and a room shape that allows for a full range of activities taking place whilst allowing for flexibility of furniture and easy supervision.

Further requirements to be accommodated in a Key Stage 2 classbase include space for whiteboard, OHP screen or similar; adequate table space for the whole class generally arranged in groups (half a table per pupil assumed); free floor space usually on a carpeted area, for gathering the whole class together and for space consuming work including large-scale construction; resources for 'dry' practical activities using the table available, such as making and testing; sink; washable floor area and resources for simple 'wet' practical activities; and two to four computer workstations depending on other ICT availability (DfES & SBDU, 2002).

The 1988 *Education Reform Act* brought the National Curriculum into this country's classrooms for the first time, the requirements of which apply to all state schools throughout England and Wales. The National Curriculum is central to policies to raise standards, setting out a clear, full and statutory entitlement to learning for all pupils, determining the content of what should be taught and the attainment targets for learning. It provides a great deal of information about what children should be doing, so clear inferences can be drawn regarding space and resources. For example the so called 'National Literacy and Numeracy Strategies' provide a practical structure of time and class management which reflects the structure of their teaching objectives. However our understanding of the links between the quality of the environment and quality of education is missing and, at a time when the connection between society and environment are generally agreed, it seems worrying that the classrooms where the next generation will learn are isolated from change, posing the question, how do

existing classroom environments respond in relation to the present National Curriculum?

Since its introduction the National Curriculum and the style of pedagogy have been adapted and re-evaluated. Understanding the design issues relating to primary school classrooms will help to improve educational environments and enhance learning possibilities. How best to design environments to support such learning needs to be considered. Curriculum activities and environmental quality constitute some of the factors that combine to create the optimal learning conditions in classroom environments. As such, understanding learning environments and their future role in education presents a complex challenge that requires serious and sustained focus.

The relationship between educational policies and architecture is unclear, and to reconcile this a number of issues must be examined, including the quality and form of existing teaching environments and how they affect teaching and learning. The environments of primary school buildings control what goes on at school. Most obviously, primary schools constrain decisions about numbers and types of classes because of the number and nature of classrooms available. The classroom is one of the most important spaces within the primary school. It is where most teaching and learning takes place, having the potential to help or hinder the delivery of the National Curriculum. The findings and recommendations of this project will provide architects, clients and users with a clearer knowledge and understanding of the specific needs of classroom environments in relation to the National Curriculum.

Therefore, the area of research is the physical environment of primary classrooms and the area of enquiry is the National Curriculum, identifying the physical attributes that enable or inhibit the delivery of the National Curriculum, thus formulating the research question: **Is it possible to design more effective primary classrooms and support the delivery of the National Curriculum by enabling the briefing process?**

1.3 Area of Enquiry

The research focuses on primary school classrooms, a very specific school environment in which teachers and pupils interact during the process of learning. The research refers to classrooms built within the existing building stock. The main body of the research refers to Key Stage 2 classrooms, which accommodates children aged between 7 and 11, in year groups 3 to 6.

1.4 Research Aims and Objectives

The main aim is to identify if it is possible to improve the design of primary classroom environments to facilitate a better delivery of the National Curriculum providing evidence in the form of a Classroom Design Brief. It is hoped that the information gained will be of interest to three main groups: teachers (the users of the classroom); Local Education Authorities or diocese (clients, that is those commissioning the projects); architects and other building professionals. In addition the research will have the following outcomes:

1. A literature review that identifies: how learning environments enable and inhibit teaching and learning; illustrates a brief historical review of today's school building stock; describes the ways in which the class and classroom are structured to facilitate teaching and learning; an analysis of the National Curriculum and how it is put into effect in the primary classroom.

2. A review of teachers' experiences of implementing the National Curriculum in classroom environments currently in use, by analysis of the data collected from the Classroom Survey Questionnaire.

3. An analysis of how existing classroom environments match current design guidelines by observing the classroom environment in use during teaching and learning activities associated with the National Curriculum.

1.5 Thesis Structure

This thesis is divided into eleven chapters that are organised according to the research sequences. Each chapter has a brief introduction and a summary.

The study begins with foundation in theory in **Chapter two,** which offers an overview of the literature in the field of learning environments, initially focusing on school environments and then on the specific issues of the design of classroom environments.

Chapter three investigates the changing forms of primary classrooms to provide an overview of the relevant design, focussing on the complex sequence of events, which have preceded architectural developments of primary classroom environments.

Chapter four is about organisation in primary classrooms, the way in which the class and classroom are structured to facilitate teaching and learning. It discusses the different aspects of organisation, providing an overview of how current practice has developed.

Chapter five is an evaluation of the current National Curriculum at Key Stage 2 and the associated teaching methodologies, focusing on developing and understanding the key ideas of the curriculum and how these are put into effect in the primary classroom.

Chapter six explains how the research questions for this study provide a structure for planning the work and the methods to be applied.

Chapter seven illustrates how the analysis developed for this research was generated for a deeper examination of the data.

Chapter eight describes the development of the research instruments used for the data collection.

Chapter nine uses quantitative and qualitative assessment methods and presents teachers' views of the classrooms in which they teach.

Chapter ten presents the classroom observations and an analysis, consisting of direct observational studies of classrooms to ascertain how the design of classroom

environments responds to users needs and pressures placed on it by the National Curriculum.

Chapter eleven concludes the thesis, with a summary of the analysis in reference to the research questions, presenting the Classroom Design Brief, illustrating how it is possible to support and improve the design of primary school classroom environments with reference to the National Curriculum. This is followed by recommendations for future research. The diagram below illustrates the research process.

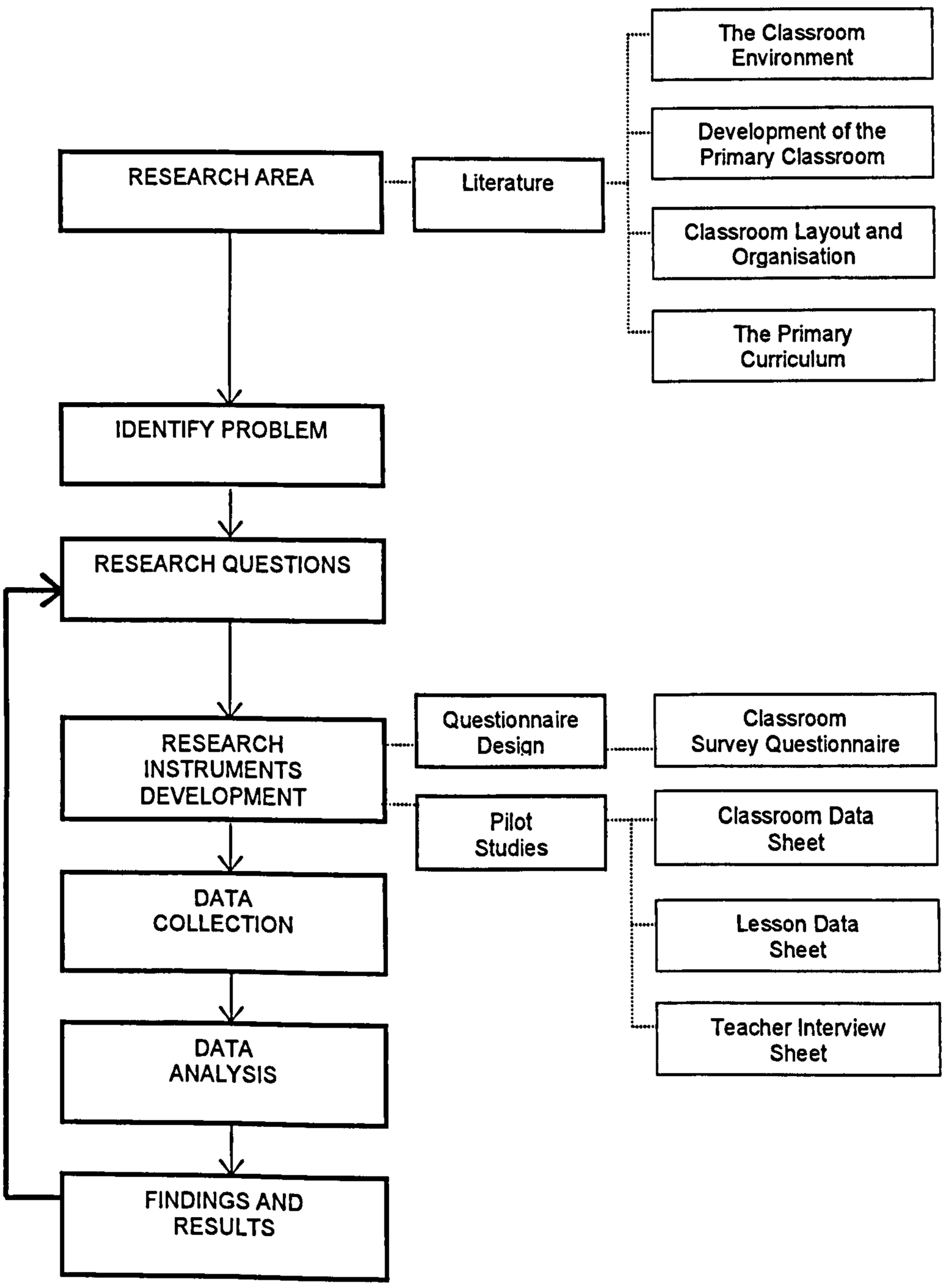


Figure 1.1: Research process

1.6 References

Department for Education and Skills (2003) *Statistics of Education: Schools in England 2003 Edition*, London: The Stationery Office.

Great Britain (1988) *Education Reform Act 1988.* London: HMSO.

CHAPTER 2: THE CLASSROOM ENVIRONMENT

2.1 Introduction

This chapter provides an overview of the current issues that are relevant to the role the physical environment plays and how learning environments can support and inhibit teaching and learning. It refers to studies from the field of educational and environmental psychology as well as literature from environment design and architectural research, focusing on the specific issues and current themes relevant to the design of primary school and more specifically classroom environments. The following diagram illustrates the structure of the literature review presented in the following four chapters.

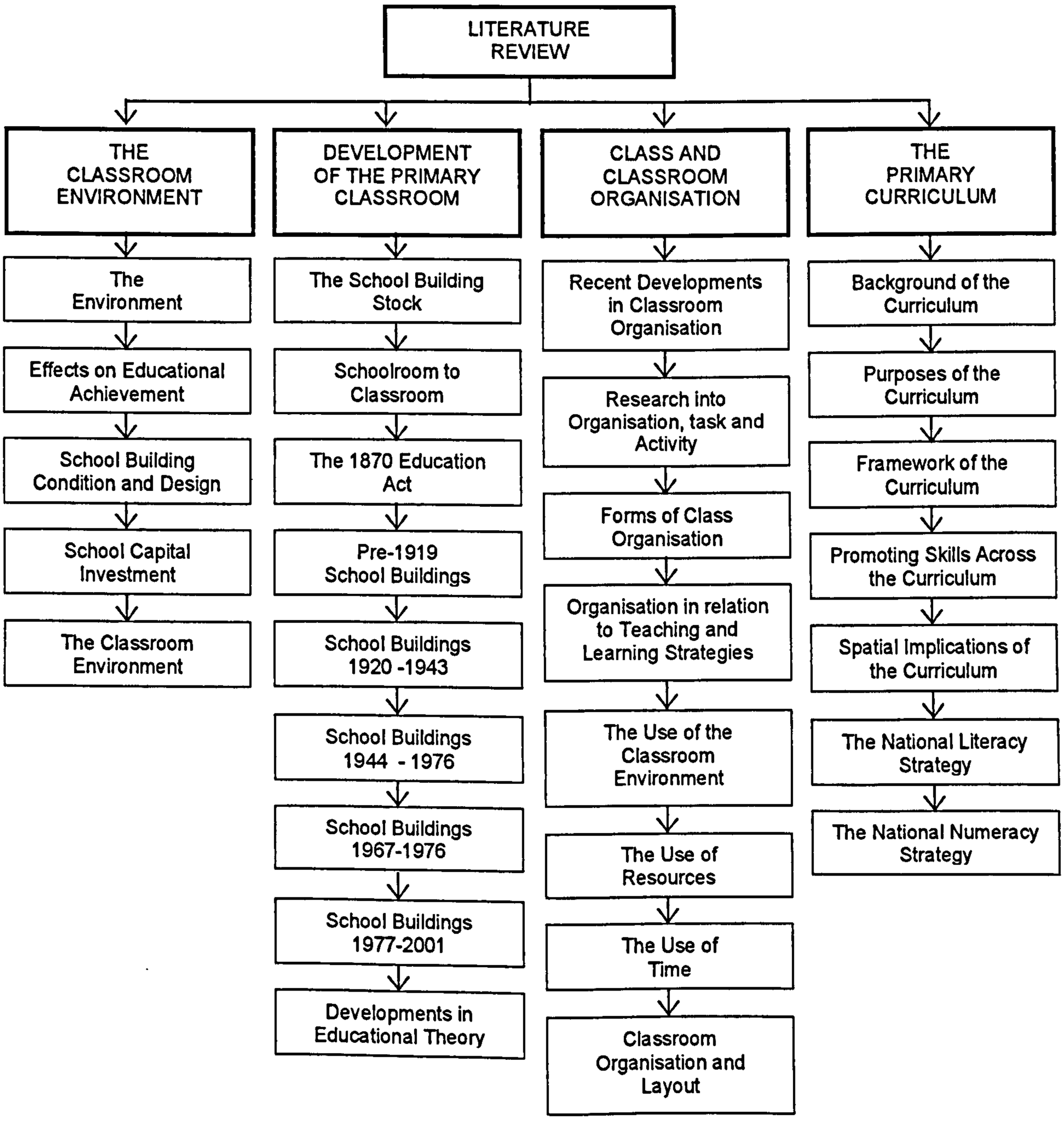


Figure 2.1: Structure of literature review

2.2 The Environment

The environment as a concept is very broad and imprecise, and understanding its role in setting of the school is challenging. In describing the environment. Rapport (1982) states:

> *'The environment can be seen as a series of relationships between things, things and people, people and people. The relationships are orderly, that is, they have a pattern and a structure – the environment is not a random assemblage of things and people any more than a culture is a random assemblage of behaviours or beliefs.'* (Rapport, 1982:178)

Another description of the environment by Steele defines it as *'the total surrounding context for the person or subject'* (Steele, 1973:6), pointing out that a subjects' environment is a combination of physical forces, including temperature, light, objects and other living things; social structure and economic forces. This study is concerned with the built or modified environment (Heimstra and Macfarling, 1978).

All built environments for children should serve certain common functions of children's development. These include the ability to foster personal identity, to encourage the development of competence, to provide opportunities for growth, to promote a sense of security and trust and allow both social interaction and privacy (Weinstein and David, 1987). However, the built environment is not to be considered the major influence on the developing child but it would appear that the development process can be influenced by characteristics of the physical setting (Weinstein and David, 1987). The research focus for this study is the primary school classroom, a very specific environment in which the teacher and the pupils interact in the process of learning.

Research dealing with the environment has attracted people from many disciplines and applied areas such as architecture and environmental design. (Hayman, 1975; Gump, 1975). A key concept for the analysis of human behaviour is the behaviour setting and behaviour settings can be defined as the basic unit of analysis of environment-behaviour interactions (Moore, 1979), with the environment being the surrounding to the behaviour and also describing an essential attribute of a behaviour setting (Barker and Gump, 1964).

Educational psychologists have been primarily concerned with how the organisational dimension effects academic achievement and performance, covering categories such as organisational development, classroom management and school climate (Rowan, 1990; Lackney, 1994).

School climate is difficult to describe and measure and definitions are often broad. The school climate has multiple dimensions encompassing organisational, environmental, social, emotional and structural elements (Frieberg, 1999) and because of this broad nature researchers cannot agree on the possibility or desirability of identifying climate (Anderson, 1982). Mortimore *et al.* (1988) refer to climates which enhance students' outcomes as 'positive' or 'productive' climates and it is hypothesised to influence student outcomes such as behaviour and satisfaction and if these influences were understood predictions of student behaviour would follow (Lackney, 1994). Anderson (1982) illustrates four groups of climate factors:

- ecology (physical and material aspects);
- milieu (characteristics of the population of the school);
- social system (relations between teachers and students);
- culture (belief systems and values)

The notion of climate has been greatly expanded through measures used to identify the disparate elements that make up the learning environment. Creemers and Reezigt (1999) focus on the role and relationship between climate factors and effectiveness factors within the framework of a school effectiveness plan, proposing that school and classroom climate factors need to be separated from effectiveness factors, such as quality of instruction to explore their influence on educational outcomes. Their model is based on Creemers (1994), in which the quality of instruction at classroom level is shown to be determined by three components: the curriculum, the grouping of procedures that are applied and the behaviour of the teacher. When all the components are lined up with each other, their effects will be reinforced. This is called the consistency principle (Creemers, 1994). In the model the school level is considered conditional for the classroom level and its influence on outcomes is mediated by the classroom factors.

Creemers and Reezigt (1999) state that educational outcomes are most strongly influenced by classroom effectiveness factors and in their model climate factors have

their own place next to the effectiveness factors. Their model includes the following set of classroom climate factors:

- the physical environment of the classroom (for example its size, its location within the school);
- the social system (relationships and interactions between students and relationships between students and their teachers);
- an orderly classroom environment (arrangement of the classroom, cosiness, functionality);
- teacher expectations about student outcomes (positive expectations, feelings and self-efficacy, professional attitude

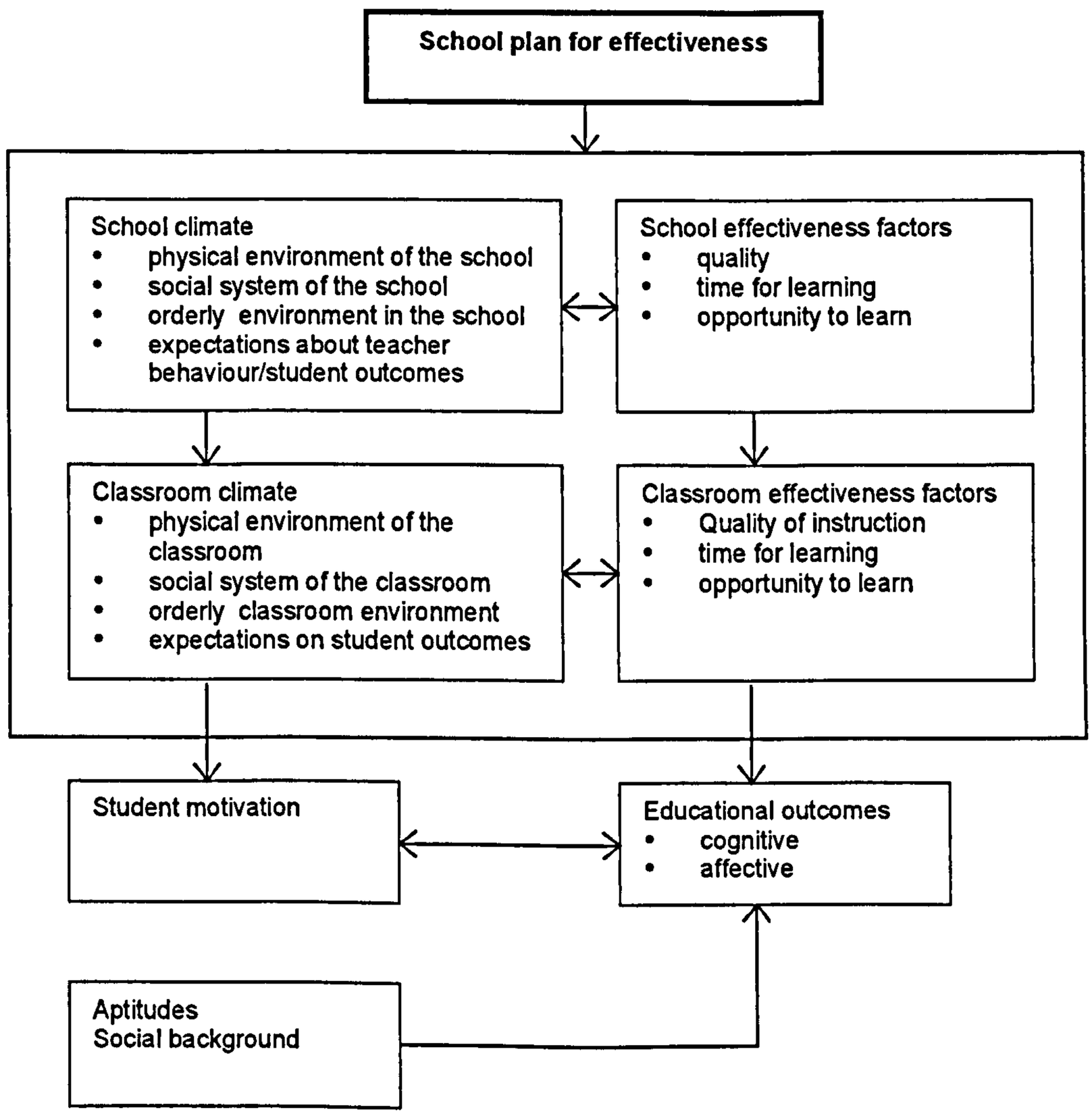


Figure 2.2: Climate factors for educational effectiveness

Environmental psychology is concerned with this relationship between people and the environment and with all the various concepts man has devised to represent space (Lee, 1976) and specifically the behaviour-environment interface (Weinstein and David, 1987). As concerns in human-environment relationships are rooted in the interplay of factors, environmental psychology has to be interdisciplinary in its research orientation. Thus it is necessary for the approach to be concerned with the concepts and concerns design professions. Concentrating on transactions between individuals and their physical setting individuals change their behaviour and the environment changes experiences. (Gifford, 1987; Heimstra and Macfarling. 1978; Lee. 1976). In this respect the field is similar to educational psychology, with the exception that empirical studies attempt to include more comprehensive sets of physical environmental variables such as classroom arrangements, seating positions and spatial density, which are discussed in more detail later in the chapter. Evidence from environmental psychology literature indicates considerable agreement among several reviewers (Gump, 1978; Lackney, 1994; Weinstein and David, 1987).

Ahrentzen (1983) suggests that the built environment may effect us directly or indirectly through the mediation of another person or object, and that environmental conditions may frustrate goals or intentions, such as social interaction or way finding. However, whilst an individual knows where he or she is and can usually describe the environmental setting, what is seldom appreciated is how the environment is being used and understanding the role of the physical environment in people's lives is a complex task (Proshansky *et al.*, 1976), especially as it leads to experiences within the environment that give rise to beliefs, feelings, attitudes and judgements In respect of the environment, schools are where people live and the quality of life of millions of children and teachers are shaped by the conditions of the school environment (Gump, 1975).

The functional components of the physical environment can facilitate or inhibit the range and quality of potential behaviours with the physical environment determining the impact on the user. The physical environment can also convey what is expected and what is acceptable, defining in the end the individual's sense of self and competence as well as how the individual is perceived by others. (Rivlin and Wolfe, 1985). The relationship between the physical learning environment on behaviour and attitudes of both teachers is well documented (Gump, 1987; McGuffy, 1982; Weinstein, 1977) and a number of studies have also examined the impact of school buildings and

educational outcomes. (Rutter *et al.,* 1979; Mortimore 1991; Mortimore 1993; Mortimore *et al.*, 1988; Maxwell, 1998).

Other studies of school buildings which have focused on concerns for the physical environment of the school have generally been limited to the enforcement of standards for room size, acoustics, lighting and heating and the physical fabric of the school building itself, resulting in the assumption that as long as these basic requirements are met, the child's learning depends in large part on pedagogical, psychological and social variables only (Weinstein, 1979).

However, over the past thirty years, neglect of the fabric of our school buildings, perhaps for political reasons, has led to a woeful lack of research linking the relationship between physical space, place and teaching and learning. (Jamieson *et al.*, 2000; Clarke, 2002). Studies rarely go beyond suggesting that at worst the built environment can undermine teaching and learning and at best has the capacity to enhance teaching and learning, but as Annesley, Horne and Cottam (2002) identify:

> *'Buildings affect people – the way they feel, experience, learn, work and relate. Buildings support particular organisational forms and operational models. They communicate messages to those who use them, and those that look at them from the outside. It is people who create buildings.' (Annesley, Horne and Cottam, 2002:6)*

This highlights a need to reassess the process of designing primary classrooms, especially from a design brief integrating users needs and functional requirements of National Curriculum teaching and learning strategies.

2.3 Effects on Educational Achievement

The role of the physical environment's influence on educational achievement has not been investigated extensively. Historically, the assumption has been that as long as the basic requirements of physical conditions are met, the pupils learning experience depends in a large part on pedagogical, psychological and social variables. Studies that have examined the impact of school buildings and educational outcomes are primarily from the United States and there is considerable evidence that the environment can affect attitudes of both teachers and students (Weinstein, 1979).

Weinstein demonstrates that a comfortable and attractive physical setting can be supportive of educational goals such as creating enthusiasm for learning and encouraging positive social relationships. However, the research concluded that physical environments of conventional classrooms have not consistently demonstrated an impact on academic achievement.

Early developments relating to educational achievement centred on the relationships between class size and academic achievement and there is considerable evidence and agreement in the research literature, that when class sizes are decreased, pupil achievements increase (Glass *et al.*, 1982 and Miner, 1992). However, class size research mainly emphasises teacher practice without addressing the physical environment. Thus the role of the physical classroom size (area) has never been explicitly addressed by the research. In addition Gump (1987) argues that class size studies have investigated reductions in the number of pupils in a classroom, without complementary increases in physical classroom size and therefore in general these studies can be considered investigations in classroom density. However, it can be generally accepted that research into class size in classrooms does suggest that the physical environment of the classroom does play an effect on achievement.

Other research on the physical environment has included the relationship between performance and particular physical characteristics, including, temperature, lighting and air quality (McGuffy, 1982). Others have compared exam performance and broad measures of building quality or building age. Maxwell (1998) provides evidence from a study that compared exam performances before and after renovations suggest that exam performance improved after renovations in schools, with performance dropping during the renovations.

Although there is some research that the quality of the built environment can have an influence on academic achievement and on particular behaviour, it is less likely to establish direct relationships between spatial features and educational outcomes than to show how physical conditions indirectly affect pupil outcomes.

2.4 School Building Condition and Design

Poor school building conditions have been shown to affect both teacher and pupils. A review of the building condition literature by McGuffy (1982) concludes that evidence

points to a positive relationship between the quality of the physical school environment and pupil performance. It is also suggested that much of this research provides valuable evidence about ways of improving aspects of design in new buildings (Earthman, 1998).

Rutter *et al.* (1979) compared the progress of over 2000 pupils in 12 secondary schools and the study asserted that the outcome between schools were not due to such physical factors as the size of the school, the age of the school building or the space available. However, it was emphasised that variations in the physical conditions of schools varied greatly and that this did prove to be related to outcomes.

In order to address the problem of unsatisfactory environments it is important to address the consequences of existing environments. Research by Cooper (1985) studied what British primary school teachers thought about the buildings in which they worked and the functions they ascribed to the physical environment in relation to the belief that the buildings influenced the education that the children received. The study offers a detailed but limited attempt to answer these questions, presenting the views expressed by teachers in ten widely differing primary school buildings in one particular education authority, concluding that the teachers investigated tended to see themselves poorly served by the physical environments in which they were asked to teach.

Research by Earthman *et al.* (1995) identified that a positive relationship exists between student behaviour and school condition. Evidence for this study was provided by analysing questionnaire responses from high school principals in North Dakota and although the study was rather limiting in scope, its findings are consistent with those summarised in Earthman and Lemaster (1996) review of research on the relationship between school buildings, student achievement and student behaviour.

Studies where positive relationships between general building condition and performance have been identified include, Bowers *et al.* (1987), Edwards (1992), Cash (1993) and further evidence can be found in more recent studies including Mortimore (1991), (1993), Mortimore *et al.* (1988) which showed that sustained periods of teacher interaction with individual pupils involving, in particular, challenging questions and feedback, were crucial determinants of pupils' progress.

It is also suggested that a depressed physical environment is believed by pupils to reflect society's lack of priority for their education and is therefore detrimental to morale, enthusiasm and effort. Additionally studies have identified a positive relationship between general building conditions and performance (Bowers *et al.*, 1987; Edwards, 1992; and Cash, 1993).

In England a review of primary schools (OFSTED, 1999) provides quantitative material about school accommodation on a national level. It was based on a random, stratified sample of 542 schools and was conducted by a small team of HMI who made visits to all the schools in the sample. The report states that:

> *The accommodation in English primary schools, in terms of its quality and its adequacy for the effective teaching of the National Curriculum, is good in less than half of the schools. As shown in Chart 39, in 1998 inspectors judged it to be good in 46 per cent of the schools inspected, they judged a similar proportion to be satisfactory, and they judged 11 per cent - one school in nine - to have unsatisfactory accommodation. Even in schools looked upon as having generally good facilities, it was rare for an inspection report not to indicate some areas of concern. For example:*
>
> *All classrooms and teaching areas are of adequate size, except the hall which is too small to accommodate the whole school for assemblies and is cramped at lunchtimes. Its small size also has a negative impact on the teaching of physical education, which is most noticeable with older pupils in gymnastic lessons.*
>
> *Weaknesses in the quantity of accommodation have the most direct impact on the subjects of the National Curriculum when there is a lack of sufficient outdoor or indoor accommodation for the teaching of physical education, and a lack of access to running water, often in "temporary" classrooms, and particularly affecting the teaching of art. Needless to say, resourceful teachers get round these problems in a range of imaginative ways. The effects of poor-quality accommodation are more insidious: leaking roofs, crumbling plaster, flaking paintwork and bleak, unpleasant outdoor play areas. Where such poor-quality accommodation is found in conjunction with routine vandalism, such as graffiti, broken windows or damage to school grounds, the adverse effects on morale and the drive to raise standards can be considerable. It may be beyond the reach of a school to tackle some of these issues, particularly those requiring a change of direction in the local community or*

> *capital investment on a large scale. Where these features of poor accommodation are present, inspection reports make depressing reading'.* (OFSTED, 1999: ch.5.8)

The neglect of school buildings corresponds with a lack of educational research into their use. Investigation into the physical attributes of learning environments as a variable influencing outcomes has been largely ignored in favour of research into pedagogical, psychological and social variables (Clark, 2002). Although the previous two sections mainly focused on non-achievement behaviour, the findings strongly suggest the physical environment plays an indirect role in educational achievement. However, generally the position that the physical environment has been neglected and that it warrants attention of educators equal to other strategies for improving the effectiveness of education can be discerned.

2.5 School Capital Investment

After a prolonged period of what has generally been acknowledged as insufficient investment in school buildings (DfEE, 2000) increased funding is now being provided through Private Finance Initiatives for investment in school buildings (School Works, 2001). The UK now has the largest schools capital investment programme for over thirty years, with central government investing £3.5 billion annually which will rise to £7 billion a year by 2005-06. The new approach to capital investment aims to replace or renew all secondary schools over the next 10 to 15 years. Primary schools too will benefit, with the funding available to primary schools estimated to be 25 per cent higher in 2005/06 than in 2002/03. The investment will result in a large number of schools being modernized, rebuilt or substantially refurbished with much of this work being delivered via the Private Finance Initiative (DfES, 2003a).

Following OFSTED reports that as many as one in five schools had accommodation so unsatisfactory that the successful teaching of the curriculum was affected, the Schools Capital and Building Branch of the Department for Education and Employment commissioned a research project on the influence of capital investment in school buildings on pupil performance (DfES, 2001). The reports evidence analysis provides some evidence of a positive and statistically significant relationship between capital investment and pupil performance. However the estimated relationship between capital and performance was not universally positive, nor universally significant, with good

teaching and learning taking place in schools with a good physical environment, with general attitudes behaviour and relationships between pupils and staff being more conducive to learning in those schools which had significant capital investment. A subsequent report (DFES, 2003b) provides evidence of the importance of the learning environment, stating that:

> *'The evidence suggests that in many cases capital investment on its own is nor enough to raise standards significantly. Rather improvements in buildings are likely to be most effective when they are part of a broader package of measures aimed at enhancing the overall quality of the learning environment, physical social and intellectual.'* (DfES, 2003b:para. 3.23)

To summarise, the impact of capital investment on pupil achievement varies. From studies that have found a broad and positive relationship, referring to specific design features of schools and the overall quality of school buildings, to economic studies that provide rather ambiguous evidence with respect to the impact of capital spending on performance.

2.6 The Classroom Environment

The primary classroom is the environment in which the pupils experience the curriculum, develop and learn, but it is also the social and cultural environment. Through initial observations it was accepted that the typical primary classroom has one teacher and thirty or so children and classroom assistants depending upon children's educational needs. A study by Adams and Biddle (1970) noted that some change in activity happened once every five to eighteen seconds and point out that communication is always present, either by talking or writing, or through gestures like the raising of the arm. It has also been stated that the classroom environment is a direct expression of the educational philosophy and it plays an active part in the educational process (Proshansky and Wolfe, 1975).

Walter Doyle's work is concerned with a rich description of complex classroom environments, Analysing classrooms as having attributes of multidimensionality, simultaneity and unpredictability Doyle (1977) argues that a deeper understanding of teaching and learning processes can occur if the environments for teaching and learning are fully described as a first stage in the search for understanding. So, in order

to understand the architectural implications of teaching and learning in classrooms it is essential to understand the environment for teaching and learning. In order to understand that environment, it is in turn necessary to have a manageable research tool that can encapsulate the processes within the classroom. Moos (1979) it points out that the:

> *'Architectural characteristics of the classroom can affect social climate directly (classes with moveable walls facilitate innovation), or indirectly through their effect on organizational characteristics (open plan classes facilitate team teaching, which may lead to higher teacher support), teacher characteristics (interpersonally orientated teachers are more likely to select open plan classes and to support supportive climates), and student characteristics (students who need less personal space and a less structured physical milieu may select open plan classes and facilitate the creation of innovative learning environments).'* (Moos, 1979:160)

This is presented as a simplified model of the interrelationships among the five sets of classroom characteristics and their relationship to the overall institutional context. The model is simplified because a unidirectional casual flow is depicted, even though the sets of factors influence each other.

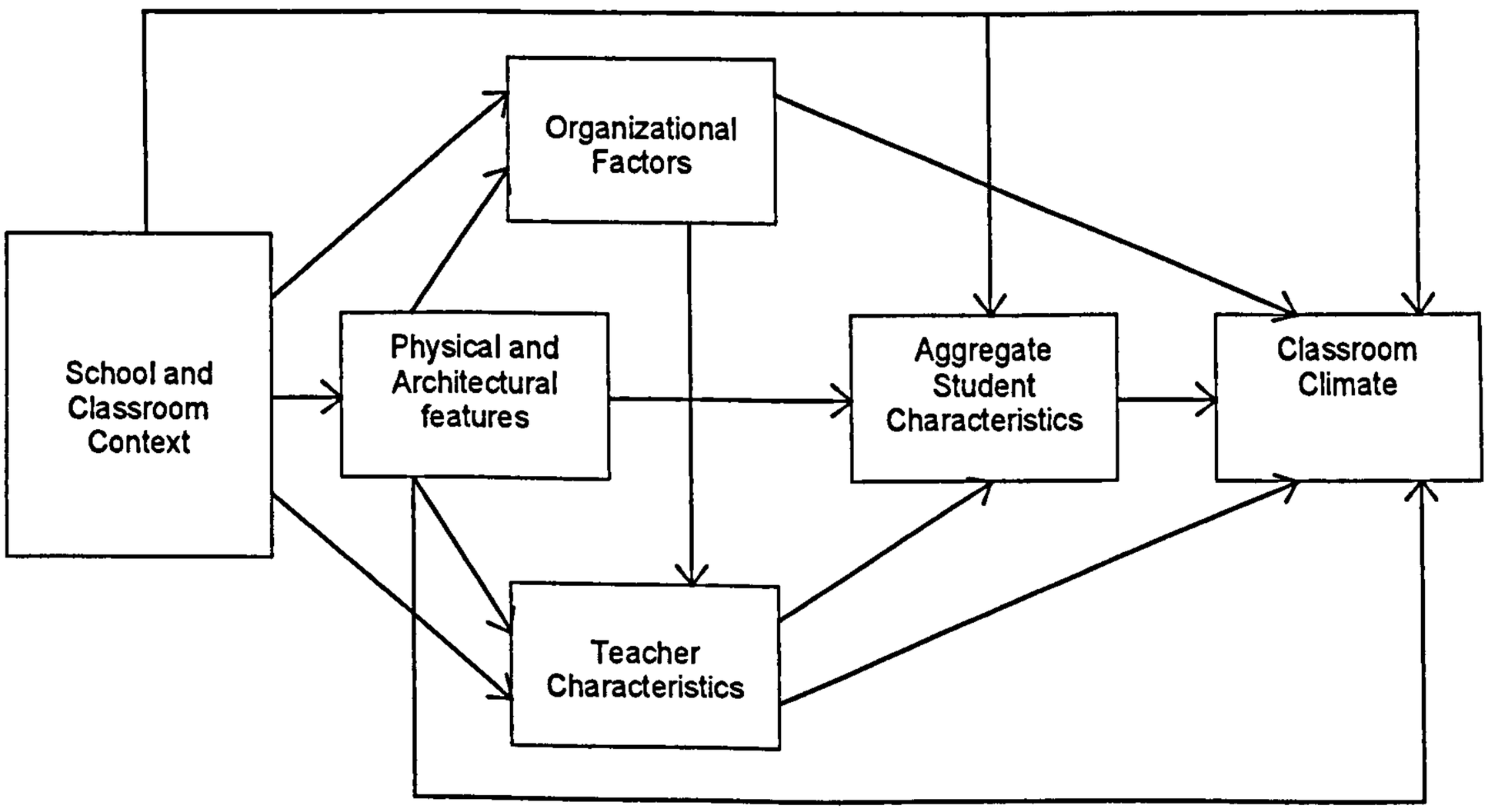


Figure 2.3: A model of determinants of classroom climate

In describing the environment of the classroom Wragg *et al.* (1976) states that:

> *'Teacher's and children spend their time in environments which are subdivided by boundaries such as walls and cupboards into inner regions or sub-environments, and extend across various areas of school space and throughout the time of the school day. For example, a morning in a British primary school might begin with classes in a short registration period (9:00-9:15), and an all-school assembly might follow. By 9:30 all the children are back in their own areas where a work period takes place in which two or more separate areas devoted to particular subject matters become established. This first work period may come to a close around 10:40; milk may be may be served during a short break, after which the pattern of the earlier part of the morning may be repeated; the children may have switched areas but teaching and learning activity in the areas remains constant. During the work periods, the teacher may help individuals and small groups but not spend much time teaching the class as a whole. However shortly before the noon dismissal, the teacher might read a story or lead some other total group activity'* (Wragg, 1976:59).

Research has focused primarily on pupil behaviour in various aspects of the classroom environment, such as classroom furniture arrangement (Rivlin and Rothenberg, 1976), spatial density (Gump, 1978; Weinstein, 1979), privacy (Moos, 1979; Weinstein, 1979) windowless classrooms (Weinstein, 1979), noise and acoustics (Weinstein, 1979) and thermal comfort (Humphreys, 1978). Gill (1977) demonstrates that behaviour can be determined by the function and condition of the physical environment within which the behaviour takes place, claiming that behaviour reflects its physical surroundings, but it is the individual teacher who has the greatest effect on the pupil, with the variables influencing behaviour being: Size, shape and arrangement of rooms and passageways; number and size of windows and doors; arrangement of furniture; interior illumination; temperature; noise; odour and colour. Additionally an attractive and stimulating environment can be achieved by the use of high quality display which enhances and excites work in progress, as well as recording and celebrating completed studies and increasing self-esteem (OFSTED, 1993). This visual improvement can partially overcome deficiencies in accommodation (OFSTED, 1999).

Existing research implies that the quality of the environment can have a significant effect on pupil behaviour and motivation (Wheeler, 1995, Earthman, 1998 and Brighouse & Woods, 1999). Such research reinforces the view, which is commonly

expressed by teachers, that the environment in a primary school classroom should be aesthetically pleasing, should stimulate children's interests, should set high standards in the display and presentation of the children's work, and should be created in such a way that it is practical to maintain (Clegg and Billington, 1994).

Traditionally classroom arrangements were territorial with space organised by individual desks or functional relating to specific activities. Lackney and Weinstein report the open-plan classroom as a milestone in the history of classroom design, constituting the first major architectural departure from the conventional school plan with orderly rows and desks (Lackney, 1994; Weinstein, 1979). However, despite the reflective accounts of classrooms in the 1960s and 1970s much of the research is framed within the historic debate between traditional and open-plan classroom arrangements.

Loughlin and Suina (1982) point out that there are two major interacting elements in a classroom that either strengthen or limit the environment's contribution to education. The first of these is the *architectural facility*, which is the beginning of the learning environment that forms the framework in which the teacher will establish the *arranged environment.*

2.6.1 Form and Function

The main constituents of the primary school classroom are the room itself, the pupils, teacher and any classroom assistants present. Bull and Solity (1987) consider that all aspects of the classroom environment should encourage teaching and learning and the desired behaviour of children. The authors describe a 'talking classroom' that works for and not against the teacher. They ascertain that the arrangement of the room and the materials in situ can set the scene for appropriate behaviour. They divide the classroom into physical elements of visual, auditory, thermal and spatial and organisational elements of fixtures, fittings, furniture and storage.

Functional arrangements can include clearly defining interest areas and locating interest areas in areas of the room that support that specific activity, separating incompatible activities such as, providing clearly defined pathways between areas, making materials easily accessible, and providing a variety of spatial options for privacy, as well as small group or large group work (Weinstein, 1981). In functional

arrangements, the physical space is divided into specific activity areas, which is typically used for small groups of pupils engaged in a variety of different activities. Well defined activity areas can have a positive influence on social interaction and behaviour (Moore, 1986) Research on functional arrangements suggests that spatial arrangements can have an influence on young children's, activities and social interactions.

As previously stated there were mixed results regarding the impact of open classrooms as physical learning environments and review as on the physical environment of conventional classrooms has not demonstrated any significant impact on academic achievement. However, various features including, classroom arrangement, class size, open-plan versus traditional, noise and lighting have been investigated, with only limited evidence supporting relationships between these features and student achievement.

Classrooms are both physical and organisational units and the physical characteristics influence both behaviour and educational programmes (Rivlin and Weinstein, 1984). Additionally the classroom cannot be understood without understanding each component of the system (Gump, 1987; Rivlin and Rothenberg, 1976). This is extremely important as the degree of communication between architects and teachers can affect the way in which the space emerges. This becomes critical when learning spaces have not been designed to allow the teacher to use a variety of teaching and learning methods, or when the teacher tries to adopt a particular method for which the space has not been designed (Smith, 1974).

2.6.2 Function and Flexibility

Walter Doyle (1977) suggests six characteristics of the classroom setting. First, classrooms are characterised by multidimensionality and must be able to accommodate a number of activities. Second, many of these activities take place simultaneously within the classroom. Third, is the rapid pace at which things happen within the classroom environment. Fourth, is the unpredictability of the classroom with events not always being anticipated. Fifth is the lack of privacy. The sixth is that classes within the classroom environment construct a joint history, remembering past events, both positive and negative.

Weinstein (1987) and Weinstein and Mignano (2003) discuss the many ways in which the design of the physical environment of the classroom can facilitate or hinder the activity and social interaction, providing many examples of how the physical environment in primary schools and preschool settings can enhance children's self-esteem, self-control, pro-social behaviour, gender identity, symbolic expression, logical thinking, creativity and problem-solving abilities, attention span and task involvement.

Steele (1973) suggests that physical settings serve six basic functions: Security and shelter, social contact, symbolic identification, task instrumentality, pleasure and growth. Weinstein and Mignano (2003) use these functions as a framework for thinking about the physical environment of the classroom. Security and shelter is the most fundamental function of all built environments, a characteristic which must be satisfied before the classroom environment serves pupils' and teachers' other needs. Grouping of tables promotes social contact between pupils; they can work collaboratively on tasks and activities, share resources and have small group discussions.

On the other hand, rows of desks make it easier for pupils to concentrate on individual activities (Bennett and Blundell, 1983; Wheldall and Lam, 1987). This view is supported by Hastings and Schwieso (1995) who found a marked increase in pupils' average time on task, from 48.0% to 78.5%. A number of studies have also found that in classrooms where desks are arranged in rows, the teacher interacts mostly with pupils seated in the front and centre of the classroom, and pupils seated here participate more in class discussions and initiate more questions and comments (Adams and Biddle, 1970).

Steele's fourth function relates to the information provided by the classroom setting about the users of the setting, the key questions being: what does the classroom tell us about the pupils, the teacher, their interests, activities, backgrounds, accomplishments and preferences. Task instrumentality or function concerns the ways the environment facilitates the tasks and activities that need to be accomplished. Given the amount of time that teachers and pupils spend in their classroom, the fifth is worth thinking about ways to create a pleasing environment.

The final function, growth, relates to the classroom environment being able to foster children's growth by stimulating their interests in certain items, such as books. Psychologists have found that the opportunity to explore rich stimulating environments is related to cognitive growth. However, it is less obvious how they can be designed to

foster growth, as growth refers to a number of areas, including increasing pupil self-confidence, learning to co-operate as well as ways in which the environment can promote pupils cognitive development.

The literature suggests that there are a number of contradictions of the classroom environment: classrooms are crowded, yet pupils are often not allowed to interact, pupils are encouraged to co-operate, yet they often work on an individual basis.

2.6.3 Size and Scale

Class size means the number of pupils per teacher whereas classroom size is the physical area of the classroom. As mentioned previously class size research has concerned itself predominantly with the question of how important class size is as a factor influencing pupil's educational attainment. Yet while it seems that class size is an important factor influencing the effectiveness of teaching in helping pupils learn, class size research has been unable to provide clear evidence to endorse these views. The observational data indicated that smaller class sizes resulted in fewer problems of control. Galton *et al.* (1996) findings supported the following conclusions, that in smaller classes there is, more time spent on task, more sustained interactions, more high order questioning of pupils, more feedback of work, less time spent on routine supervision, less time exercising classroom control and less time given over to housekeeping (sorting out papers, handing out books etc). However, these did not seem to be of a magnitude, which might be expected to produce dramatic differences in pupils attainment. Similar evidence from Blatchford and Mortimore (1998) suggests that class size is not likely to influence educational attainment except through the mediating effects of what happens in the classroom. The evidence suggests that teachers with smaller classes do not achieve more progress with their pupils because they do not organise their classes sufficiently differently form when they teach large ones.

It has been acknowledged that this distribution is a coincidence of history rather than a calculated decision and that the size of a present day classroom approximates to the size of nineteenth century classrooms (Schletchy, 1990) and Blatchford and Martin (1994) suggest that this ambiguity and inconsistency in class size research evidence has enabled politicians to select those particular findings that support their preferred policy.

The earliest evidence of classroom size was found in *Planning and Fitting Up Public Elementary Schools* (1887) that states the minimum classroom size for 60 children to be 270 square feet. This changed little until *The Standards for School Premises Regulations* (1959) in which area is defined not by classroom but for the whole school depending on the number of pupils and the age group. That implies that provided every classroom in a school shall comprise an area of not less than 200 square feet for the first ten pupils, or part thereof after, for which the classroom is designed and 15 square feet per pupil thereafter. In 1996 the school premises regulations (DfEE, 1996) cut out any requirement for minimum teaching areas. However *Area Guidelines for Schools* (1996) suggest and area range of between 54 m^2 and 63 m^2. The Revised Area Guidelines (DfES & SBDU, 2002) that are non-statutory are based on a maximum pupil number of 30 for which it is suggested that depending on how much practical work is preferred in the classbase (classroom) and how much in specialist practical areas should also range of between 54 m^2 and 63 m^2.

Scale is also considered to be an important aspect that affects the nature of the experience of the environment (Rivlin and Weinstein, 1984) and as the teacher and the children have different requirements the architect must be aware of the different scale of requirements. Rivlin and Weinstein also point out that only a limited amount of research has focussed on children's issues relating to density. However it can be ascertained that high density may effect learning situations where the activity involves physical movement around the classroom or when learning depends on a particular resource that pupils have to interact with. Later analysis of primary and secondary school classrooms has revealed interesting repetitive patterns of movement, showing that there was a clear relationship between mobility and density. The data showed that the more densely packed a classroom, the more a teacher tends to move (Horne Martin, 2002).

2.6.4 Arrangement and Layout

Environmental psychologists point out that the effects of the classroom can be both direct and indirect (Proshansky & Wolfe, 1974). For example, if pupils are seated in straight rows and are unable to carry on a class discussion because they can't hear one another, the environment is directly hindering their participation. Pupils may also be affected indirectly if they infer from the seating arrangement that the teacher does not really want them to interact. With classroom arrangements remaining unchanged

despite changes in teaching and learning strategies as a result the curriculum and the classroom environment in which the curriculum is delivered are often in conflict with each other hindering both teaching and learning. In addition many teachers and administrators tend to focus on pedagogical and interpersonal issues, ignoring the physical environment in which the teaching and learning process occurs. (Weinstein, 1981).

As with workspace the idea of open plan environments has also filtered into the design of schools. It would appear that similar problems have ensued with teachers generally responding negatively to the reduced privacy. Studies have shown that both students and teachers report more disruptive noise in open classrooms (Brunetti, 1972; Rivlin & Rothenburg, 1976). In contrast a study comparing open plan versus traditional classrooms in New Zealand found no difference in behaviour or performance (Gill, 1977) this study did not however measure either teacher or student satisfaction. Arguments for open plan classrooms tend to hinge on economic issues in that they are cheaper to build and more flexible to furnish. There seems to be no real evidence for their educational benefit. Given that open plan classrooms exist, some researchers have looked at how they can be made more satisfying and effective.

It is believed that the design and the arrangement of classroom space and furniture are both factors in implementing educational change (Gump, 1987; Proshansky and Wolfe, 1975). Weistein (1977) demonstrated how behavioural goals might be achieved through structured manipulation of the physical layout and Evans and Lovell (1979) suggest that the physical layout can be manipulated to demarcate territories and provide areas of privacy for teachers. As with open plan offices, the design must allow control over access and maintain a balance between interaction and privacy. Adams and Biddle (1970) identified subsections of the classroom by subject matter by studying arithmetic and social study lessons. Using these samples of classroom operations, the investigators established a number of interesting results. For example in both kind of lessons, the extent to which the pupils interact with the teacher is very closely related to where they sit. Several seats across the front of the room and several more down the center account for the large majority of teacher/pupil interaction.

Both the physical and spatial aspects of learning environments communicate a symbolic message of what is expected to happen in a particular space, with the environmental experiences of childhood always being influential (Weinstein and David,

1987). Spatial organisation is the arranging furniture to create spaces for learning activities within the classroom environment, both for individual learning and in partnership with the teacher. However, spatial organisation requires a clear perception of the classroom space, and even when teachers can visualise the space clearly, they may have difficulty considering new ideas about spatial organisation, having always thought about the room arrangement in certain traditional ways (Loughlin and Suina, 1982:32).

Yet, teachers sometimes do not realise that certain behaviours occur in the classroom as a result of how the classroom is arranged (Proshansky and Wolfe, 1975). Loughlin and Suina (1982) state the teachers can use the spatial organisation to design settings that stimulate children's work. However, an examination of the distribution of furniture and activity in elementary (primary) schools found that the physical layout of the classroom remained quiet stable over the course of the year. This suggests that although teachers were free to make changes, these were often not made and given the physical limitations of the classroom, the teacher faces the problem for providing for variety and flexibility (Proshansky and Wolfe, 1975).

Thus the classroom is more than an enabling factor in terms of effectiveness of the learning space. It does not create the ideal learning space but it enables or disables the teacher in their approach to create it. Dick (1997) observes that the ultimate success of a learning space depends far more on what the teacher does with the room itself James Dyke (1994) in his article *The case of the L-Shaped Classroom* argues that the conventional classroom shape is far from ideal. He states that after much research, the conclusion must be that the form of the classroom has a considerable effect upon effective learning. He draws the analogy between former times when the most public facilities were planned to prepare children for a life in the factory. As such, the schoolroom itself was viewed as a kind of factory for the receipt of knowledge. Hence the children sat in serried ranks. In recent times, although the overall form of school buildings has changed, with the addition of common areas, gardens, assembly halls etc., the classroom form itself has remained unchanged. His lists of pre-requisites for modern classrooms are as follows:

> *'It has to accommodate the formation and functioning of small learning groups while providing a sense of separation, because groups working too closely together will experience distractions and non-productive interaction.*

It has to be flexible enough to allow the continual reorganization of the whole class into various sizes and numbers of small learning groups. This means the space must be as free as possible of permanent obstructions.

It has to manageable by a single teacher who has command of the entire space. This means the space must be compact and open.' (Dyke 1994: 45)

It was found that the modern classroom has competing requirements: distances and separation on the one hand; compactness and flexibility on the other. While the squat rectangle does well on compactness and flexibility, it does poorly on distance and separation. The challenge is therefore is to find a shape that meets both requirements.

Arrangements and layouts affect the social interaction of both teachers and students (Gifford, 1987). Loughlin and Suina (1982) suggest that teachers see spaces in different ways and when furniture is placed in a classroom, the appearance is affected in terms of available space. For instance placing chairs in a circle instead of rows makes it clear that some form of interaction such as discussion is involved (Gump, 1987). Loughlin and Suina (1982) state that different people will use a space in more than one way at different times. In this respect there cannot be one ideal arrangement, even for a single classroom, as it always needs to deal with changing needs and changing people. Activity areas are influenced by relations to paths (Gump, 1987). The way the classroom is structured determines the paths or routes through it. These in turn influence traffic and movement, which in turn influences which areas are most frequently used. Furniture can be useful in defining work areas and paths and movement is a normal accompaniment to learning experiences of children. Circulation patterns surrounding activities encourage fluid traffic patterns and encourage children to access what is available (Moore and Lackney, 1995; Loughlin and Suina, 1982). Contrastingly confusing circulation patterns can create unnecessary chaos and disorganisation (Moore and Lackney, 1994).

2.6.5 Noise and Acoustics

Gifford (1987) found evidence that suggests that noise levels can interfere with learning by hindering performance by interfering with information processing and by increasing blood pressure and excessive noise has been shown to an adverse effect on reading comprehension and memory (Ledford, 1981; Silverstone, 1981). Comfortable noise levels in learning environments should be maintained between 40dB and 50 dB. At 60 dB the learning environment becomes noisy and above that level it begins to interfere with communication (Silverstone, 1981). In addition teachers suggest that it may adversely influence educational activities. (Zentall, 1983; Gump, 1970; Wohlwill and Heft, 1991).

Factors in the classroom that contribute to the stimulation of noise include the difficulty of the activity being performed and the density of the classroom (Zentell, 1983). Activities within the classroom have been found to contribute to the ambient sound level, although teachers typically control noise from internal sources (Wohlwill and Heft, 1991). However it has been reported that an acoustically dead classroom is nearly as bad for some purposes as a noisy one. Noise in learning environments can originate from within as well as outside the school buildings and both these sources of noise can have major effects on student behaviour and achievement. Noise can interfere with the teaching and learning process, by decreasing teaching time due to teachers continuously pausing or by making it difficult for the pupil and the teacher to hear one another (Crook & Langdon, 1974). Noisy classrooms reduce the clarity regarding tasks and therefore pupil performance (Dejoy, 1984). Because of poor acoustics and high levels of background noise, children with perfectly normal hearing are often unable to make out what is being said in class. Good acoustic conditions benefit both hearing and hearing-impaired children of all ages in all school environments.

Noise is part of the general environment, and in the home has been shown to have a detrimental effect on child development in areas such as language acquisition and attention (Wachs, Uzgiris & McHunt, 1971) and reading ability (Cohen, Glass & Singer, 1973). Noise effects on communication in schools are indicated from two main sources. Firstly, hearing impaired children have difficulty coping with the school environment (May and Brackett, 1987). Secondly, it seems that noisy classrooms reduce clarity regarding tasks and therefore reduce pupil performance. (Dejoy, 1984).

Building Bulletin 93: Acoustic Design of Schools (2001) which is in compliance with requirement E4 of schedule 1 to the Building Regulations 2000 explains that each room and other space in a school building shall be designed and constructed in such a way that they have the acoustic conditions and the insulation against disturbance by noise appropriate to its normal use. This is supported by a similar statement in *The Education (School Premises) Regulations* (1999), stating that:

> *'Each room or other space in a building shall have the acoustic conditions and the insulation against disturbance by noise appropriate to its normal use.'* (DfES, 1999:para. 76)

The biggest ever survey of classroom acoustics reveals that primary school children in three London boroughs are regularly subjected to noise that exceeds World Health Organisation guidelines. Data from noise surveys, analysis of Standard Assessment Tests results, children's reports and experimental studies provide converging evidence that noise levels influence children's performance and can negatively impact on their attainments. Over 2,000 children aged 7 and 10 were surveyed to establish how disruptive the noise was in their classroom. For the first time, the data were compared with different types of acoustic measurements undertaken in the schools. The results indicate that noise levels influence children's performance and can adversely affect national test results.

2.6.6 Lighting

One of the most critical physical characteristics of the classroom is lighting. The importance of an appropriate visual environment for learning tasks requires careful consideration. The visual environment affects a learner's ability to perceive visual stimuli and affects his/her mental attitude, and thus, performance. Classroom lighting plays a particularly critical role because of the direct relationship between good lighting and student's performance. Hathaway and Fielder (1986) found that light is a key to the general well being of people confined to a physical facility a great portion of the day. Blackwell (1963) observed that the eyeball is not damaged structurally by bad lighting, either insufficient quantity or poor quality. He also found that the effectiveness of information collection is reduced in bad light. Seeing in bad light can lead to the development of ineffective programming of the information collection process. Bad lighting leads to discomfort.

The importance of lighting was recognised in the first statutory building regulations made under section 10 of the *1944 Education Act* (DES, 1967) This act pointed out that low quality lighting led to poor work, slower reading, more mistakes in writing and a larger number of accidents and breakages. Physically insufficient lighting could cause eye problems and behaviourally pupils and staff. The amount of light in a classroom is determined by natural and artificial light (Bull and Solity, 1987) and the colour scheme (DES, 1969). Lighting creates an atmosphere and is therefore one of the main elements of a successful school building (DES, 1967). A space can be considered to have adequate daylighting if it has an average daylight factor of 4–5% and a uniform ratio of 0.3 – 0.4. Key factors in achieving this are glazing, ceiling height and depth of space (DfES, 2001). Efficient design strategies are primarily directed at achieving the highest level of usability in a given situation with the minimum use of energy. An approach to good lighting design that architects should adopt so that the client may fully understand what they are likely to get from a lighting system is illustrated in the *CIBSE Code for interior lighting (2002).*

The recommended background lighting levels given in *Building Bulletin 90* are 300 lux in general teaching spaces and 500 lux for teaching spaces with close and detailed work, such as art rooms and design and technology spaces. The *CIBSE Code for interior Lighting* (2002) provides an extensive list of illuminances for various areas and tasks. Daylighting provides illumination across the entire colour spectrum, but change in content over the day. Artificial light sources vary in their spectral content, and should be carefully selected for their colour characteristics.

Good daylighting is an important consideration in all school buildings. Evidence on the effect of lighting comes from two sources, natural lighting effects and artificial lighting in school buildings. Cohen and Trostle's (1990) study, showed children's preferences for brighter lighting. Hathaway (1994) carried out a two year long study of 327 American fourth grade students under four lighting conditions. Students under full spectrum fluorescent lamps with ultraviolet supplements showed fewer dental cavities, better attendance, higher achievement, and better overall growth and development. Students in the high-pressure sodium vapour lighting condition did worst on all measures. Kuller and Lindstein (1992) assessed children in classroom conditions with no direct access to windows and daylight, with windows and direct access to daylight, fluorescent lighting which mimics the effect of daylighting, and normal white fluorescent lighting. They found that access to direct daylight and daylight fluorescent lighting had a

positive effect on stress hormones compared to the other two conditions. Another study, by King and Marans (1979) noted several research reports showing that florescent lighting increased hyperactivity among children compared with the use of full spectrum or incandescent lighting.

2.6.7 Temperature and Ventilation

Climate factors such as temperature humidity and air movement all have impacts on academic achievement and task performance, attention spans and levels of discomfort (King & Marans, 1979). However the only real information relating to classroom air temperature and ventilation comes from *The Education School Premises Regulations (1999)* that prescribe certain standards:

> *'Each room or other space in a school building must have a system of heating which is appropriate to its normal use.'* (DfES, 1999: para. 79)

With areas where there is a normal level of physical activity, such as classrooms being 18 ºC. As long as the minimum requirements are met it seems that there not been much interest in this area.

2.7 Summary

This chapter provides considerable evidence regarding the complex range of school and classroom functions, highlighting that the physical environment of the classroom can affect behaviours, interactions, attainment and attitudes of both the teachers and pupils.

Like all physical environments the classrooms serve a variety of functions, the most obvious function being to educate by providing a setting for teaching and learning. Despite this there has been surprisingly little research on this in the United Kingdom which mirrors the general neglect of physical environments in education over the last 25 years (Jamieson *et al.*, 2000; Clarke, 2002). However, although the much of the literature cited in this chapter dates from the 1960s to the 1980s, it reveals considerable agreement that the effects of the built environment can be both direct and indirect (Ahrentzen, 1983; Gump, 1978) facilitating or inhibiting the range and quality of potential behaviours, whilst illustrating the difficulty of appreciating how the physical environment is being used (Gump, 1975; Proshansky *et al.*, 1976).

It was during the 1970s that pedagogy began to be incorporated into architectural theory (Doyle, 1977; Proshansky and Wolfe, 1975; Moos, 1976; Wragg *et al.*, 1976). Providing evidence that the physical environment of a classroom is an important aspect of teaching and learning that should be planned for as systematically as other aspects of teaching, discussing the many ways in which the design of the physical environment of the classroom can facilitate or hinder the activity and social interactions. (Weinstein, 1987; Weinstein, 1992).

The primary classroom is an important environment since it is where most time is spent. However, historically the assumption has been as long as school buildings meet the minimum standards such as classroom size, acoustics and lighting the pupils' learning depends on pedagogical, psychological variables (Weinstein, 1979). There is now a greater indication of interest in the relationship between the physical environment of classrooms that is re-confirmed by more current literature (Clarke, 2002), which also offers the most relevant principles for classroom organisation, showing how teachers organise their classrooms (Moll *et al.*, 1996).

As result it can be assumed that primary classrooms need to be organised in ways that are most appropriate for supporting the learning activities that have been planned. It

can be acknowledged that the primary classroom comes into being as a result of many issues and constraints (Annesley, Horne and Cottam, 2002), however, a study of the whole range of concerns relating to the classroom environment would be an unmanageable task. Although this chapter has illustrated some of these issues the prime concern of this study is the physical environment of the primary classroom prompting a greater understanding of the physical attributes that can most effectively support teaching and learning.

In order to understand the function of the primary classroom there is a need to identify how primary classrooms have developed architecturally (Chapter three), appreciate how class and classrooms are organised (Chapter four) and review and reflect on the primary curriculum taught in today's classrooms.

2.8 References

Adams, R. S. and Biddle, B. J. (1970) *Realities of teaching – Exploration with Videotape*, New York: Holt, Rinehart and Winston.

Ahrentzen, S. (1983) *Children and the Built Environment: an Annotated Bibliography of Representative Research of Children and Housing, School Design and Environmental Stress*, Monticello, Ill: Vance Bibliographies: Architecture Series, A 764, 31-52.

Anderson, C. S. (1982) 'The search for school climate: A review of research', review of Educational Research, 52, 3, 368-420.

Annesley, H., Horne, M., and Wright, S. (2002) *Learning Buildings*, London: School Works Ltd.

Barker, R. G. and Gump, p. V. (1964) *Big School, Small School*, Stanford CA, Stanford University Press.

Bennett, N. and Blundell, D. (1983) Quantity and quality of work in rows and classroom groups, *Educational Psychology*, 3, 93-105.

Blackwell, H. R. (1963). A general quantitative method for evaluating the visual significance of reflected glare utilizing visual performance data. Illuminating Engineering, 58, 61.

Blatchford, P. and Martin, C. (1998) The Effects of Class Size on classroom Processes; it's abit like a treadmill- working and getting nowhere fast. British Journal of Educational Studies. 46, 2, 118-137.

Blatchford, P. and Mortimore, P. (1994) The Issue of Class Size for Young Children in Schools: what can we learn from the research? *Oxford Review of Education*, 20, 4, 473-498.

Bowers, D. E.. Howard, D. and Burkett, A. (1987). 'Physical Environment and Student Achievement.' *Environment and Behaviour*, 29, 7, 133-150.

Brighouse, T. and Woods, D. (1999) *How to Improve Your School*. London: Routledge.

Brunetti, F.A. (1972). Noise distraction and privacy in conventional and open school environments. in W.J. Mitchell (Ed.), Environmental design: research and practice. LA: University of California press.

Bull, S, and Solity, J. (1987) *Classroom Management: Principles to Practice*, Kent: Croom Helm.

Cash, C. (1993). 'A Study of the Relationship Between School Building Condition and Student Achievement and Behaviour.' Unpublished Doctoral dissertation, Blacksburg, VA. Virginia Polytechnic Institute and State University.

CIBSE (2002) Code for interior lighting. London: Chartered Institution of Building services Engineers.

Clark, H (2002) *Building Education: The role of the physical environment in enhancing teaching and research,* University of London: Institute of Education.

Clegg, D. and Billington, S. (1994) *The Effective primary Classroom: Management and Organisation of Teaching and Learning*. London: David Fulton.

Cohen, S., Glass, D.C., & Singer, J.E. (1973) Apartment noise, auditory discrimination and reading ability in children. *Journal of Experimental Social Psychology*, 9, 407-422.

Cohen, S., & Trostle, S.L (1990). Young children's preferences for school-related physical environmental setting characteristics. *Environment and Behaviour*, 2296), 753-766.

Cooper, I. (1985). Teacher's Assessments of Primary School Buildings: the role of the physical environment in education, *British Educational Research Journal*. 11 (3), 253-269.

Creemers, B. P. M. (1994) *The Effective Classroom*, London: Cassell.

Creemers, B. P. M. and Reezigt, G. J. (1999) *The Role of School and Classroom Climate in Elementary School Learning Environments,* in H. J. Freiberg, (1999) *School Climate: measuring, Improving and Sustaining Healthy Learning Environments*, London: Falmer Press.

Crook, M. A. & Langdon, F. J. (1974) The effects of aircraft noise in schools around London Airport. *Sound and Vibration,* 34, 221-232.

DES (1967) *Lighting in Schools: Building Bulletin 33*, London, HMSO.

DES (1969) *Colour in school buildings: Building Bulletin 9*, London, HMSO.

DfEE (1999) *Building Bulletin 90: Lighting Design for Schools,* London: The Stationery Office.

DfEE (2000) Schools get spending in pre-budget statement, Press release, Nov. 2000.

DfES (2001) *Building Bulletin 95: Schools for the Future, Designs for learning communities,* London: The Stationery Office.

DfES (2001) *Building Performance: an empirical assessment of the relationship between schools capital investment and pupil performance, Research Report 242,* London: The Stationery Office.

DfES (2003a) *Building schools for the future, consultation on a new approach to capital investment,* London: The Stationery Office.

DfES (2003b) *Building better Performance: an empirical assessment of the learning and other impacts of schools capital investment, Research Report 407,* London: The Stationery Office.

DfEE/ABB (1996) *Building Bulletin 82: Area Guidelines for Schools*, London: HMSO.

DfES and SBDU (2002) *Building Bulletin 82 Revision: Revised area Guidelines for Schools*, (online), available from: www.teachernet.gov.uk/management
[Accessed November 2002]

DfES and SBDU (2003) *Building Bulletin 93: Acoustic Design in Schools, (online),* www.teachernet.gov.uk/Acoustics
[Accessed September 2003]

Dejoy, D.M. (1984) The non-auditory effects of noise: Review and perspectives for research. *Journal of Auditory Research*, 24(2), 123-150.

Department for Education and Employment/Architects Building Branch (1996) *Building Bulletin 82: Area Guidelines for Schools*, London: HMSO.

Dick, J. (1997) *The Learner-Centered Environment Using the Fat L Shaped Classroom*, Paper presented at the Environmental Design Research Association Conference 28 in Montreal-Canada, 7-11 July, 1997.

Doyle, W. (1977). Learning the classroom environment: an ecological analysis. *Journal of Teacher Education*. 28 (6) 51-55.

Dyke, J. A. (1994) The Case of the L-Shaped Classroom, *Principal*, 11, 41-45.

Earthman, G.I. (1998). 'The Impact of School Building Condition and Student Achievement and Behaviour.' Presented at the OECD Conference on the Appraisal of Educational Investment, Luxembourg, November 1998.

Earthman, G. I, Cash, C. S. and Van Eerkum, D. (1995) *A State Study of Student Achievement and Behaviour and School Building Condition*, EDRS Availability.

Earthman, G. I. and Lemasters, L. (1996) *Review of Research on the relationship between School Buildings, student Achievement and Student Behaviour*, EDRS Availability.

Edwards, M. M. (1992). 'Building Conditions, Parental Involvement and Student Achievement in the D.C. Public School System.' unpublished Master's Thesis, Georgetown University, Washington D.C.

Education Department (1887) *Planning and Fitting Up Public Elementary Schools*, London: HMSO.

Evans, G. W. and Lovell, B. (1979). Design modification in an open-plan school, *Journal of Educational Psychology*, 57(6), 994-999.

Freiberg, H. J. (1999) *School Climate: Measuring, Improving and Sustaining Healthy Learning Environments*, London: Falmer Press.

Galton., M, Hargreaves, L. and Pell, A. (1996) *Class Size, Teaching and Pupil Achievement*: Research commissioned by the National Union of Teachers.[online] School of Education, University of Leicester, (online), available from: http://brs.leeds.ac.uk/~beiwww/beid.html [Accessed June 2001]

Gifford, R. (1987) *Environmental Psychology – Principles and Practice*, Newton MA: Allyn and Bacon.

Gill, W. M. (1977) Classroom Architecture and Classroom behaviours: a look at the change to Open-Plan Schools in new Zealand, *New Zealand Journal of Educational Studies*, 12, 1, 3-16.

Glass, G. V., Cahen, L. S., Smith, M. L. and Filby, N. N. (1982) *School class size: Research and Policy*, Beverly Hills, CA: Sage.

Great Britain (1999) *The Education (School Premises) Regulations 1999*. London: The Stationery Office.

Gump, P. V. (1975) *Ecological Psychology and Children*, Chicago: The University of Chicago Press.

Gump, P. V. (1975) *Operating Environments in schools of Open and traditional Design*, in T. G. David and B, D. Wright (Eds.) *Learning Environments*, Chicago: The University of Chicago Press, pp.49-67.

Gump, P. (1978) *School and Classroom Environments*, in I. Altman and J. F. Wolhill. (Eds.) *Handbook of Environmental Psychology*, New York: Plenum Press, pp. 131-174.

Gump, P. V. (1987) *School and Classroom Environments*, in D. Stockols and I. Altman (Eds.) *Handbook of Environmental Psychology*, USA: Wiley-Interscience Publications, pp. 691-732.

Hastings , N. and Schwieso, J. (1995) Tasks and tables: The effects of seating arrangements on task engagement in primary schools. *Educational Research*, 37 (3), 279-291.

Hathaway, W.E. (1994). Non-visual effects of classroom lighting on children, *Educational Facility Planner*, 32(3), 12-16.

Hathaway, W.E. & Fielder, D.R. (1986). *A window on the future: A view of education and educational facilities*. Columbus, Ohio: Paper presented at the meeting of the Council of Educational Facility Planners.

Hayman, J. L. (1975) *System theory and human Organization: An Introduction*, in S. D. Zalantino and P. J. Sleeman (Eds.) *A System Approach to Learning Environments*, USA: Medd Projects, pp. 2-28.

Heimstra, N. W. and Macfarling, L. H. (1978) *Environmental Psychology*, CA: Wadsworth Publishing Company.

Horne Martin, S. (2002) The Classroom Environment and its Effects on the Practice of Teachers, *Journal of Environmental Psychology*, 22, 139-156.

Humphreys, M. A. (1978) *A study of thermal comfort in primary school children in summer*, Building Research Establishment Current Paper, 17, Garston, Watford.

Jamieson, P., Fisher, K., Gilding, T., Taylor, P. and Trevitt, C. (2000) Places and spaces in the design of new learning environments. *Higher Education Research and Development*, 19, 2, 221-37.

Kuller, R., & Lindsten, C. (1992). Health of behaviour of children in classrooms with and without windows. *Journal of Environmental Psychology*, 12(4), 305-317.

King, J. & Marans, R.W. (1979). The physical environment and learning process. (Report No. 320-ST2). Ann Arbor: University of Michigan Architectural Research Laboratory.

Lackney, J. A. (1994) *Educational Facilities: The Impact and Role of the Physical Environment of the School on Teaching, Learning and Educational Outcomes*, University of Wisconsin-Milwaukee, Milwaukee: Publications in Architecture and Urban Planning.

Lee, T. (1976) *Psychology and the Environment*, Bungay Methuen & Co Ltd.

Ledford, B. (1981) *Interior design: Impact on Learning Achievement*, in P. J. Sleeman and D. M. Rockwell (Eds.) *Designing Learning Environments*, New York: Longman, pp. 160-173

Loughlin, C. E. and Suina, J. H. (1982) *The Learning Environment: an Instructional Strategy*, New York: Teacher College Press.

Maxwell, L.E. (1998). *School Building Renovation and Student Performance: One District's Experience.* Paper presented at CEPFI Annual Conference, Vancouver, B.C.

May, J., & Brackett, D. (1987) *Adapting the classroom environment. Hearing rehabilitation Quarterly*, 12(2).

McGuffy, C.W. (1982*). Facilities*, in W. Herbert (Ed), *Improving Educational Standards and Productivity*, Berkely, CA: McCutchan.

Miner, B. (1992) Student learn best in small classes: Teneeses study follows 6500 children for four years, *Rethinking Schools*, Jan/Feb, 6 (2), 15.

Moore, G. T. (1979) *Environment-Behaviour Studies*, in J. C. Snyder and A. J. Catanese (Eds.) *Introduction to Architecture*, New York: McGraw Hill.

Moore, G. T. (1986) Effects of Spatial Definition of Behaviour Settings on Children's behaviour: a Quasi-Experimental Field Study, *Journal of Environmental Psychology*, 6, 205-231.

Moore, G. T. and Lackney, J. A. (1994) *Eduactional Facilities in the Twenty-First Century: Research Analysis and Design Patterns*, Wisconsin-Milwalkee: University of Wisconsin-Milwalkee.

Moos, R. (1979) *Evaluating educational environments*, New York: Jossey-Bass.
Mortimore, P. (1991). *The Nature and Findings of Research on School Effectiveness in the Primary Sector*, in Riddel, S. and Brown, S. (Eds), *School Effectiveness Research: Its Messages for School Improvement*, Edinburgh, HMSO.

Mortimore, P. (1993). 'School Effectiveness and the Management of Effective Learning and Teaching.' *School Effectiveness and School Improvement*, 4, 4, 290-310.

Mortimore, P., Sammons, P., Stoll, L., Lewis, D. and Ecob, R. (1988). *School Matters.* Somerset, Open Books.

OFSTED (1993) *Well managed classes in Primary Schools: Case studies of six teachers*, London: HMSO.

OFSTED (1999) *A review of primary schools in England 1994-1998*. London: HMSO.

Proshansky, E. and Wolfe, M. (1975) *The Physical Setting and Open Education*, in T. G. David and B. D. Wright (Eds.) *Learning Environments*, The University of Chicago Press: Chicago, pp. 31-48

Proshansky, H. M., Ittelson, W, H. and Rivlin, I. G. (Eds.) (1976) *Environmental Psychology: People and their Physical Setting,* Holt, Rinehart and Winston: New York.

Rapport, A. (1982) The meaning of the built environment, CA: Sage Publications.

Rivlin, L.G.,& Rothenburg, M. (1976). *The use of space in the open classrooms*, in H.M. Proshansky, W.H. Ittelson, & L.G. Rivlin (Eds.), *Environmental psychology: People and their physical settings*, New York; Holt, Rinehart & Winston

Rivlin. L. G. and Weinstein, C. S. (1984) Educational Issues, School Settings, and Environmental Psychology, *Journal of Environmental Psychology*, 4, 347-364.

Rivlin, I. G. and Wolfe, M. (1985) *Institutional Settings in Children's Lives*, New York: Whiley-Interscience Publication.

Rowan, B. (1990) Commitment and control: Alternative strategies for the organizational design of schools. *Review of research in education*, Washington D. C: American Architectural Research Association, pp. 353-389.

Rutter, M., Maughan, B., Mortimore, P., Ouston, J. and Smith, A. (1979). *Fifteen Thousand Hours.* London, Open Books.

School Works (2001) *Why School Works?.* Schoolworks.

Schlechtly, P. C. (1990) *Schools for the Twenty-First Century*, Oxford: Jossey-Bass Publishers

Smith, P. (1974) *The Designing of Learning Spaces*, Council for Educational Technology: London.

Statutory Instruments (1959) *The Standards for School Premises Regulations 1959*, London: HMSO.

Steele, F. I. (1973) *Physical settings and organization development*, Reading, MA: Addison-Wesley.

Silverstone, D. M. (1981) *Considerations for Listening and Noise Distractions*, in P. J. Sleeman and D. M. Rockwell (Eds.) *Designing Learning Environments*, New York: Longman, pp. 75-86.
Taylor, A (1998) *Programming and designing learning environments for the 21st century*, Conference Report, Committee of Architecture and Education, San Fransisco.

The Building Regulations (2000) Approved Document E – Resistance to the Passage of Sound. London: The Stationery Office

Wachs, T.D., Uzgiris, J. C., & McHunt, J. (1971) Cognitive development in infants of different age levels and from different environmental backgrounds. *Merrill-Palmer Quarterly of Behaviour Development*, 17, 288-317.

Weinstein, C. S. (1977) Modifying student behaviour in an open classroom through changes in the physical design. *American Education research Journal*, 14, 249-262.

Weinstein, C. S. (1979) The physical environment of the school: a review of research, *Review of Educational Research,* 49 (4), 577-610.

Weinstein, C. S. (1981) Classroom design as an external condition for learning, *Educational Technology,* 8, 12-19.

Weinstein, C. S. and David, T. G. (1987) *Spaces for Children – The Built Environment and Child Development*, New York: Plenum Press.

Weinstein, C. S. and Mignano, A. J. (2003) *Elementary Classroom Management: Lessons from Research and Practice* (3rd ed.), McGraw-Hill: New York.

Wheeler, S. (1995) 'The right environment', *Research in Education*, 52 (3), 3-9.

Wheldall, K. and Lam, Y. Y. (1987) Rows versus tables. II. The effects of two classroom seating arrangements on classroom disruption rate, on-task behaviour, and teacher behaviour in three special school classes. *Educational psychology*, 74 (4), 303-312.

Wohlwill, J. and Heft, H. (1991) The Physical Environment and the development of the Child, in D. Stotols and I. Altman (Eds.) Handbook of Environmental Psychology, Wiley-Interscience Publication, USA, pp. 281-328.

Wragg, E., Oates, J., and Gump, P. (1976) *Classroom Interaction*. Milton Keynes: The Open University Press.

Zentall, S. S. (1983) Learning Environments: A review of physical and temporal factors, *Exceptional Education Quarterly*, 4, 90-115

CHAPTER 3: DEVELOPMENT OF THE PRIMARY CLASSROOM

3.1 Introduction

Classrooms in use today but built at various times in the past were all designed with certain educational and architectural aims in mind. This chapter investigates the changing forms of primary classrooms to provide an overview of the relevant design, focussing on the complex sequence of events, which have preceded architectural developments of primary classroom environments.

3.2 The School Building Stock

In the 1960s it was estimated that nearly three quarters of a million primary school children in England were being educated in schools of which the main school buildings were built before 1875 (DES, 1967:389). Today there are 4,065,042 pupils attending 17,985 primary schools in England (DfES, 2002). The current building stock still contains many Victorian schools over a hundred years old. There are also a large number of schools from the 1930's and a lot of system built schools from the 1950s and 1960s when pupil numbers expanded rapidly. There are also a relatively small proportion of modern school buildings built in the last 15 years (Beeton, 1999).

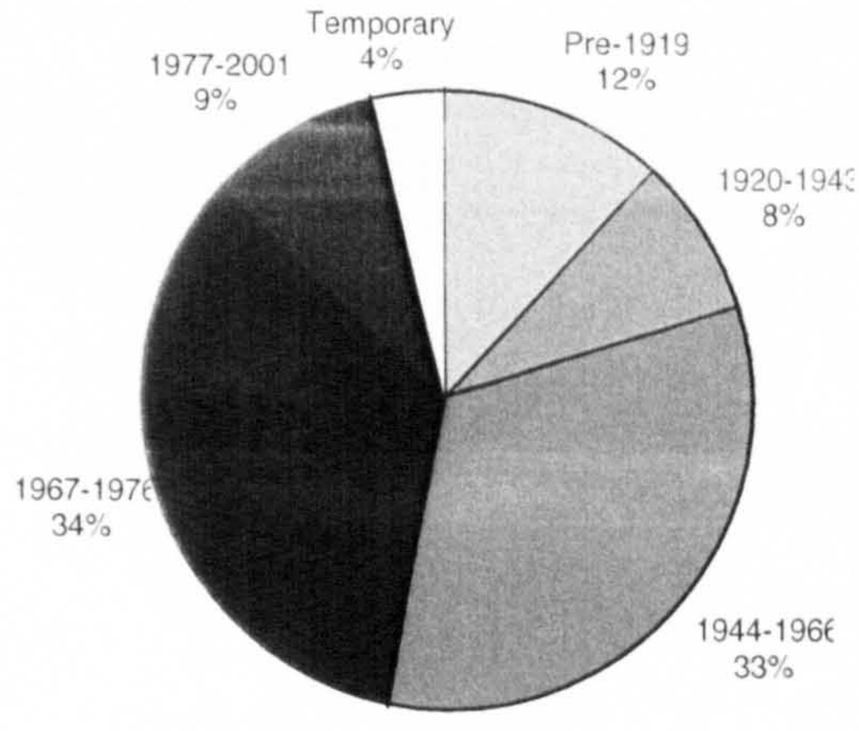


Figure 3.1: Age of existing schools building stock

Generally, the issue of deteriorating school buildings infrastructure has been constantly pushed down the educational agenda and the neglect of school buildings has corresponded with a lack of educational research into their use. A prolonged period of what has generally been acknowledged to be insufficient investment in the sector's capital stock has meant that school buildings are ageing rapidly, with the majority of

these school buildings being at or past the end of their 30-40 year life span envisaged when they were built, which in turn has led to problems regarding the quality and adequacy of teaching environments.

3.3 Schoolroom to Classroom

In the mid-nineteenth century schools were planned simply and dominated by the single schoolroom where children of all ages would be educated. Galleries and tiered seating were often used to raise the children so they could watch demonstrations. Often different age groups of children would be taught simultaneously inside the schoolroom. There were seats for the children but few desks as writing was rarely required. Schoolrooms were rectangular, as this was convenient in terms of planning the buildings, and allowing light and ventilation into each of the rooms, and were appropriate for the style of teaching that was popular at that time.

In 1856 Robert Scott Burns produced a booklet entitled *The Arrangement, Construction and Fittings in Schoolhouses* in which he made the connection between well arranged and healthy constructed classrooms and improvements in housing for the poor, which he believed, were important aids to higher moral and social civilisation. Burns suggested orientating the schoolroom north-south, with pupils facing north towards the teacher with a blank wall behind him, to help in the understanding of the orientation of maps as well as avoiding glare.

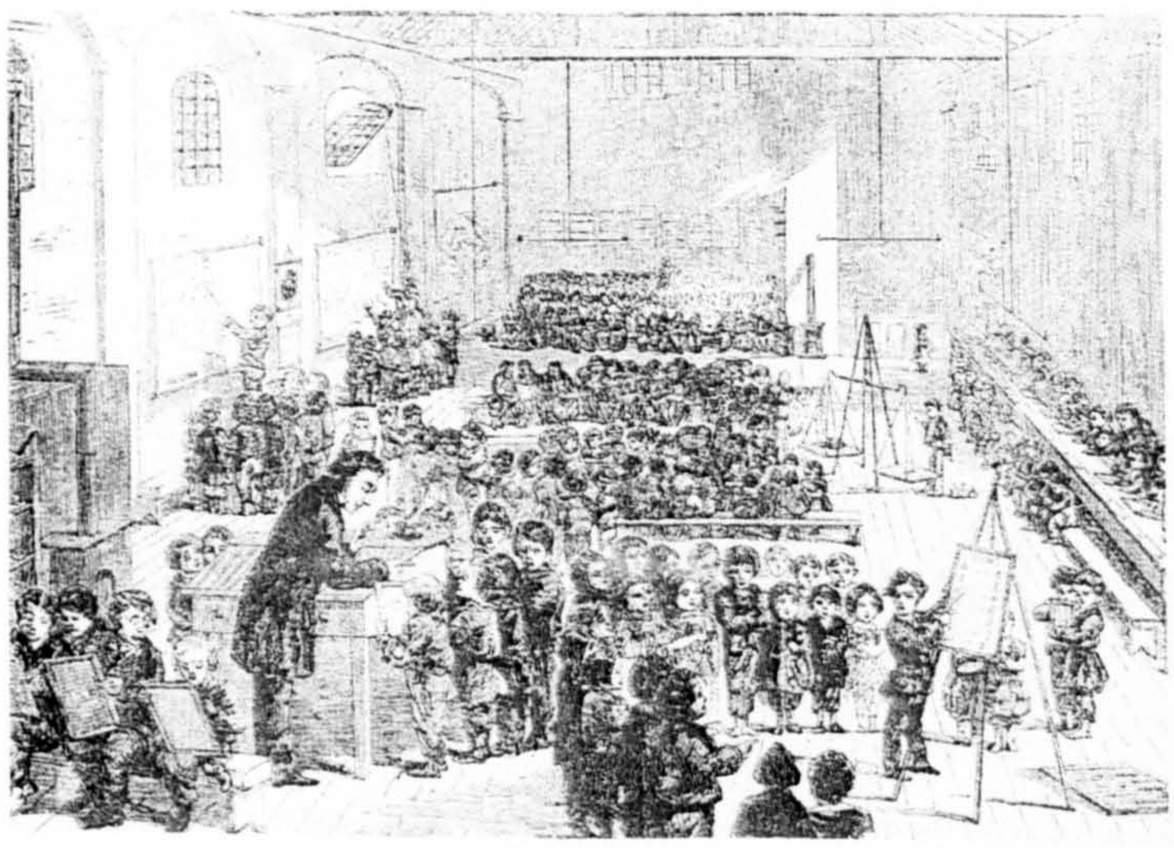


Figure 3.2: A typical schoolroom in Whitechapel, East London

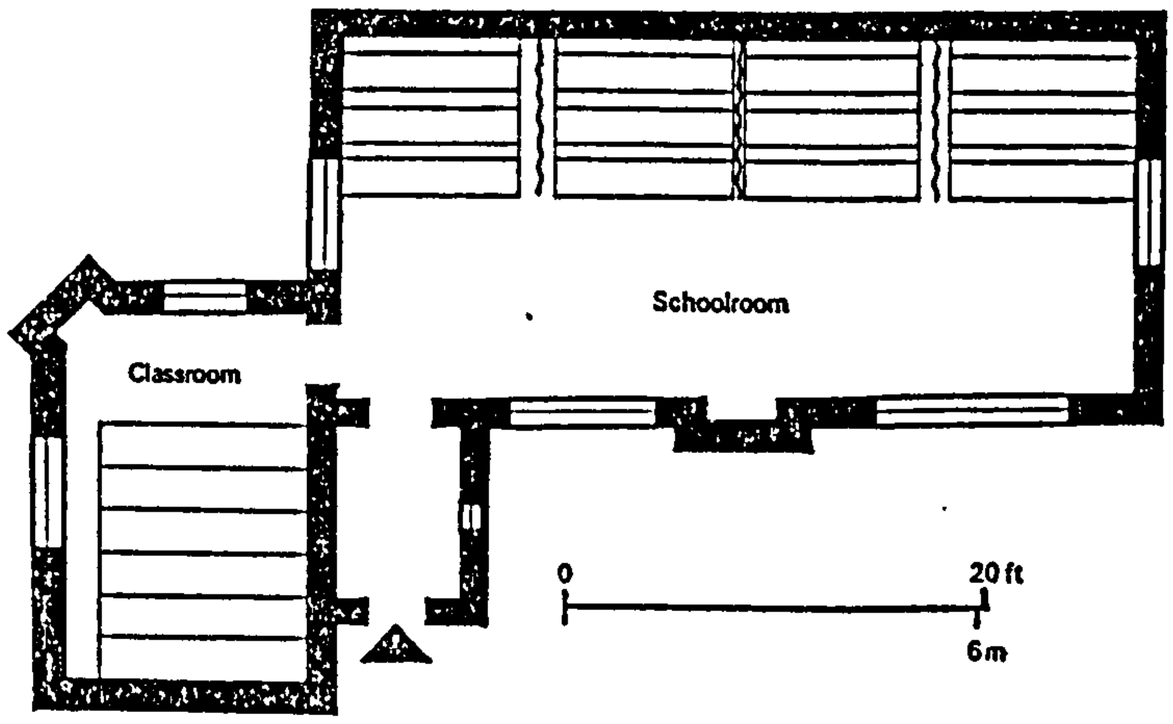


Figure 3.3: Plan of school showing layout suggested in 1851 by the Committee of Council on Education

The building illustrated above is typical of the period, consisting of an oblong schoolroom with three rows of desks arranged along one side of the room, and with each class separated from the next by a curtain. The two-room school buildings which were recommended by the Committee of Council on Education accommodated children in four classes which were taken by pupil-teachers and when the master or mistress wished to address the whole school the curtains would be pulled back to the wall. Variations on this plan were widely adopted in the second half of the nineteenth century (Seaborne, 1971).

3.4 The 1870 Education Act

The English government remained reluctant to help the poor and the majority of working class children remained uneducated. England lagged behind other countries in Europe who introduced state education systems at the beginning of the nineteenth century. England maintained the right until 1870 that elementary schooling should be provided by voluntary religious and charitable organisations. The 1870 *Education Act* marked a significant turning point in state participation in Education. It attempted to ensure a minimum standard of education for everyone. It was brought about by the need for a more educated workforce and finally overcame opposition by religious groups, who had hindered educational development at this time over disagreements of the form of educational instruction in schools. It also made the provision of education necessary for all those for whom efficient and suitable provision did not already exist. Where elementary schools in sufficient number and size were not already provided by voluntary agencies the deficiency had to be met by a school board elected for that purpose, thus for the first time laying down the foundations for nationwide schooling.

In addition, it provided for the creation of School Boards, which could set up new Board Schools in areas where existing voluntary provision was insufficient. This marked a significant turning point in state participation in education. However, it did not abolish the voluntary system, but allowed it to remain, with help from Government Grants, alongside the schools erected by the School Boards.

3.5 Pre-1919 School Buildings

In the early years of the twentieth century schools were seen to be dignified buildings in which children could be educated. Classrooms were generally rectangular, as this was convenient in terms of planning the buildings, and allowing light and ventilation into each of the classrooms. The teacher stood at the front of the classroom, and pupils were encouraged to look straight ahead, and ignore everyone but the teacher. Social and educational experiments were founded upon the idea of the perfectibility of humanity through the planning and arrangement of the built environment under a benign regime. The idea of the perfectibility of the school environment in line with teaching and learning theories has long been held. Felix Clay in his preface to the 1902 edition of Modern School Buildings suggests that the *'perfect school of the future'* will one day be planned (Clay, 1902 p.vi). The form of the classroom was rigid, providing little motivation. Gradually increasing importance was placed on the internal environment. The child was originally seen as a *'cognitively empty organism'* and in the early period of the twentieth century school buildings were not seen as a vehicle for architectural experiment (Seaborne, 1971).

> *'The main tendency was to increase the number of classrooms along the sides of a central corridor, which gradually widened to become the hall used for general assemblies and for teaching two or more classes.'*(Seaborne, 1971:26).

The typical school of this period consisted of a large classroom with one or two smaller classrooms leading off from the main room. The younger children often had the privilege of being in one of the smaller classrooms whilst the older children used the main room. The main room housed several classes and also served as an assembly hall. These rooms were usually arranged to give an entire system of benches and desks facing in one direction towards the master. They were however sometimes planned with benches and desks placed in groups or rows down both walls, and the scholars then face each other from opposite sides of the room.

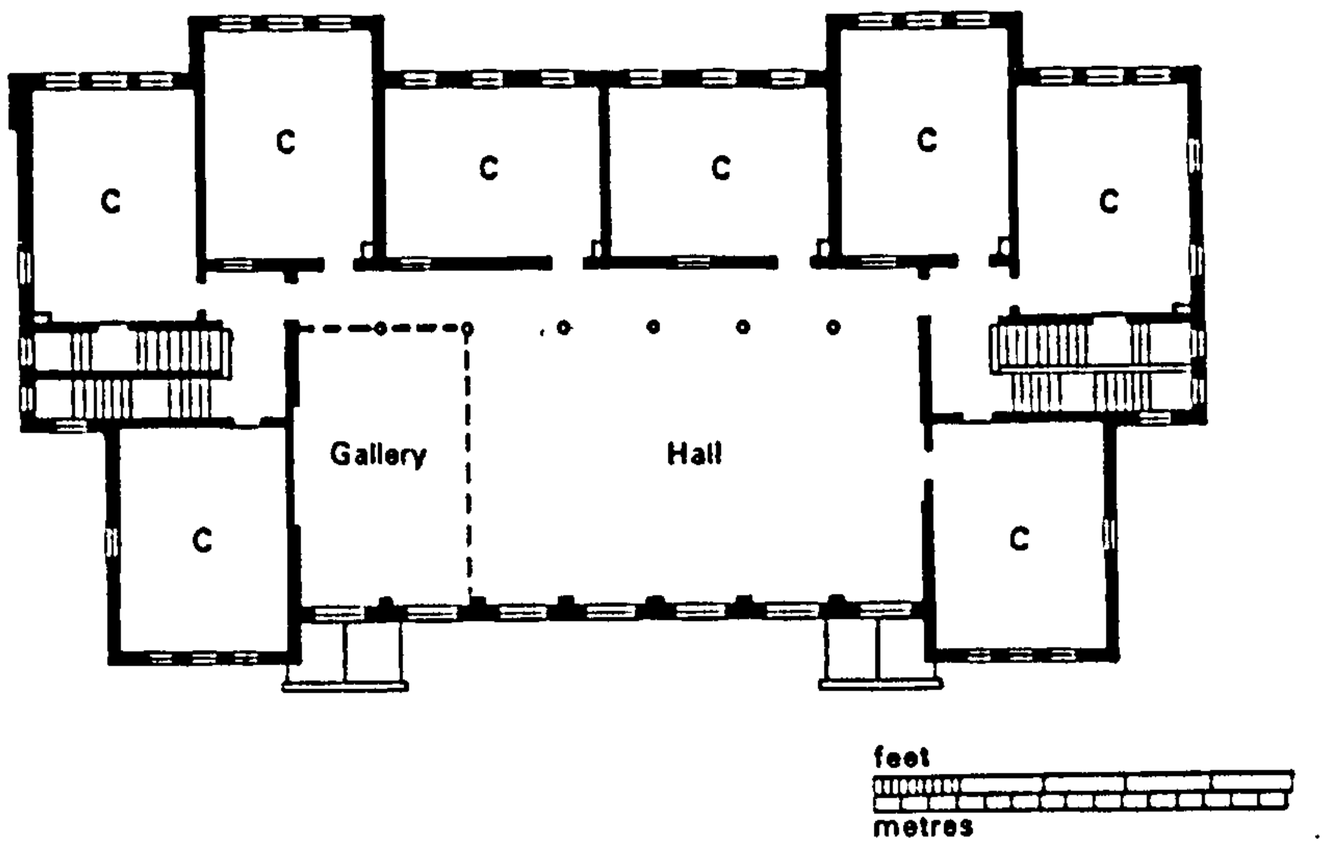


Figure 3.4: Jonson Street Board School, Stepney, 1873

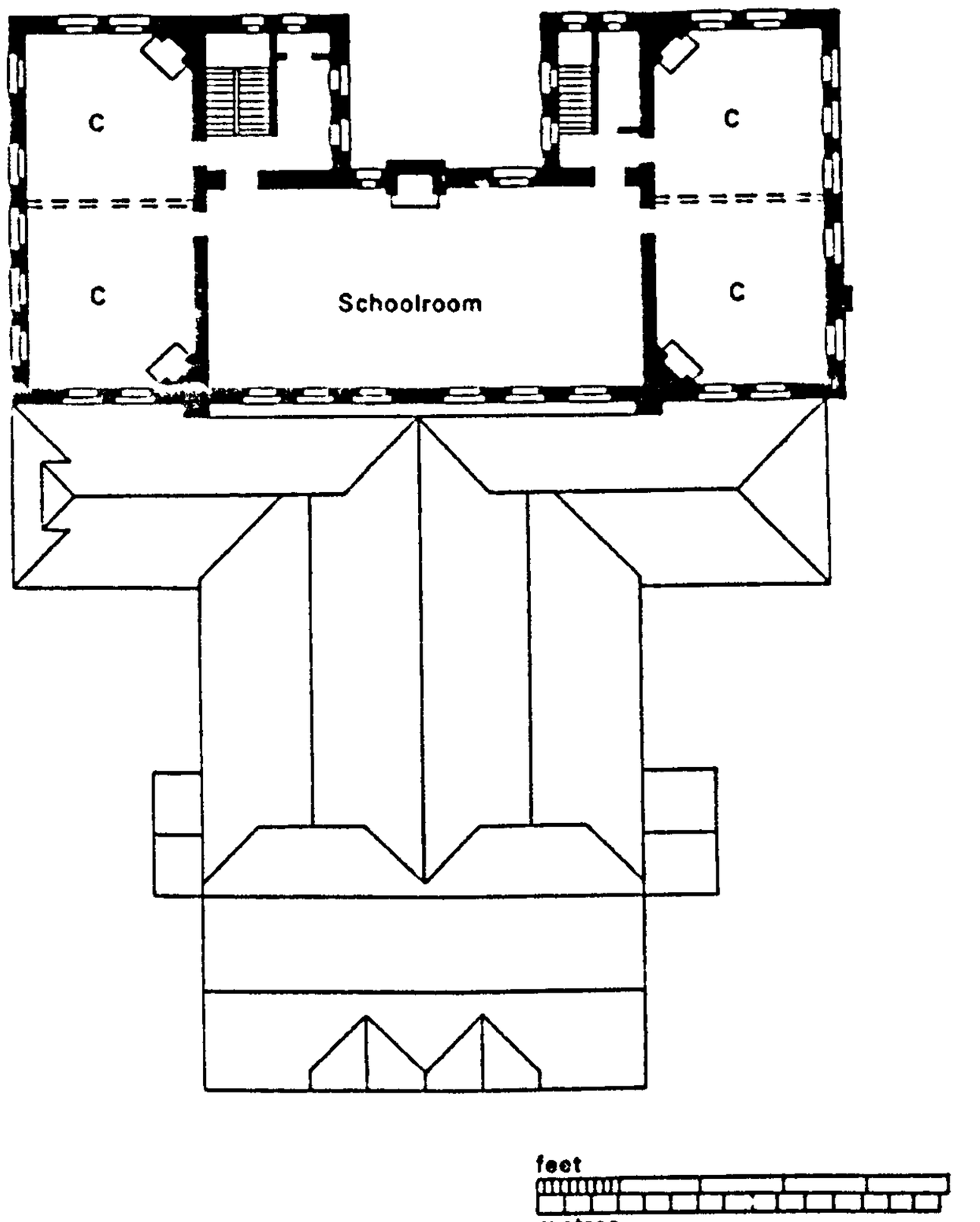


Figure 3.5: Worington Road Board School, Portobello; boys' department on first floor, 1874

3.5.1 Board Schools

The 1870 *Education Act* called for a large number of schools, mainly in crowded urban areas, to be built with public rather than private money. London, for example, had over 400 board schools by 1895 (Dixon & Muthesius, 1978:239) The school board period starts from the passing of the Education Act of 1870 to the handover of elementary education to county and borough councils in 1903. Some of the biggest school boards like Manchester and Glasgow shared out their schools among different architects as a matter of policy in order to spread patronage around. As a result Glasgow is home to one of the finest board schools ever built, Scotland Street School, designed by Charles Rennie Macintosh in 1904.

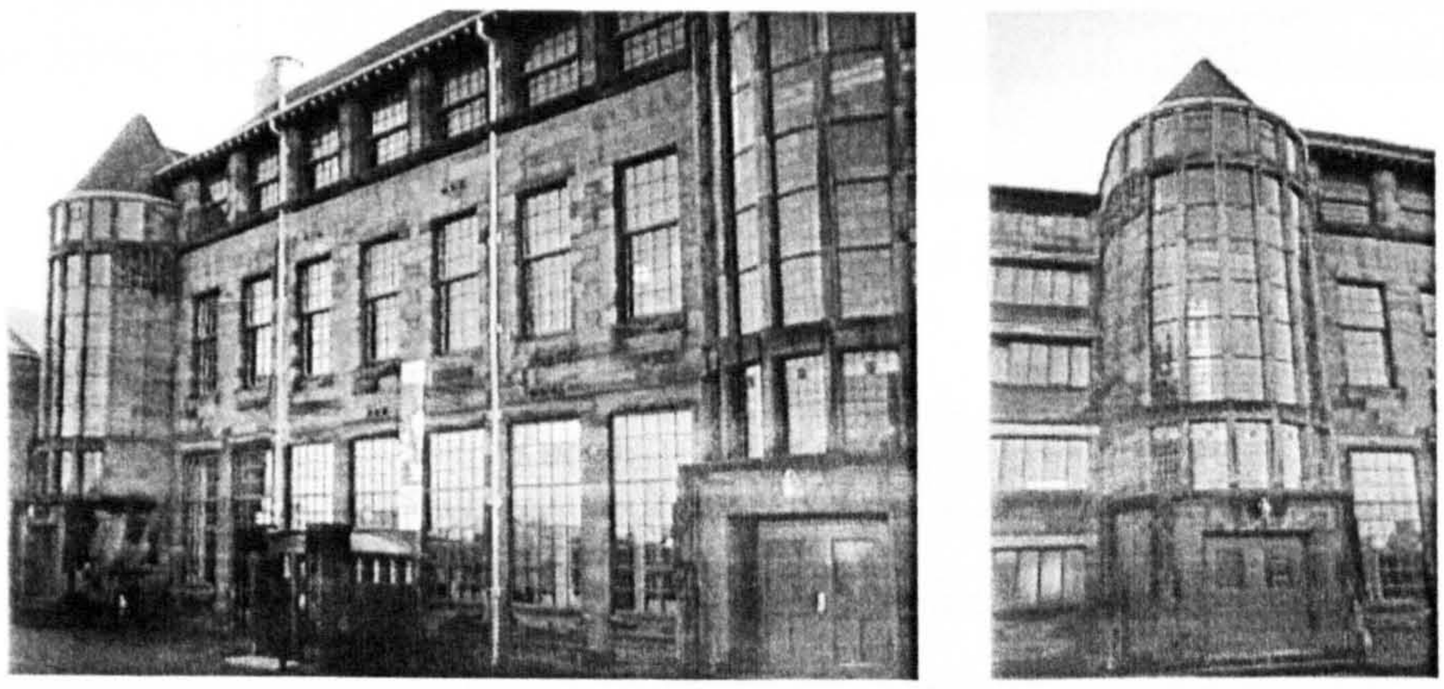


Figure 3.6: Scotland Street School, Glasgow, 1904

Styles varied across the country and many architects seemed not to know how to design economically and effectively on difficult urban sites. However:

> '*A coherent approach to building board schools first made itself felt in the towns and cities in towns and cities where accommodation was most deficient and where boards therefore felt the greatest sense of energy and urgency, in Birmingham, in Sheffield and above all in London'* (Saint, 1995:34).

Where there was consistency it was because one single firm dominated the work, in Sheffield Innocent and Brown and Martin and Chamberlin in Birmingham produced quality Gothic board schools of one or two storeys. Examples include Walkley School in Sheffield, designed by Innocent and Brown in 1874. Consisting of a large Gothic building, with a diagonally placed bell tower over the end gable, projecting side wings and a covered playground. The Manchester school board built 39 schools during its existence. But, there is no clear line of development due to the sharing out of the

designs to local competition. As in Birmingham and Sheffield two storey was at first the rule, but schools in the Queen Anne style appeared at the end of the eighteenth century. Examples include, Woodhouse and Willoughby's Upper Lloyd Street School in Moss Side that was built in 1894 using the Queen Anne style.

Figure 3.7: Upper Lloyd Street School, Manchester, 1894 (left)

Figure 3.8: Walkley School, Sheffield, 1874 (right)

The London School Board was the first to appoint its own school architects. They experimented with what was known as the Prussian model, a large hall with separate classrooms for each teacher, each accommodating as many as eighty children under a certificated teacher. The next development was the central hall arrangement introduced around 1890. Smaller and better lit classrooms led off from central hall. Open fires were replaced, central heating, separate cloakrooms and lavatories were provided. Development continued, with classrooms leading off from one side of the hall, allowing light to enter from the other side. Plans showing the development of school buildings in London are illustrated in the Final *Report of the School Board for London* (King, 1904). These schools and their classrooms were relatively autonomous and closed to the outside world.

The development of elementary schools was very rapid in the late nineteenth century. The first board schools designed by E.R Robson inadvertently adopted a model based around the form of the eighteenth century house, with individual (class) rooms, clearly articulated circulation routes and a large assembly hall at it's heart. They had an order configuration, which was an essential characteristic of the educational process itself establishing a framework for both (Dudek, 2000). In 1874 Robson published his School Architecture in which he illustrated a number of London Board Schools.

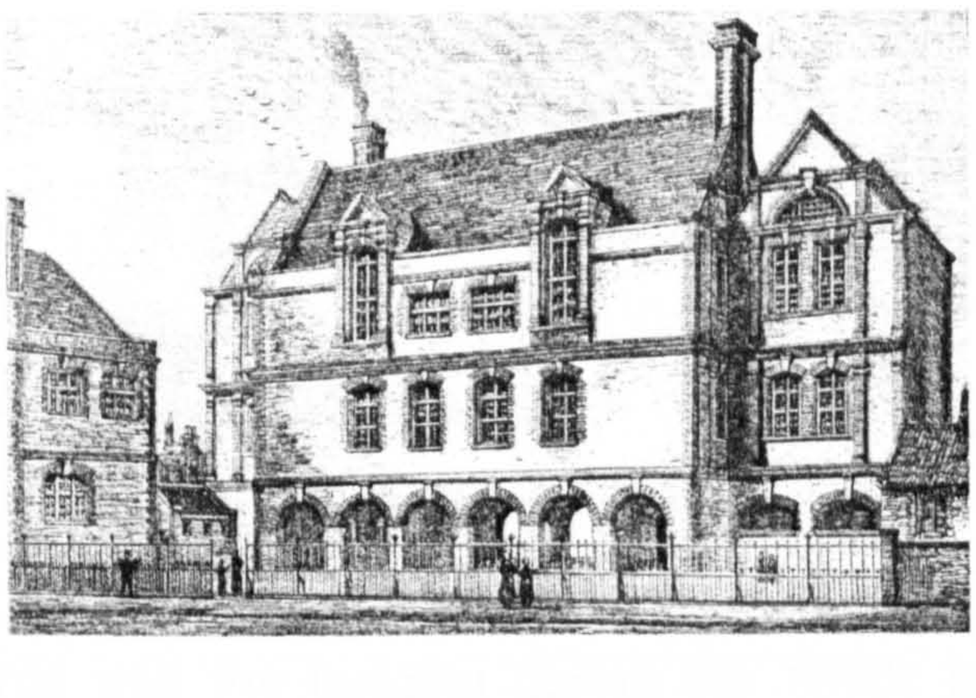


Figure 3.9: Board School, Orange Street, London, 1873 (left)

Figure 3.10: Board School, Angler's Gardens, London, 1873 (right)

Although Robson and his precursors were largely concerned with the educative process as one of control they continued to forward the development of elementary schools asking the question *'how should we build schools in England?'* In answer to this he writes:

> *'Before beginning the erection of any school, or any group of schools, something more is necessary than merely to count the cost. The aim and object of the enterprise should be clearly defined, and the theory of the school determined completely. Above all, the system of teaching should be settled, so that every facility may be provided in the building for it's successful result.'* (Robson, 1877:159)

Later developments included the erection of separate buildings for infants and additional rooms provided for handicraft and domestic science. Teaching methods in the 1880s were largely mechanical, partly owing to large classes. As additional subjects found their way into the curriculum, teaching methods improved, but very slowly. Elementary science was represented by the object lesson which was lauded as a means of developing the pupils powers of observation. Frequently they resulted in the pupils repeating after the teacher long strings of technical terms or memorising perfectly obvious facts in a set form of words.

The final achievement of the School Boards was the building during the 1890s of higher grade elementary schools for pupils who wished to stay on for two years beyond the prescribed leaving age. These facilities were more expensive than the ordinary elementary schools. They often had extravagant exterior architectural features such as terracotta ornamentation and internally some schools incorporated lavish facilities for teaching science. The Board of Education was established in 1899 and the *Education Act* of 1902 abolished the School Boards and transferred their powers and duties to Local Authorities.

School boards redefined popular schooling and gave a generation of late Victorians experience of the classroom. These classrooms had painted dados, high window sills to minimise distraction and raised teacher's desks. Today there are still visible embodiments of the Victorian idea of the purpose of schools in the very architecture of the schools themselves. These buildings are all of historical importance, since in them we can see the gradual adaptation towards the end of the nineteenth century to the classrooms. Many also included the first specialist teaching rooms for subjects such as cookery, music and science. However in the Gothic designed schools some architectural aspects overwhelmed the educational, as, for example schools built in the 1840s were given lancet windows of perfect Gothic design without apparently taking account of the amount of natural light inside the building which resulted (Seaborne, 1971:5).

However, many of these schools remained in use throughout the twentieth century as acknowledged by Curtis in 1967:

> *'Our large towns still possess far too many schools which were which were built as a result of the 1870 Act, and which, with certain modification, are yet in use. The typical school of this period consisted of a large classroom with one or two smaller classrooms leading of from the main room. The younger children often had the privilege of being in one of the smaller classrooms whilst the upper part of the school used the main room, which housed several classes. The latter also served as an assembly hall for the school. Town schools were often built near the junction of busy streets, were the roar of traffic and the babel within the room, owing to one teacher having to make himself heard above the rest, interfered with the concentration of the pupils, and played havoc with the teachers voice and nerves.'* (Curtis, 1967:291)

3.6 School Buildings 1920-1943

School buildings in the 1920s and 1930s began to reflect changes in educational policy brought about by and increase in the number of pupils, a call for the break in the child's education at the age of eleven and official pressure for advanced work in primary schools, which centred the Hadow Report of 1926 on T*he education of the adolescent.*

School buildings incorporated considerations of health and hygiene and a recognition of the diverse needs of children. In the late 1920s much progress was made in the design of school building and classrooms with large windows and moveable walls being capable of being thrown entirely open. However, the implementation slowed due to a period of depression from which the Board of Education did not emerge until 1936 when it announced more liberal school building grants, which led to a frenzy of school building. As Seaborne and Lowe (1977) notes:

> *'It meant that many school architects had time to absorb proposals for cheaper school buildings and the influence of the modern movement in architecture before they set about planning new schools to meet the requirements of the Hadow Committee.'* (Seaborne & Lowe, 1977:125).

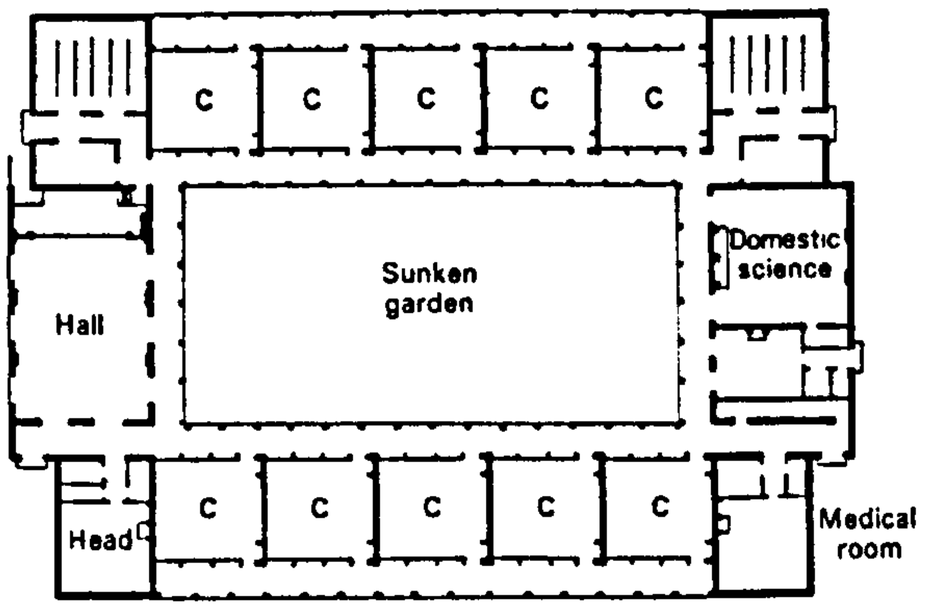


Figure 3.11: Senior department, Walton Hall Avenue Elementary School, Liverpool, 1927

School buildings developed in accordance with the principles of the modern architectural movement, a popular arrangement for this was around a small quadrangle, this enabled pavilion classrooms with cross-ventilation, suppressing the Neo-Georgian in school design. However as Saint states:

> *'Nearly all elementary schools built in the 1930s were conventional. They were designed for the most part by local authority architects working to written briefs and undiluted by contact with the teaching profession. In accordance with the Board of Education's mixed bag of rules and 'suggestions', the briefs detailed the accommodation to be provided and thus perpetuated the nature of existing teaching practice. Classrooms whether they were strung out in long airy pavilions or jammed together more densely, would be grouped together in runs of corridors; each would be strictly orientated towards a blackboard and equipped with rows of rigid, uncomfortable locker-desks.'* (Saint, 1987:37).

Many of them had flat roofs; clerestory lighting and moveable windows to allow for cross ventilation were also frequently used. Ceiling heights were also dramatically reduced to create a friendlier environment for the pupils and in addition many larger schools began to incorporate quiet and noisy, clean and dirty spaces and individual classrooms were positioned at one side of long corridors.

Nevertheless, there was some loosening-up, owing mainly to the first stirrings of joint medical and architectural research. Classical, symmetrical arrangements gave way to plans that offered better environmental conditions. Schools were still built in the 'pavilion' arrangement, on the grounds that they provided a good quality of lighting,

leading to schools that tended to be over glazed. This stemmed from a joint investigation by the medical research Council and the Building Research Station, which suggested that children's eyesight was harmed by poor school lighting; larger areas of glazing (it was then thought) might rectify this (Saint, 1987).

Additionally during this period the style of teaching, and concept of child as learner began to change to that of *'active organism'*, with the role of the teacher becoming less important and a move away from the previous rigid orientation towards the teacher's desk (Seaborne, 1971:5). This idea is reinforced by Dudek, who states:

> *'Accommodating new generations of school children in the 1930s and 1940s would require large institutional buildings with multi-functional spaces to match complex social and academic aspirations. The architecture like the pedagogic philosophy, which was seen as an instrument of social change rather than solidification (of the existing social status) as had been the Victorian vision for mass education. The buildings were to be democratic and open reflections of the new societies aspired to by British politicians and educationalists such as Henry Morris, Secretary for Education at Cambridge County Council.'* (Dudek, 2000: 25)

During the interwar period in Britain there was a considered movement away from the heavy, permanent, monumental style of school architecture towards the light flexible and modern. There was a sense that the construction of buildings which indicated that they might carry more than one or two generations through he education process might become burdensome and represent a disservice to the young. In 1938 the English Board of Education stated that:

> *'the character of the new building should be such as to permit of easy adaptation and enlargement should it be required. It seems quite clear that the solid stereotyped buildings of fifty years ago are entirely out of place in this connection. The demand for light buildings, with little of the classroom about them, arranged with a view to the freedom and variety of use, to possible enlargement and even replacement in the not too far future'.* (Gardner-Medwin & Wright, 1938: 109).

Balancing educational, architectural and environmental needs in the 30s and 40s had become more complicated, due to the economical, social and political situation of the post-war years. Educational and architectural factors were heavily influenced by the endeavour to achieve a balance between cost, quantity, provision and the scarce availability of resources.

3.6.1 Hadow Report

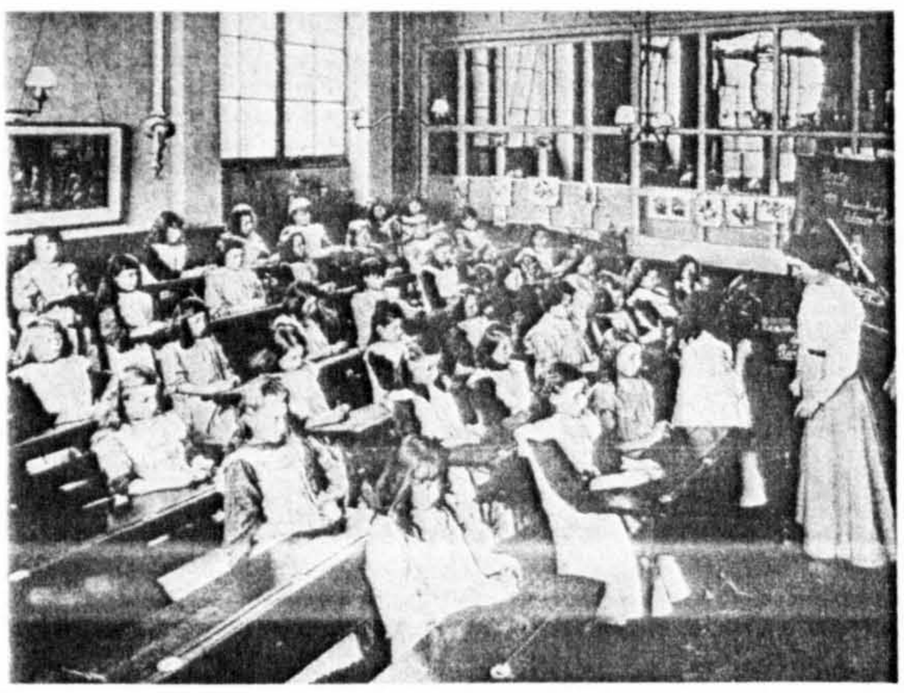
The Hadow Report was mainly concerned with education provision in the post-primary years. But it also recognised that children up to the age of 11 were developmentally best suited to a form of schooling which was 'enriching, illuminating and giving point to their growing experience'. A follow up report entitled *The Primary School* focussed more tightly on primary education. The report made use of the educational ideas of the French psychologist Jean Piaget. His work *Le Langage et la Pensee chez l'Enfant* was translated into English in 1926.

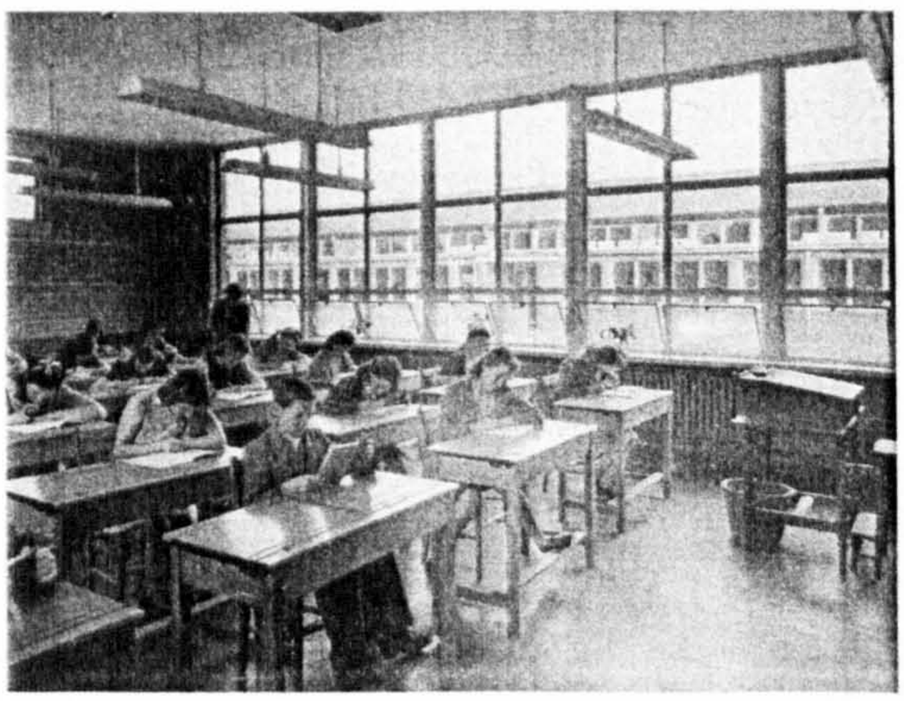
The Hadow committee published three reports in 1926, 1931 and 1933. These led to major changes in the structure of primary education. Firstly, an emphasis was on teachers helping the child to learn intellectual skills, aesthetic values and appreciation, rather than these things being didactically taught to all children by the teacher. The reports also argued for styles of teaching to be built on the interests of the children themselves, and was enthusiastic about the integrated project approach. They also led to major changes in the structure of primary education. In particular, they resulted in separate and distinctive educational practice for children aged 5 - 7 years (infants), and 7 - 11 years (juniors). For both these groups of children, an educational style which emphasised child-centred approaches was recommended, rather than the more didactic and syllabus-centred approaches which typified practice in the elementary schools. In other words, the emphasis was to be on teachers helping the child to *learn* intellectual skills, aesthetic values and appreciation, and moral (broadly Christian) understandings, rather than on these things being didactically *taught* to all the children by the teacher. An important implication of the Hadow recommendations was that class sizes for young children (and especially for the youngest groups) should be reduced, wherever possible to 30 children or fewer.

In a real sense, these recommendations of the Hadow Reports amounted to the triumph of 'progressive' educational thought and practice over more 'traditional' ideas. They proved to be popular with many policy makers and teachers alike. As a result, by 1939, half of the children aged 5 - 11 years in England and Wales were being educated in primary schools, most often in separate nursery or junior school; the rest remained in the elementary schools, though even in these schools class sizes for younger children were reduced and teaching methods were adapted to better reflect a more child-centred approach.

3.7 School Buildings 1944-1976

Towards the end of the 1939-45 War, the British government again turned its attention to education. The impetus for creating new schools was varied: factors included the 1944 Education Act, the raising of the school-leaving age to 15 in 1947, the post-war 'baby boom' and an inheritance of a motley assortment of inadequate and outmoded Victorian schools, many of which were bomb-damaged, that had been designed for an authoritarian regime based on rote-learning in large classes. The scale of the task facing the new Ministry of Education was spelt out in a government leaflet issued to parents. *Our Changing Schools: A Picture for Parents* (1950) featured rosy accounts of school life and boasts of funds spent on new schemes. It is clear though that it was also responding to criticism at the slow pace of change. It warns of the 'huge national task' of trying to recruit and train teachers and to build and equip schools.





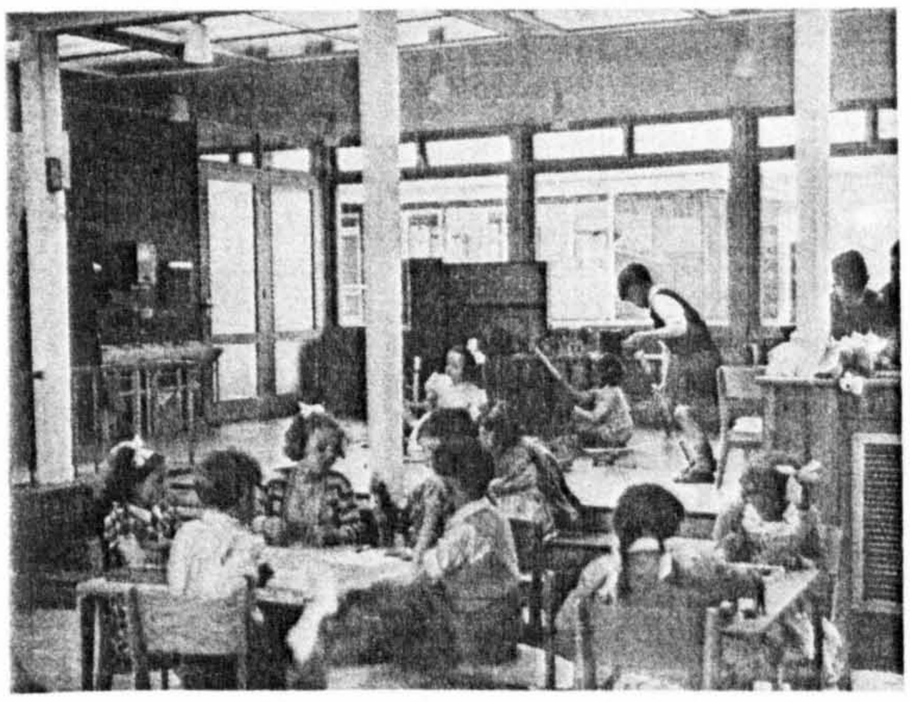


Figure 3.12: Classroom about 1900

Figure 3.13: Classroom about 1928

Figure 3.14: Post-war classroom, 1949

Figure 3.15: Large more informal classroom about 1957

In the story of post-war school buildings (Ministry of Education, 1947) developments in classroom design are illustrated in four photographs. The first is a board school, with tiered pitched pine desks, high window sills and glazed partitions. The second dates from the 1920s though the furniture is older. The third illustrates a classroom in a 'finger plan' school of about 1949. A second parallel finger can be seen through the window, and you can see the improved standards in lighting, heating and ventilation. The fourth portrays a then recent example with larger and more informal teaching space, a self-contained toilet unit and child sized furniture.

In the post war period, a massive rebuilding of schools was undertaken due to the raising of the compulsory school leaving age, the rise in the birth rate, and the need for new schools to keep pace with the development of new housing areas. A period of about a dozen years after the Education Act of 1944 (Butler Act) was spent in over coming the lag caused by war conditions, bringing the act into operation as far as economic circumstances made it possible. Despite the difficulties, there is plenty of evidence that innovative and progressive educational thinking, modern design and experimental architecture informed the new school environment.

The Butler Education Act emphasised the importance of secondary schooling, after the child had reached the age of 11 years. In particular, this Act established the notion of selection at the age of 11, with the brightest children going on to Grammar schools (between about 12% and 20%), most of the rest going on to non-selective Secondary Modern schools, but some being selected to go to Technical schools (about 10%). The effect of this restructuring of secondary education on primary schools was that many began to concentrate on preparing their children for success in the selection tests at the end of the primary period (the so-called 11+ examination).

Thus it also unintentionally began to shape the curriculum of the junior primary years to the demands of the 11+ examinations. This led to a focus on the acquisition of subject knowledge, often at the expense of more child-centred learning approaches, which had previously been increasingly favoured by primary teachers. This meant that teachers were increasingly concerned to ensure that children acquired the knowledge necessary for passing this examination at the end of the primary years of schooling. To some degree, teachers were unable to give as much attention to other areas of learning (those expressive and aesthetic subjects like art and music) as they did to the Basics, especially for children between the ages of 7 and 11.

In many regards, junior primary schools that did this were reflecting parental concerns that children should do well in this test, and go on to selective schools. However, it is also meant that some of the child-focussed approaches of the pre-War period were compromised, if not altogether abandoned. Functional design was favoured for most post war schools and there was a strong sense of social idealism amongst the school architects departments of the larger Local Education Authorities, the County of Hertfordshire being a prime example. Under the county architect C. H. Aslin, Hertfordshire produced one of the finest examples of primary school design at the time. Aboyne Lodge, St Albans opened in 1950, was built in an old orchard and made the most of the layout of the site.

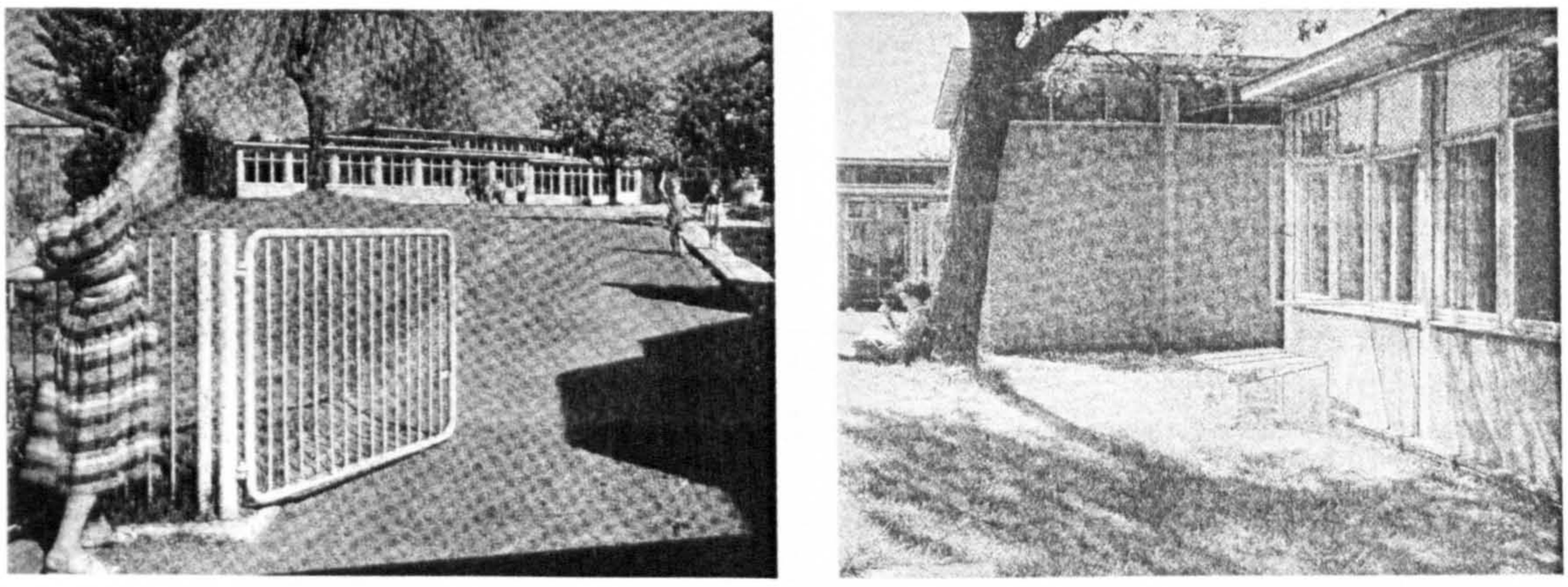


Figure 3.16: Aboyne Lodge, St Albans, 1950

The developments in the design of school buildings after the First World War were followed by even greater developments after the Second World War during which the 1944 Education Act had been passed. There was high pressure to build more and more schools, as the country's population became increasingly prosperous and geographically dispersed. Britain invested huge sums of money to create new schools that would help generate a well-educated population. Between 1945 and 1946 the Architects Department of Hertfordshire County Council carried out a research programme into the standardisation of structural systems, dimensional control and surveys of daylighting and heating provision which resulted in the so called *'corridor-plans'*. As the corridor plan developed it came to be known as the *'finger-plan'* and in time the finger plan schools were considered a revolutionary solution of school design. However from the end of the war, school plans were continually tightened in an effort to reduce school building costs. The main emphasis was to minimise circulation area while obtaining maximum area for usable teaching purposes leading to a cluster of classrooms around a central assembly hall.

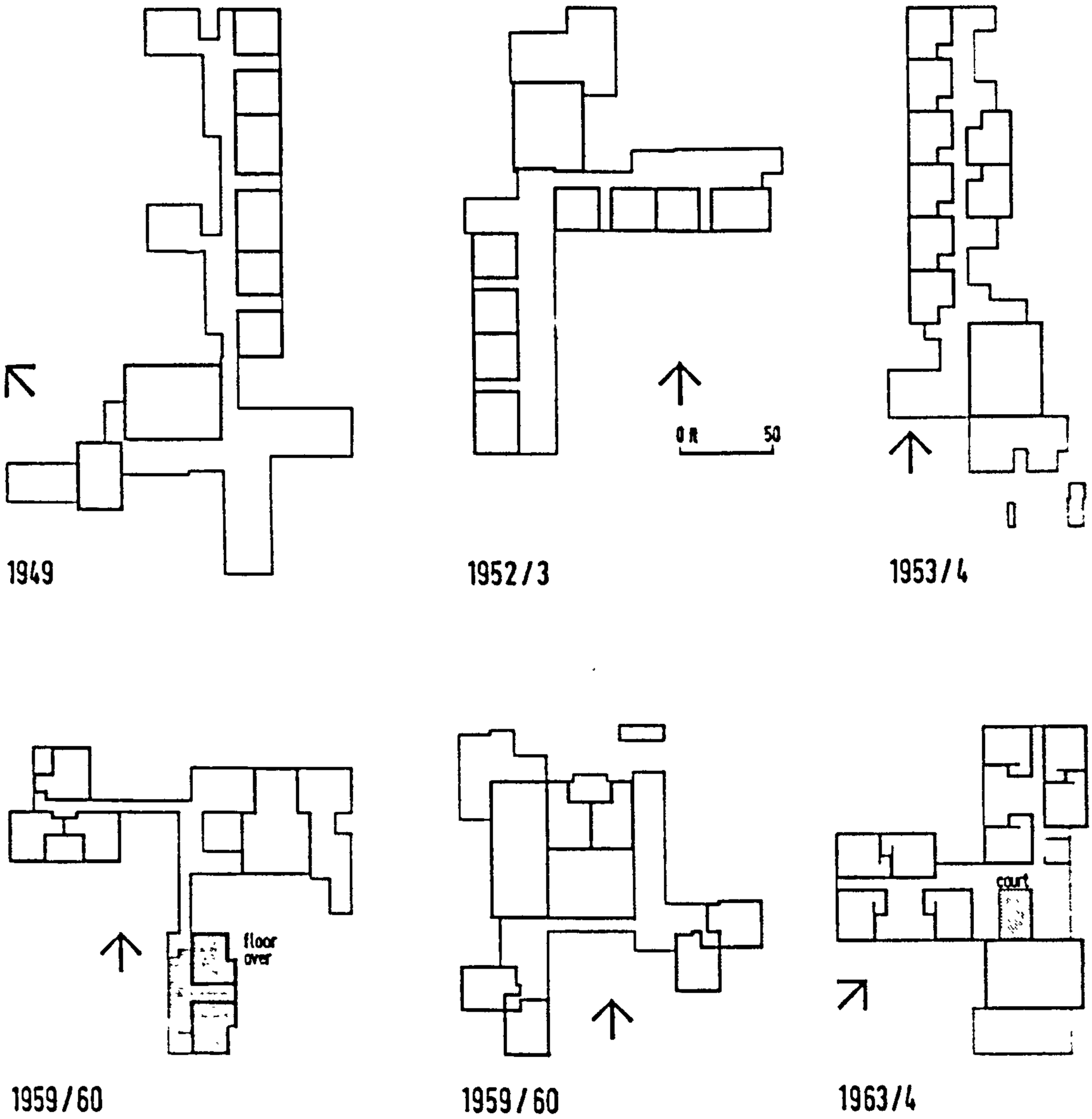


Figure 3.17: Evolution in the planning of the post-war primary school in Cheshire
(The heavier lines bound the major teaching areas)

But, between 1950 and 1970 prefabrication and system building produced standardised buildings popular at the time. School buildings built of this period developed a number of faults: their roofs leaked, contributing to high maintenance cost; there was excessive solar gain in summer and low temperatures in winter. During the 1960's there was close co-operation between educationalists, planners and architects. With this there was no longer a lagging behind of the architectural response to educational ideas, replaced by a positive acceleration in the development of school buildings and classroom environments. Development in school buildings accelerated immediately after the Second World War, as building designs began to respond to

educational and environmental needs. Roth (1950) summarizes these conditions as follows:

> • *The child is the subject and not the object of education and consequently of school building (scale of the child).*
>
> • *The object of education is to gain a grasp of the whole human being, the psychic and intellectual life. This can only be achieved by a flexible system of many different activities (cheerful, differentiated planning of rooms, greatest possible convertibility).*
>
> • *Teaching methods must be adapted to the child' age and talents (individual instruction, group work, friendly rooms).*
>
> • *Education at school must be considered a continuation of family influence. Therefore the closest possible affinity between school and home with the respect to rooms and atmosphere must be attained.*
>
> • *The entire environment in which the child lives and is educated is an integral part of education (unity of fundamental architectural conception, close affinity with nature).*
>
> • *The child is gifted by nature with creative imagination and loves all that is true and alive (lively architectural design, exclusion of all that is not genuine, schematic or artificial).'* (Roth, 1950:29)

The first Local Education Authority that achieved a high reputation for its primary school buildings was Hertfordshire County Council, an area with a continually growing population, a shortage of building materials and craftsman due to the competing demands of housing and light industry. The basic success lay in the use of standardised components that were mass produced in factories and then assembled on site (Seaborne, 1971). Each classroom was self-contained, with its own practical space, cloakroom and lavatory leading out of it. With this they could vary the scale and layout of the primary school and break the long, drab, institutional corridors and stagger the classrooms. This offered the teachers the option of intimacy, by decentralising lavatories and cloakrooms, or of community and integration, by staggering the corridors and opening them up to the classes (Saint, 1987).

Many of the lessons where applied in other areas including Nottinghamshire where there was a need for a light and flexible type of building to overcome the problems presented by mining subsistence. Other authorities with mining subsidence problems joined with Nottinghamshire in 1957 to form the Consortium of Local Authorities Special Programme (CLASP).

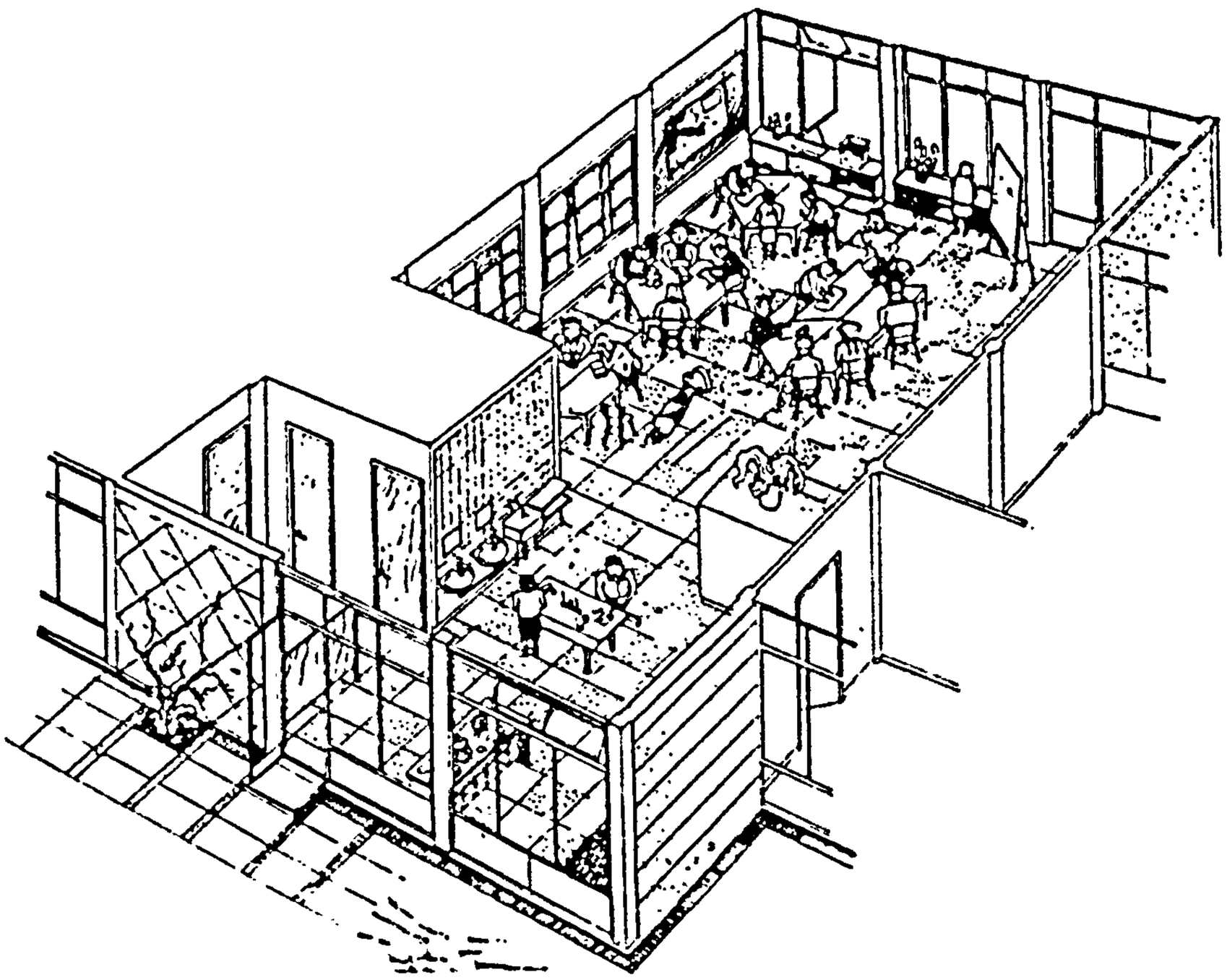


Figure 3.18: Sketch plan of typical teaching unit adopted for the Hertfordshire County Council programme

These ideas put forward in the first Building Bulletin, *New primary schools* (1949) condemned the typical 'finger-plan' school and two years later the Ministry of education issued another Building Bulletin on *Primary schools plans* (1951) The document illustrated plans of primary classrooms designed and built using the principles of the first Bulletin with classrooms brought closer together and in some instances classrooms spaces shared a space for lavatories and coats. Then in 1958 a two form entry (eight class) junior school in Amersham was designed by the Ministry of Education's Development Group in cooperation with Buckinghamshire Local Education Authority and was published in a Building Bulletin (Ministry of Education, 1958). The eight classrooms were arranged in two groups of four which each classroom to remain separate whilst allowing easy access from room to room without the use of corridors

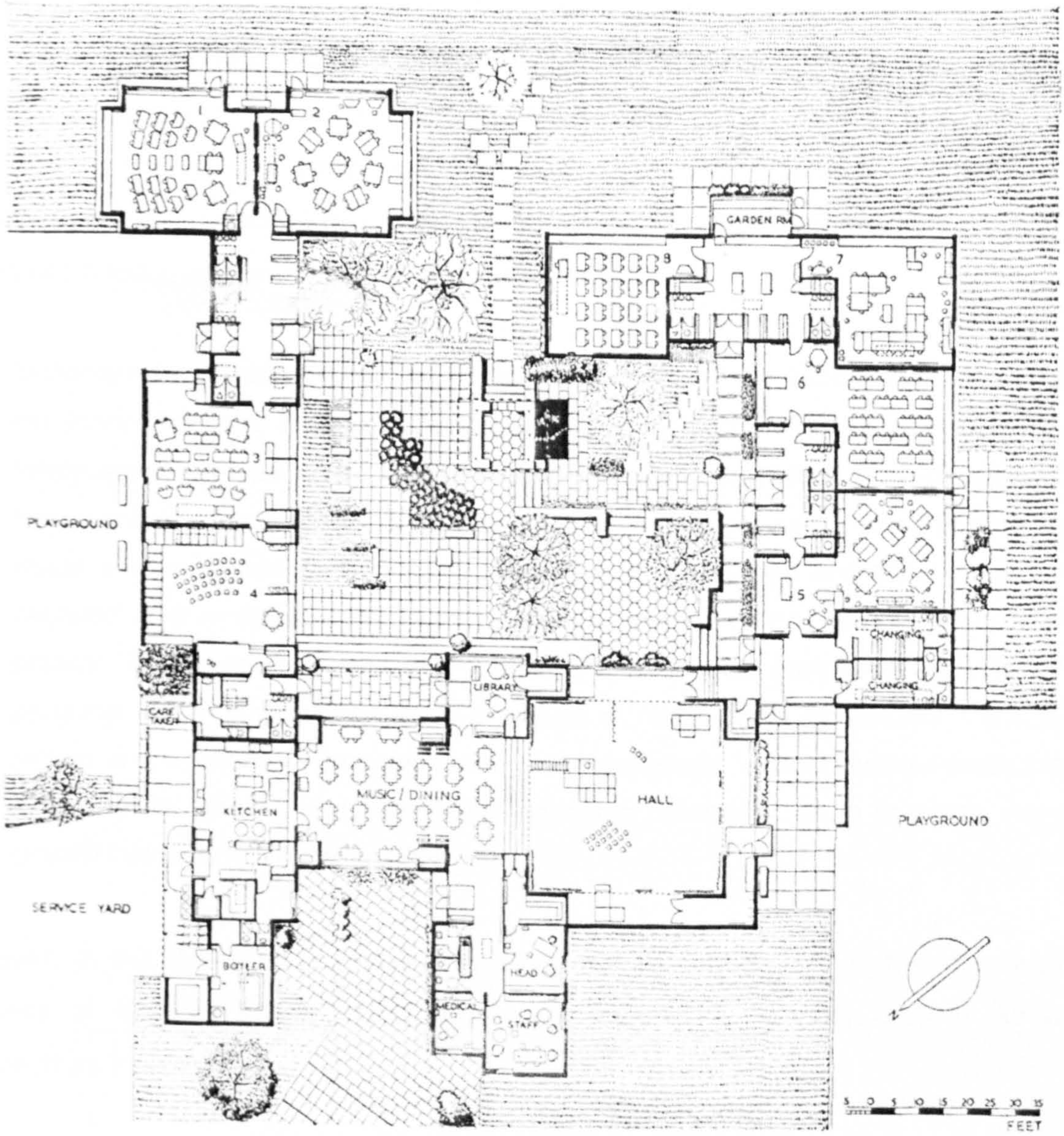
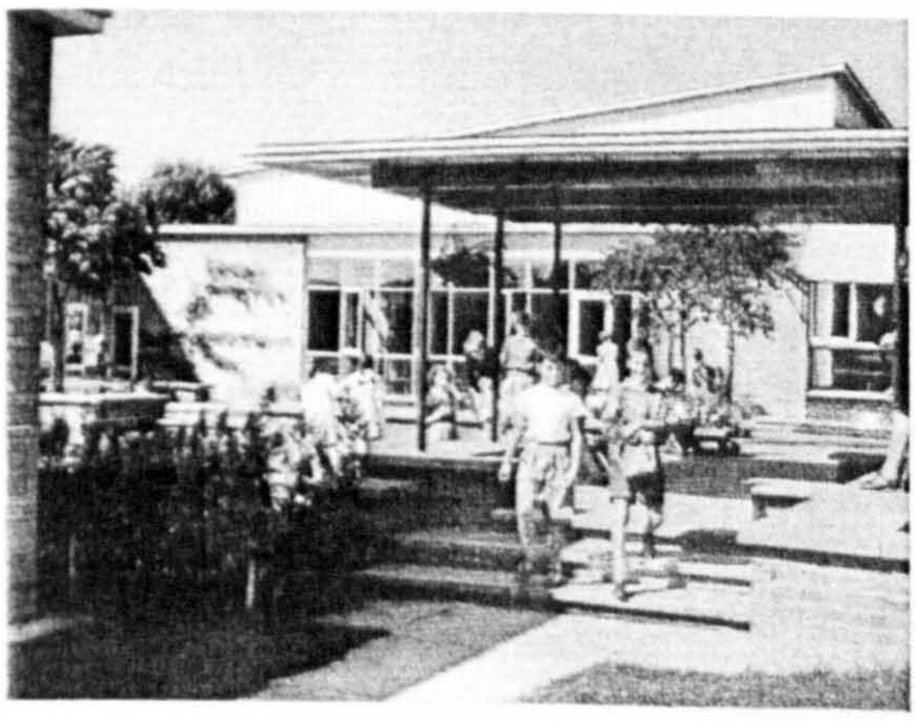


Figure 3.19: Amersham Junior School, ground plan, 1958



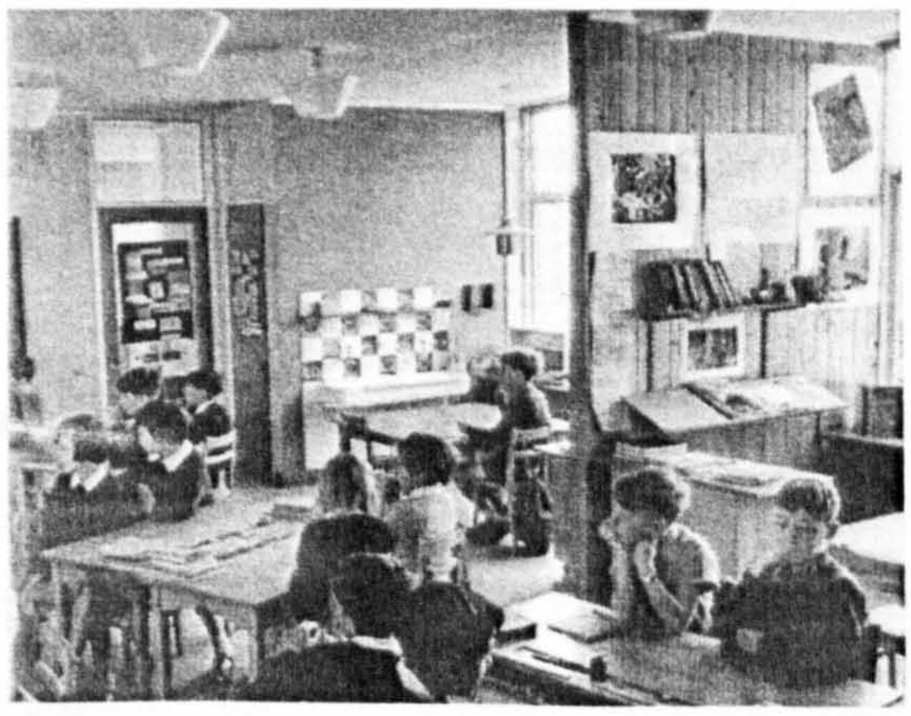


Figure 3.20: Amersham Junior School, external view, 1958

Figure 3.21: Amersham Junior School, classroom, 1958

The country's economic situation led to the general phasing out of 'finger plan' schools. New trends and developments in school building design were encouraged, leading to plan layouts responding to analysis of schools functional requirements in regard to the educational philosophy of the period. This lead to the idea of open-plan schools which originated in the United States where it had many enthusiastic supporters such as James Morriseau, who in a book by Maclure states:

> *'Schools-without-walls are the most dramatic evidence of the trend toward adapting the school house to educational change... the classroom has given way to large, totally open zones of space accommodating as many as 200 or more pupils and their teachers. There are more partitions; movable furniture and/or screens provide visual privacy where desired. Acoustically absorbent ceilings and floor – that is, carpeted floor – ambient noise and distance between groups provide acoustical privacy. These open spaces lend themselves to a wide variety of instructional grouping – from independent study to groups of 100 or more for lectures – and to instant and unobtrusive rearrangement of the groupings. Schools-without-walls are adaptable to virtually any educational approach, traditional, team teaching, non-graded instruction.'* (Maclure, 1984: 138)

However, in the Britain these ideas were taken with caution. David Medd one of the pioneers of English schools architecture expressed his reaction to the American approach as follows:

> *'In my opinion this is not the kind of flexibility that English education is now demanding. It sounds theoretically attractive but it is in an abstract conception... I do not want to suggest that it is not important to have partitions that can be moved; it is important for the long-term arrangement of the interior, but at the moment we are in danger of paying to high a price for them in the sacrifice for everyday variety.'* (Maclure, 1984: 138)

During the 1960s and into the 1970s there was a tendency towards greater flexibility, openness and reduction of circulation areas. This combined with the functional requirements of progressive teaching methods promoted open-plan schools as the ideal learning environment. However the argument for open–plan schools was not decisive, because the use for open-plan space for learning activities has made it doubtful to know whether the school building is responding to the activities taking place (form follows function), or vice versa.

However, most teachers adopted a "mixed-bag" of teaching styles and approaches to learning. Though generally lively and varied in their ethos and working organisation, in the period from the mid- to late-1960s until the early 1980s, the great majority of primary schools and classrooms remained places of ordered and structured learning.

> *'World War II showed the inadequacies of the national education system and we began to change it with the Education Act of 1944, which introduced the aim of secondary education for all children, and started the long process of building and reorganising the schools which would make that aim a reality.'* (Wheeler, 1968: 1457).

3.7.1 Building Bulletins

From 1949 onwards the Ministry of Education which had superseded the Board of Education issued Building Bulletins on various aspects of school design and space standards were introduced. The first Building Bulletin on *New primary schools* (1949) advocated more compact plans where multi-purpose spaces eroded the distinction between circulation and teaching areas. Small working bays were introduced in some classrooms that made the transition from one activity to another easier. Building Bulletins were also produced relating to remodelling of old schools. These included sections relating to furniture, fittings and the organisation of teaching materials. Previously school plans were subject to approval by the Government, but as Seaborne (1971) states:

> *'since the Second World War architects' and buildings branch of the Department of Education and Science has done much to influence school design by issuing Building bulletins and entering in to close consultation with local authorities.'* (Seaborne, 1971: 3)

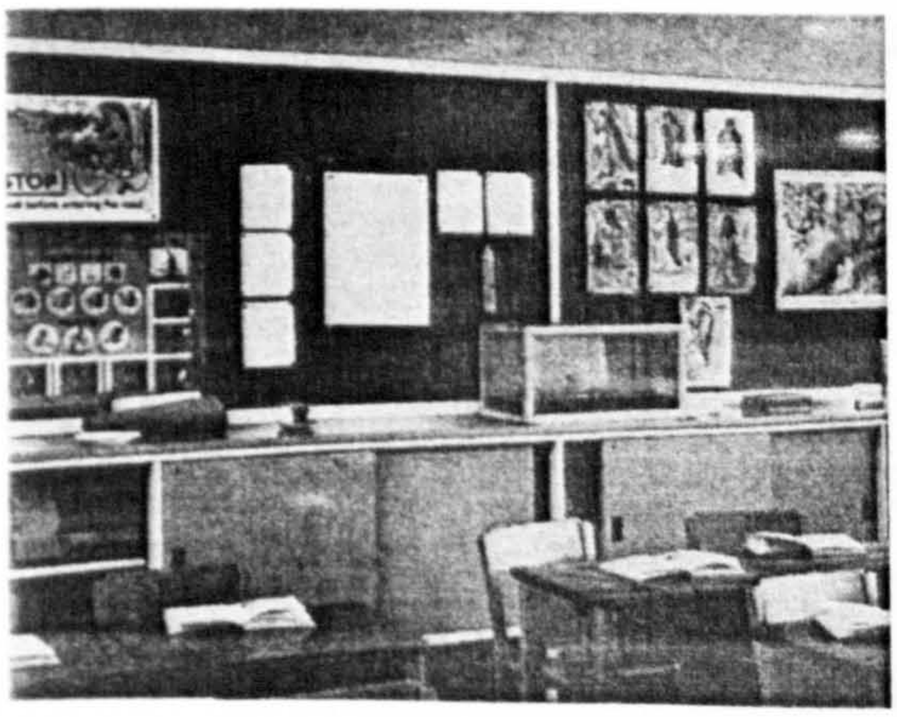
Today Building Bulletins are still published by the Schools Building and Design Unit of the Department for Education and Skills and aim to promote best practice in design, use and management of school facilities.

3.8 School Buildings 1967-1976

During the 1960s there was close co-operation between educationalists, planners and architects. With this there was a move away from the lagging behind of the architectural response to educational ideas, replaced by a positive acceleration in the development of school buildings and classroom environments.

During the 1960s The Pilkington Research Unit was established within Liverpool University's Department of building science to work on problems of design in different building types, to particular reference to studies of internal environments. The 1967 study The Primary School was published as a collection of essays and papers which represents an appreciation of the situation of the design of primary school buildings and endeavours to establish some critical points for consideration by educational administrators, teachers architects, research workers and others. Manning's (1967) research into the spatial environment of primary schools illustrates that classrooms had one or other of two standardised shapes:

> *'Rectangular plans with a door in one wall and windows along the opposite, or a longer rectangle with a bit taken out of the corner for a store-cupboard. Tradition obviously plays a large part in determining these stereotyped shapes and the conventional approach to teaching probably reinforces it. It is possible too, that the desire to adequately illuminate the whole area of the classroom by daylighting is a major contributing factor. However it seems likely that the increased demand for flexibility to take account of teaching techniques still require schools whose plan form is of a more open character, and which have facilities for simple and temporary subdivision of spaces and possibly for noise control. The traditional classroom, conceivably, will soon be obsolete.'* (Manning, 1967: 40)



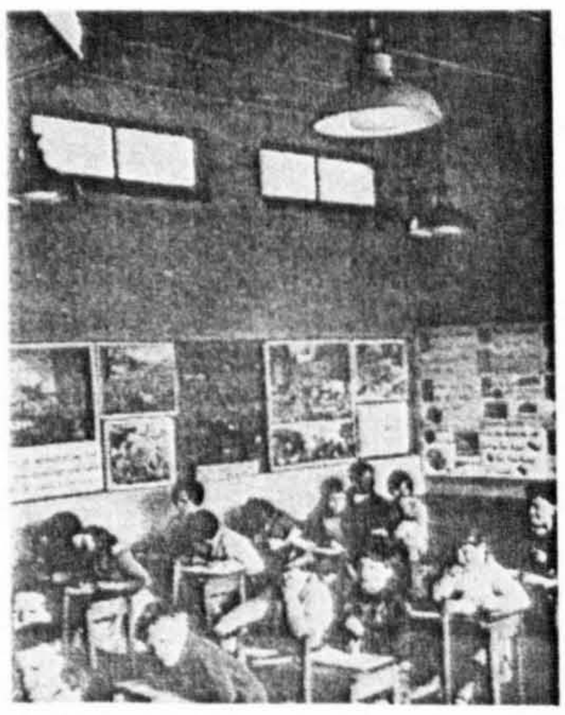


Figure 3.22: Teachers' most frequently voiced complaint is the lack of storage space (left)

Figure 3.23: It is noticeable that buildings which have an intimate small scale usually have domestic height ceilings, clerestory windows used above adjoining corridors raise the internal height (right)

In addition the findings generalise about qualitative features of school environments and some of their consequences. In summarising the educational requirements of primary schools buildings they state that for covered teaching spaces (classrooms):

> *'As large a space as possible is required for each designated group of forty children. Each space to permit a variety of groupings of children and of furniture. As a rough guide to the areal needs of future teaching spaces in primary schools provide double the area now considered to be sufficient for a designated group of children taught by traditional methods. Adjacent spaces for other groups of children to be located so that when necessary the space may be linked together. Inflexible 'boxed' (ie, structurally separated) spaces to be eliminated. Separate space units may be grouped (say, in pairs or threes) to form clusters.'* (Manning, 1967: 79)

The 1960s and 70s was a time of large scale school building and renewal and many of the ideas about the flexible use of school buildings, first voiced in the inter war years were revisited during this period. During the late 1960s and early 1970s there was full consultation between the administrative officers of the education committee, the architect, the educational advisers and practising teachers:

> *'The plans of new schools were often discussed in the educational and architectural press, and the Department of Education and Science (which has to approve all new school plans) also puts its point of view.'* (Seaborne, 1971: 3)

Designs continued to be developed and the educational ideas that lay behind them continued to be documented in Building Bulletins. The Eveline Lowe School is another example of a school designed by the development group of the Department of Education and Scicnce, this time in co-operation with the Inner London Education authority. Here the concept of classroom virtually disappeared with the design consisting of four main areas that are probably best regarded as 'semi-open' rather than 'open-plan' (Seaborne & Lowe, 1977). Firstly the Nursery Area was designed to accommodate sixty children and include some infants who might be socially less advanced than the rest. The second area occupying the area of four conventional classrooms was designed to accommodate one hundred and sixty children aged from five to eight. The third area accommodated one hundred children aged nine and some eight year olds who were ready for more advanced work. The final area housed the hall and dining area and various administrative offices.

As the Building Bulletin 36 (1967b) describes in relation to group rooms B, D, E and F:

> *'The accommodation has been designed for these four groups of forty children, each with its own teacher, can also be regarded as, for example, one group of 160 with four teachers or as two groups of eighty children, each with two teachers, or as many small groups.'* (DES, 1967b)

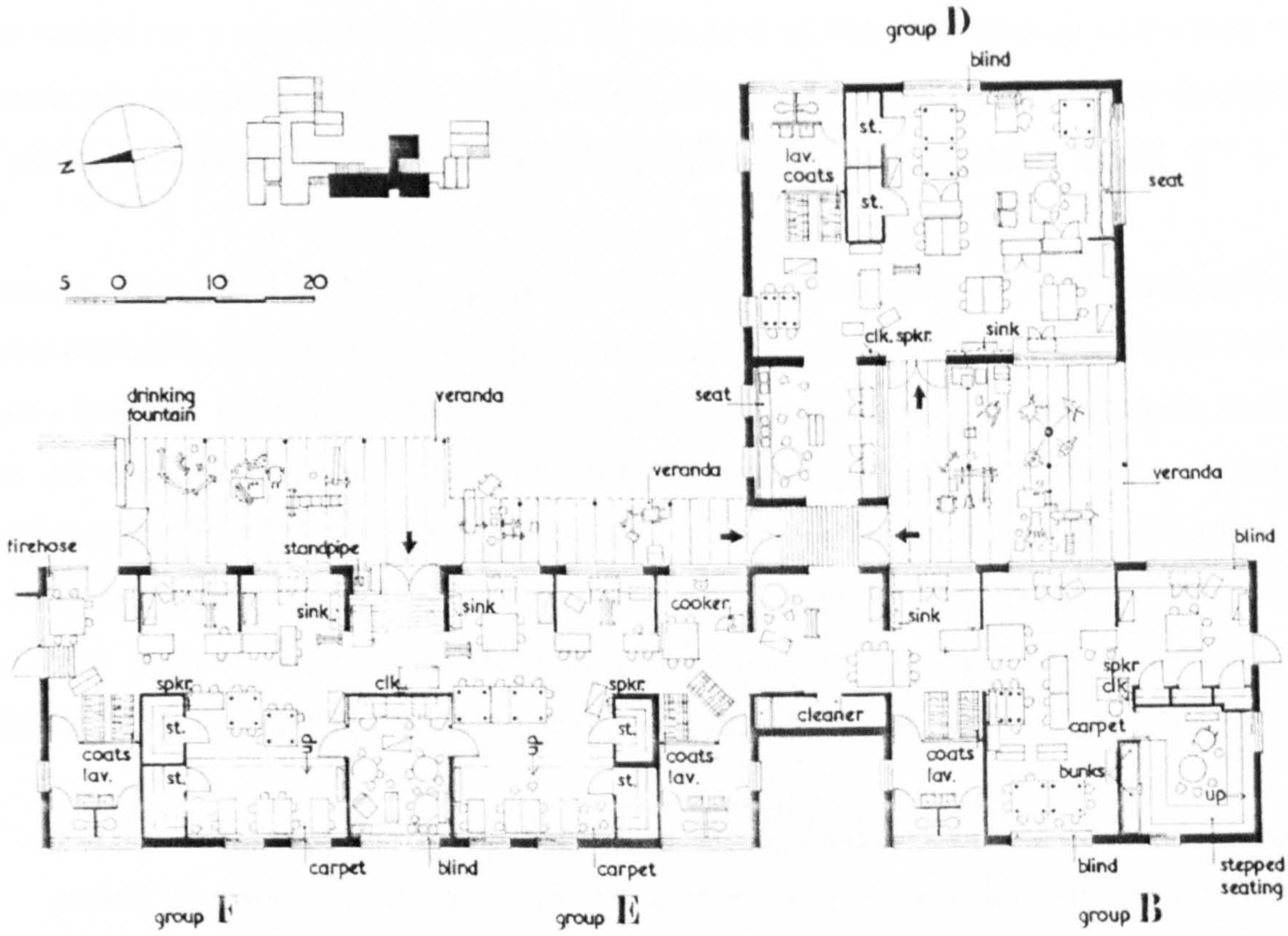
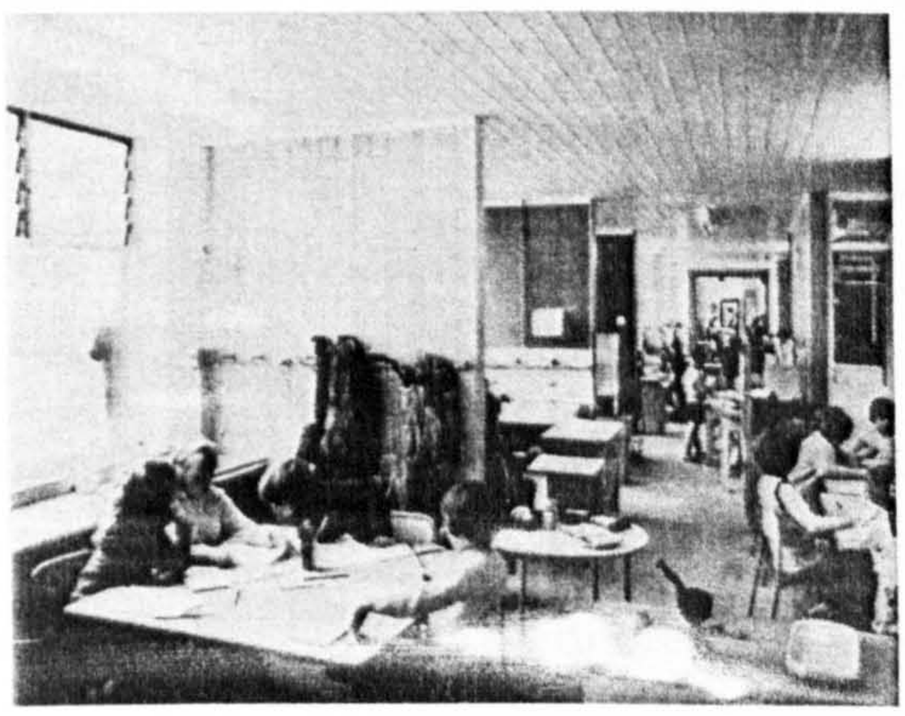


Figure 3.24: Key plan and Groups B, D, E and F (160 pupils)



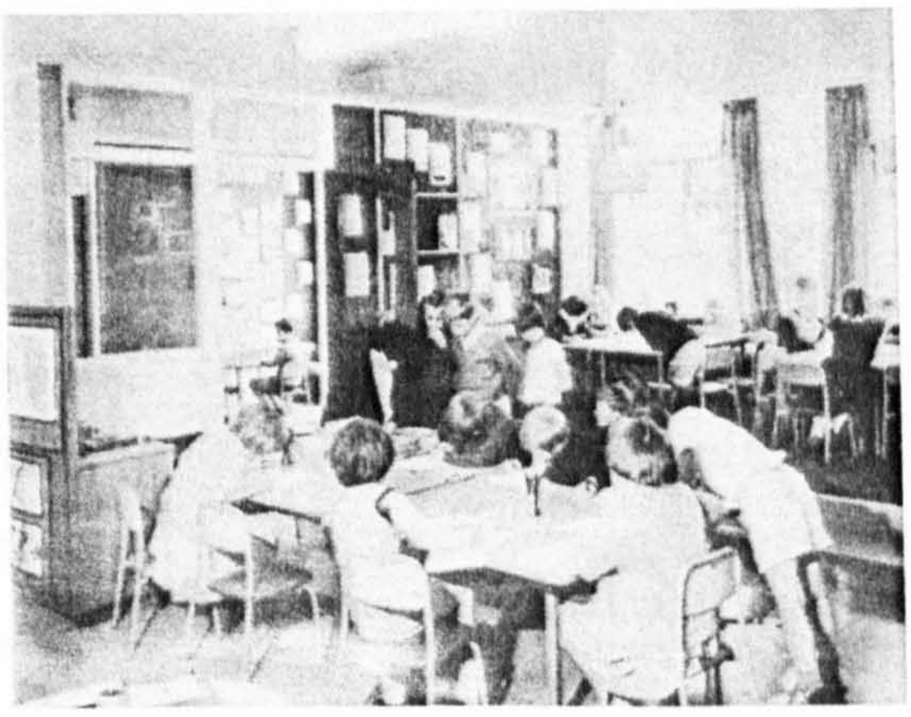


Figure 3.25: A view from room F looking to E and B, showing the linked general working areas (left)

Figure 3.26: Looking towards the carpeted and raised reading area room F and into the quiet room (right)

Progress in school design continued and in December 1972 the then Secretary of State, Margaret Thatcher, published her White Paper entitled *A Framework for Expansion.* The White paper promised a move forward over a 10 year period including, more nursery education, more replacement of old schools. It was a positive statement about the value of public education backed by the promise of funds. There was in real terms a 40% increase in education spending envisaged over a 10 year period up to 1982, and although inflation was rising rapidly, in April 1973 school building cost limits were raised by a unprecedented 22%. By the end of the year energy costs had risen dramatically in response to the Middle East oil crisis. The chancellor of the Exchequer cut public spending, the cost limits system was swept away (Maclure, 1984).

However, from 1973-76 there was a significant fall in the area per cost place achieved in new school buildings. The average non-teaching area in primary schools fell from 16 square feet per cost place (1953-68) to fifteen square feet. Teaching space also fell from 25 square feet to 21 square feet. The minimum appropriate area standard recommended in 1977 was 16 square feet for non-teaching space and 24 square feet for teaching space (DES, 1977). This was the beginning of the under-funding of the education system during the Thatcher years that so damaged our state education facilities and building programmes rapidly fell back (Maclure, 1984).

> *'For the rest of the decade, school building was well below the pre-1973 level. By the mid-1970s it was down to less than one third of the peak achieved in 1972-73; by the end of the 1970s, it was down to less than a quarter.'* (Maclure, 1984: 263)

To summarise, Open-plan design was a continuation which evolved with the progressive tradition in the 1930s and which received practical application in the 1950s and 1960s. However fully open-plan designs did not win the same degree of support as partially open-plan designs such as at the Eveline Lowe School. Fully open-plan classrooms were not a success with noise and distraction and circulation through classrooms figuring predominantly in the hierarchy of problems for both teachers and pupils. In the later period fewer schools were built as the government enforced ever tighter financial restrictions and limited the permitted area per pupil.

3.8.1 Plowden Report

During the 1960's there were changes in the traditional approach to the education of younger children. This change was highlighted by the report on primary schools by a committee under Lady Plowden (1967a). This report recommended, among other things, the abolition of corporal punishment and the hiring of more teachers. It also recommended that educational priority areas be established in the most deprived areas of Britain's cities. The main strength of the Plowden report, which set it above the preceding reports, is that it examines the nature of the child as well as the nature of schools. Examining how children develop, and how widely their rates of development vary. The main recommendations of the Plowden report were these:

- *Recognising - what had been previously been officially ignored – that numbers of children are deprived from birth by being born in slums and twilight areas amid poverty, overcrowding and ignorance, the report urged the establishment of educational priority area, where more should be spent sooner on the provision of new primary and nursery schools, to adjust the balance and give these children a more favourable start in life.*

- *Recognising that many teachers are seriously overworked, it recommends that teacher's aids should be recruited and trained to help in all sorts of practical ways in primary schools.*

- *Recognising that many very old buildings will continue to be used for years to come, a crash programme of minor works should be undertaken, to provide civilised indoor lavatories, proper heating, and redecoration, to start (a generation of primary school children later than the report was published) in 1971-72.* (Wheeler, 1968: 1458).

The Plowden report also considers, through detailed exploration, the nature of the child, pointing out that children were physically maturing more quickly and growing larger. It goes on to consider the development of behaviour and the development of language. In essence, the effects of the Plowden Committee's recommendations were to signal a return to the child-centred and humanitarian approaches to primary schooling which had increasingly characterised the period before 1939. After a slow and uncertain start to reform, the Committee's recommendations were widely and enthusiastically adopted by the great majority of the countries' primary teachers.

3.9 School Buildings 1977-2001

In the seventies and eighties the amount of money made available for school buildings was significantly reduced which in turn reduced design quality and significantly reduced the number of schools being built. An exception to this was Hampshire, where the growing population, supported by local politicians, led to series of interesting and radical school designs (Weston, 1991). The Hampshire County Architects Department has been at the forefront in the design of a series of schools. Here the quality of the environment is uppermost in the architect's mind. Today classrooms are designed with a much richer variety of materials and equipment. There is careful detailing performing technical functions. All skirting, kick boards and liners are beech, a costly but hard wearing material, and there are high specifications for fittings, such as brushed stainless steel ironmongery. An example of a school designed by the Hampshire County Architects Department is the Queens Enclosure that was completed in 1989. The school consists of a row of nine classrooms, and 'pods' which contain specialised activities that look onto the circulation spine, an arrangement that has proved educationally advantageous.

> *'The Queens Enclosure offers telling proof of the mature ease with which the Department responds to the varied demands of the educational requirements of a primary school, and the adaptability of the steadily evolving combination of defined and shared teaching spaces. Most teaching in modern primary schools is based around small group working rather than the traditional 'chalk and talk', and the spacious interior of the school provides an ideal setting for the varied activities which the children engage. With the advent of the National Curriculum these are set to become even more varied, and learning – rather than formal teaching – will increasingly depend upon group and individual working using a range of educational resources.'* (Weston, 1991: 26)

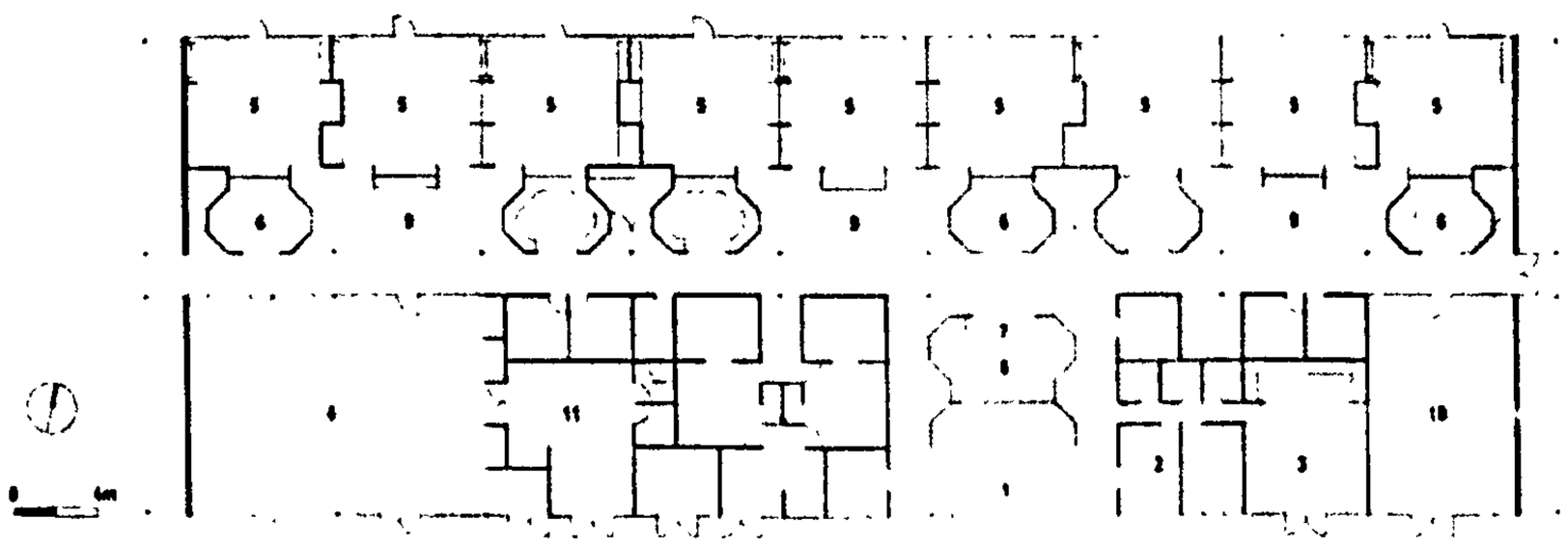


Figure 3.27: Queens Enclosure, Plan, 1989

Figure 3.28: Queens Enclosure, Entrance, 1989

Figure 3.29: Queens Enclosure, Shared Space, 1989

Though as can be seen from the statement, the Queens Enclosure was designed based around small group working, the following chapter highlights the most common forms of class organisation encountered in today's primary classrooms are whole-class and individual. However, its success lies in providing both defined and shared teaching spaces which provide a variety of settings for the varied teaching and learning activities associated with the National Curriculum. Through the 1980s Hampshire County Council built primary schools which were site specific and although briefs were similar, the results were very different, providing a variety of solutions rather than standard solutions.

A more recent school project described in the Royal Institute of British Architects Awards citation as 'innovative' and 'bold and dynamic' in its design process, Hampden Gurney School is an exciting solution to the problem of a tight urban site in the heart of the inner city. The 3,400 square metres school is built on six storeys one of which is at lower ground level. Bridges link the open-air play decks across a small full height central atrium to an embracing masonry L-shaped wing. The plan is very similar for the three main school floors with the two stair towers at the end of the L-shape holding the classrooms and in the case of the upper floors sandwiching a central library/resource room. Thus each floor functions totally independently, complete with its separate play area. The top floor has a technology room and garden partially covered by a tensile fabric tent roof.

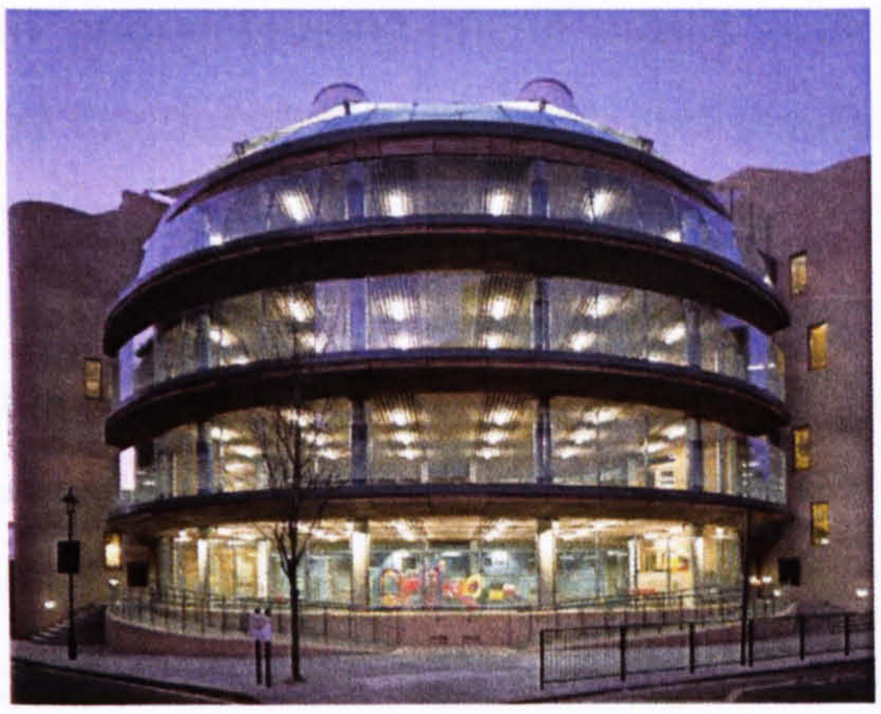
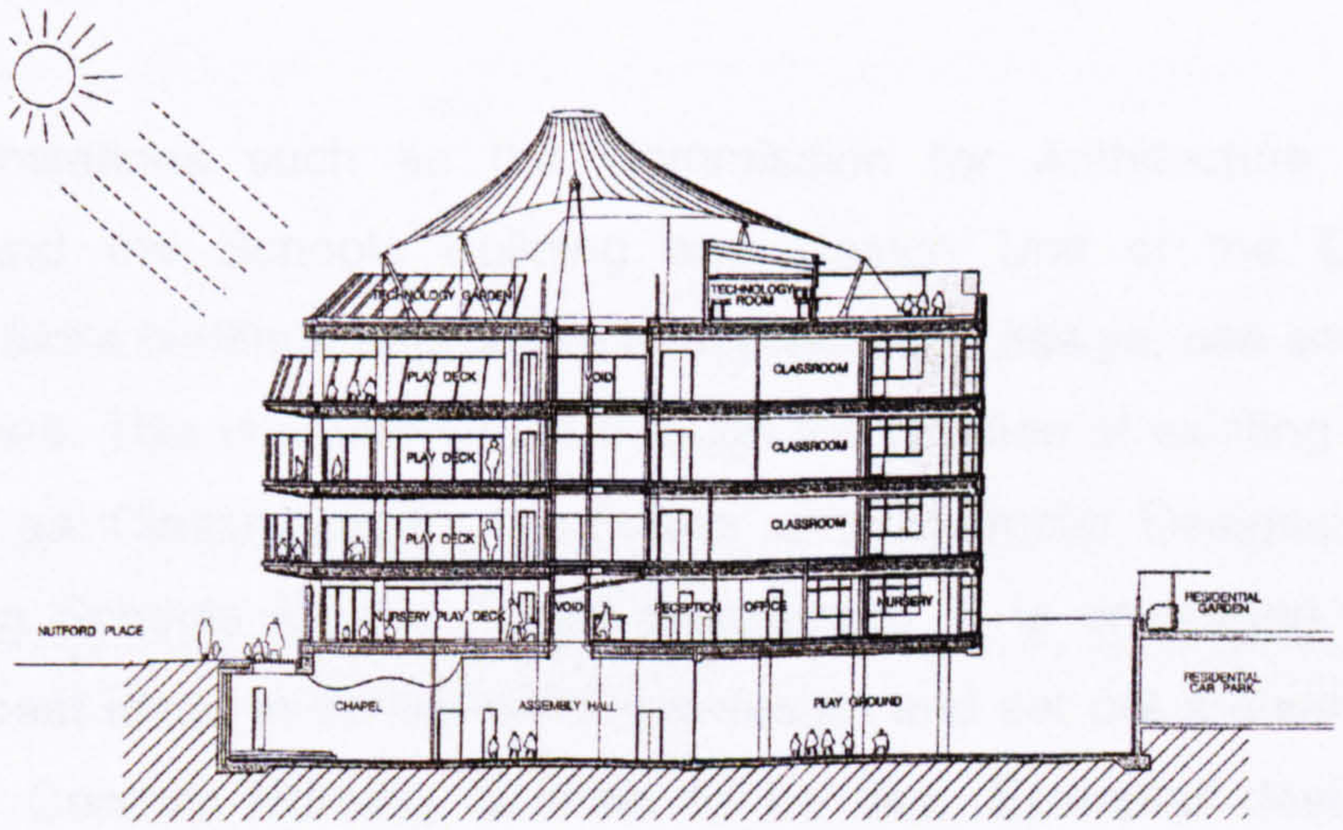


Figure 3.30: Hampden Gurney C of E Primary School, external night view, 2002

Figure 3.31: Hampden Gurney C of E Primary School, classroom, 2002



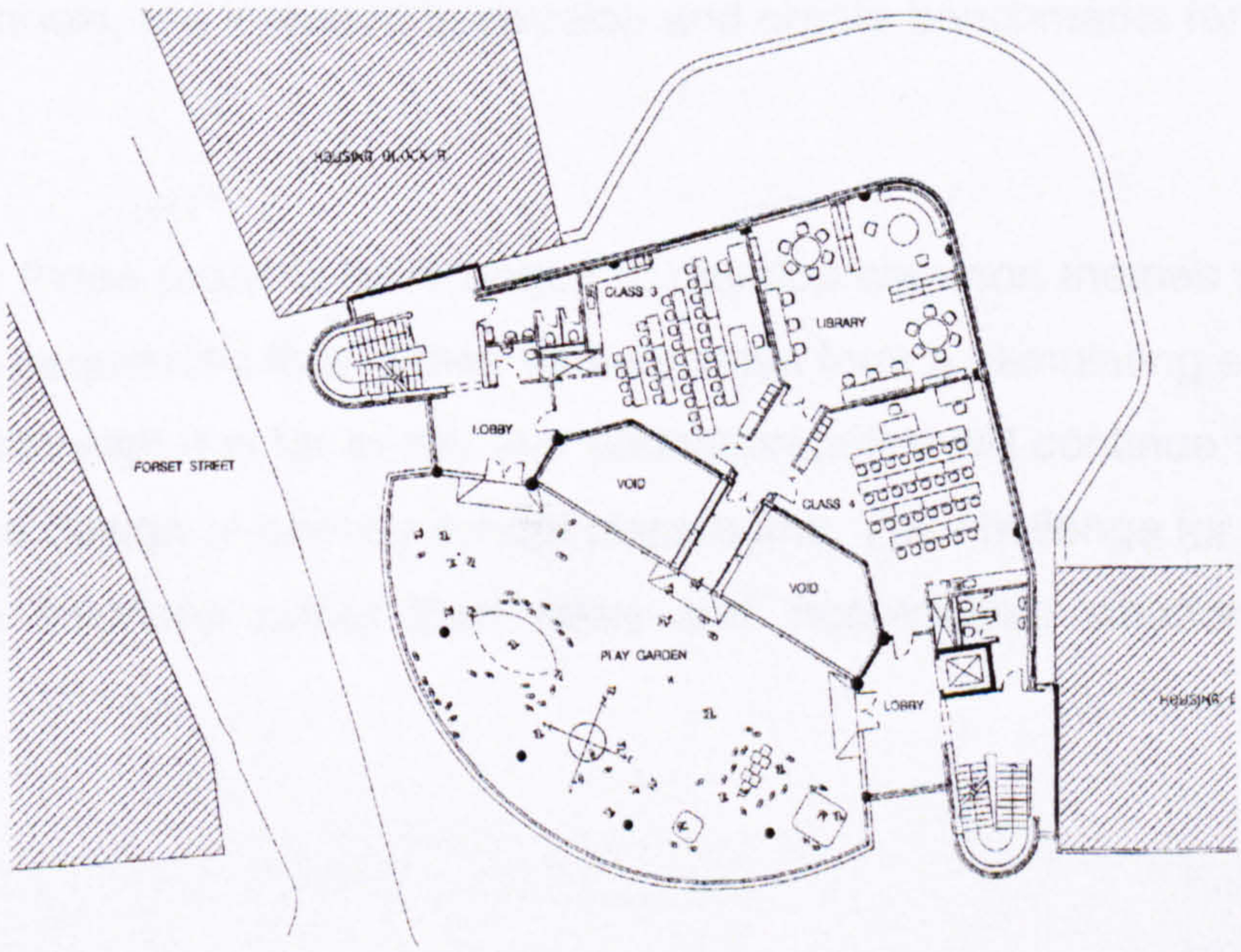


Figure 3.32: Hampden Gurney C of E Primary School, section, 2002

Figure 3.33: Hampden Gurney C of E Primary School, second floor, 2002

More recently the Private Finance Initiative was introduced to create a framework for private sector investment in public sector infrastructure projects and was gradually applied to educational building and services. The United Kingdom now has the largest capital investment programme for over thirty years and by 2005-06 it will be £5.2bn, of which at least £500m will fund improvements in primary schools. The investment will result in a large number of schools being modernised and rebuilt and much of this work will be achieved via the Private Finance Initiative (CABE, 2002). This is a massive opportunity and its legacy will live with us for the next fifty years or so and for this reason until the link between high quality classroom environments and learning and teaching outcomes relating to the curriculum are made, the potential for mediocre school design will remain. It is also difficult to see how schools tied into Private Finance Initiatives and other contracts will be able to adapt classroom environments to the changes of time.

However organisations such as the Commission for Architecture and the Built Environment and the Schools Building and Design Unit of the Department for Education and Skills continue to promote best practice in design, use and management of school facilities. This is implemented through the revision of existing guidelines and initiatives such as 'Classrooms for the Future' and 'Exemplar Designs' in preparation for the Building Schools for the Future programme. It is envisaged that these will represent the best ideas in school buildings design and set out a clear vision of what we want 21st Century learning facilities to be like. Exemplar designs are being developed to improve the design and quality of school buildings. The designs, including five primary schools, are intended to develop and create benchmarks for well designed schools.

To summarise, these projects have begun to develop common themes and all contain exciting spatial sequences that in their various ways form a stimulating environment for learning, and although it is far to say that education policy will continue to develop and in turn effect the design of primary school classrooms. The challenge for architects is to design flexible solutions rather than static and incompatible solutions of previous generations.

3.11 Developments in Educational Theory

At the beginning of the twentieth century new educational ideas began to be developed across Europe and America. Whilst traditional methods were employed there was a growing increase in child psychology which led to a more enlightened approach to the educational needs of large pupil numbers within Britain's expanding cities and educational reformers such as John Dewey (1859-1952), Froebel (1782-1852) and Maria Montessori (1870-1952) are still held in high esteem internationally.

In 1899, an American called John Dewey published a book called *School and Society* that captured the imagination of a new generation of educators. Dewey promoted a more open approach to the school environment. He believed that the school is primarily a social institution. Education being a social process, the school is simply that form of community life in which all those agencies are concentrated that will be most effective in bringing the child to share in the inherited resources of the race, and to use his own powers for social ends.

Froebel was a philosopher whose ideas had a marked effect on early childhood education in pre-school and primary years. His most influential work was *The Education of Man,* in which he advocated a form of education which was broadly based, interrelated, and led by the interests of the child. His emphasis was on 'doing' and 'creativity', convinced of the importance of structured play and learning activities that provide the child with worthwhile knowledge and experience. Froebels ideas were built upon by such British educationalists as Margaret McMillan who had a considerable influence on the development of primary education, and especially of the education of nursery and infant aged children. They forwarded an approach to education which emphasised their physical care and development. They opened their first nursery in Deptford, London in 1911. They were enthusiastic supporters of the ideas of Froebel, believing that feelings and emotions were critical to the development of children's personalities, nurtured and made effective through imaginative play.

By the 1920s in Britain, the ideas of Froebel and McMillan had been developed into a body of widely spread educational practice, termed the 'New Education', considered more 'progressive' than that found in the rest of the Elementary School system. This was, remember, still only 50 years after compulsory schooling for young children had first been introduced.

Maria Montesorri developed a theory and practice-based education. She first came into contact with educational questions as part of her work as a junior doctor at a psychiatric clinic in Rome. Working with children with learning disabilities she confirmed her ideas that a stimulating environment, the development and coordination of movement as well as development and refinement of their sensory perceptions did far more to promote the development of these children than purely medical approaches. Like Froebel, Montesorri argued that the learning environment of both school and classroom should support the principle of rediness. Her work is available in English translation both in the original version, *The Montessori Method*, and a reworked version entitled *The Discovery of the Child*, in which she describes her work in the 'Children's House' and how she developed her theory.

Montessori ideas are emphasised in a number of different contexts. The child is an individual, who possesses a fundamental creativity and spontaneity of action and is not bound by instinct, but has a certain degree of freedom of action. Believing that the child's work is to actively engage with the environment in order to grow into an independent human being.

> *'The most important help a teacher can provide is for a Montessori the creation of a prepared environment. By that she means an experimental arena for the child that is tailored to their physical dimensions, capabilities and development needs (sensitivities). The central element of the prepared environment in the first and second stage of development (0-6 and 6-12 years) is the teaching materials.'* (Ludwig, 2002)

In the primary school Montessori materials are a central part of every classroom, which are complemented by other teaching materials aimed at stimulating self-directed learning. Each classroom has its own library, reading corners, niches and storage organised by subject area and small kitchens, facilities that provide the foundations for children to develop autonomy and for group activities, which gradually found many supporters among the progressive sections of society. The relation between the child and the teacher is based on the teacher's respect for the child's expression of its will, its spontaneity, and an ability to emphasise with its sensitive phase.

3.11 Summary

School classrooms have always reflected the social change and developments in educational theory and today's classrooms are far removed from the large schoolrooms of the mid-nineteenth century in which hundreds of children could assemble for instruction. There have been some enormous periods of growth and development reflecting the recognition of education in modern society. However, in between there have been stages of inadequate funding which reduced the quantity and quality of primary school designs.

Generally though primary school buildings have always taken close account of their functional purpose and it is possible to see the development of educational ideas and teaching methods through the changing form of primary school buildings. The 1870 *Education Act* was the significant turning point for the foundation of nationwide schooling. Initially the form of the classroom was rigid as this was convenient in terms of planning and allowed for an education that was 'teacher-centred', with the teacher standing at the front of the classroom and pupils seated facing towards the master (Seaborne and Lowe, 1977). Development was rapid and school buildings were built based around the form of the eighteenth century house with classrooms positioned around an assembly hall (Robson, 1874; Dudek, 2000).

School buildings in the 1920s and 1930s began to inccrporate considerations of health and hygiene and changes in educational policy, brought about by the increase in pupil numbers and recognition of the diverse needs of children. (Seaborne and Lowe, 1977; Saint, 1987). In the late 1930s and 1940s new generations of children were accommodated in large schools based on new principles of construction and multi-functional classrooms that met the social and academic aspirations of the time.

The post-war period produced a massive rebuilding of schools which led to standardisation and prefabrication from which evolved the so-called 'corridor plan'. This was developed leading to a revolutionary solution of school design known as the 'finger-plan'. However the need to reduce building cost minimised circulation areas while maximising the area usable for teaching leading to clusters of classrooms around an assembly hall (Saint, 1987). The development of this and a response to the educational philosophy of the period led to open-plan classrooms that offered greater organisational flexibility, openness and a reduction in circulation areas.

Educational theories have continued to evolve with a move away from 'child-centred' teaching methods of the 1960s and 1970s exemplified by open-plan schools to a more hybrid approach which reflects the compulsory nature of the National Curriculum subjects and the evolving views on how children learn.

To summarise, although primary education in terms of its theories and teaching methods has been positively developed since the beginning of the last century, the architecture of school buildings and classroom environments has responded slowly to educational changes always tending to lag behind educational ideas and this seems largely due to a lack of interrelations between educators and architects. This has resulted in a mismatch between the present teaching and learning strategies and the varying strengths and weaknesses of the range of existing classroom environments.

In light of this there is a need to consider the challenges facing the existing stock of primary school classrooms especially as today many children are still compelled to attend classrooms in schools designed and built over a century ago. This has highlighted a need to provide new or adopt existing classrooms to provide the most functional environments in which to teach and learn.

The following chapter is about class and classroom organisation, describing the ways in which the class and classroom are structured to facilitate teaching and learning, discussing the different aspects of organisation and providing an overview of how current practice has developed.

3.12 References

Armfelt, R. (1950) Our changing schools: a picture for parents / prepared for the Ministry of Education by the Central Office of Information, London: HMSO.

Beeton, K. (1999) 'Modernising the school infrastructure in England'. Keynote talk, UEF/PEB/CAE International Symposium, Baltimore, MD.

Burns, R. S. (1856) *The Arrangement, Construction and Fittings in Schoolhouses,* Edinburgh: Blackwood. Cited in: M. Seaborne (1971) *The English school: its architecture and organization [Vol.1]: 1370-1870,* London: Routledge and Kegan Paul.

Commission for Architecture and the Built Environment (2002) *Client Guide: Achieving well designed schools through PFI,* London: CABE

Clay F, 1902, *Modern School Buildings Elementary and Secondary, a handbook on the Planning, Arrangement and Fitting of Day and Boarding Schools,* Batsford, London.

Curtis, S. J. (1967) *History of education in Great Britain* (7th ed.), London: University Tutorial Press.

DES (1967a) *Children and their Primary Schools. A Report of the central Advisory Council for Education (England). Vol. 1: The Report. (Plowden Report),* London: HMSO.

DES (1967b) *Eveline Lowe Primary School, London Building Bulletin 36,* London: HMSO.

DES (1977) *A Study of School Buildings,* London: HMSO.

DfES (2002) *Statistics of Education: Schools in England 2002 Edition,* London: The Stationery Office.

Dixon, R. & Muthesius, S. (1978) *Victorian Architecture,* London: Thames and Hudson.

Dudek, M (2000) *Architecture of Schools, The New Learning Environments,* London: Architectural Press.

Gardner-Medwin, R. and Wright, H., M. (1938) *The Design of Nursery and Elementary Schools.* London: The Architectural Press.

Great Britain (1870) *Elementary Education Act, 1870,* London: HMSO.

Great Britain (1870) *Elementary Education Act, 1902,* London: HMSO.

Great Britain (1926) *The education of the adolescent (Hadow), 1926,* London: HMSO.

Great Britain (1931) *The primary school (Hadow), 1931,* London: HMSO.

Great Britain (1933) *Infant and nursery school (Hadow), 1933,* London: HMSO.

Great Britain (1944) The Education Act, 1944 (Butler), 1944, London: HMSO.

King, D.S. (1904) The Final Report of the School Board for London, 1870-1904, School Board for London.

Ludwig, H., *Maria Montessori's Fundamental Ideas on Education,* in T. Müller & R. Schneide (Eds.) (2002) *Montessori: Teaching materials 1913-1935, Furniture and Architecture.* Munich: Prestel, pp.17-25.

Maclure, S. (1984) Educational Development and School Building: Aspects of Public policy 1945-73, Harlow: Longman.

Manning, P (Ed.)(1967) *The primary school: an environment for education*, by the Pilkington Research Unit, University of Liverpool: Department of Building Science.

Ministry of Education (1947) *The story of post-war school building: Ministry of Education pamphlet no.33*. London: HMSO.

Ministry of Education (1949) New primary schools: Building Bulletin 1, London: HMSO.

Ministry of Education (1951) Primary school plans: Building Bulletin 6, London: HMSO.

Ministry of Education (1958) Development Projects: Junior School, Amersham: Building Bulletin 16, London: HMSO.

Montessori, M. (1912) The Montessori Method: scientific pedagogy as applied to child education in 'the Children's Houses', London: Heinemann.

Montessori, M. (1948) The discovery of the child / translated (from the Italian) by M. A. Johnstone, Madras : Kalakshetra.

Robson, E., R. (1877) *School Architecture: being practical remarks on the planning, designing, building and furnishing of school houses* (2nd ed.), London: Murray.

Roth, A. (1950) *The new school = Das neue Schulhaus = La nouvelle ecole*, Zürich: Girsberger.

Saint, A. (1995) *The Architecture of the Board Schools*, in C. Clark and M. Seaborne (Eds.) (1995) *Beacons of learning*, breathing life into new schools, London: Save Britain's Heritage.

Saint, A, (1987) *Towards a Social Architecture, The Role of School Building in Post-War England*, New Haven and London: Yale University Press.

Seaborne, M. (1971) *Primary School Design*, London: Routledge & Kegan Paul.

Seaborne, M. (1971) *The English school: its architecture and organization (Vol.1): 1370-1870*, London: Routledge and Kegan Paul.

Seaborne, M. & Lowe, R. (1977) *The English school: its architecture and organization (Vol.2): 1870-1970*, London: Routledge and Kegan Paul.

Weston, R (1991) *Schools of Thought: Hampshire Architecture 1974-1991*, Winchester: Hampshire County Council

Wheeler, S., *Education and the changing World*, The Architects Journal, 28 (7), 1453-1473.

CHAPTER 4: CLASS AND CLASSROOM ORGANISATION

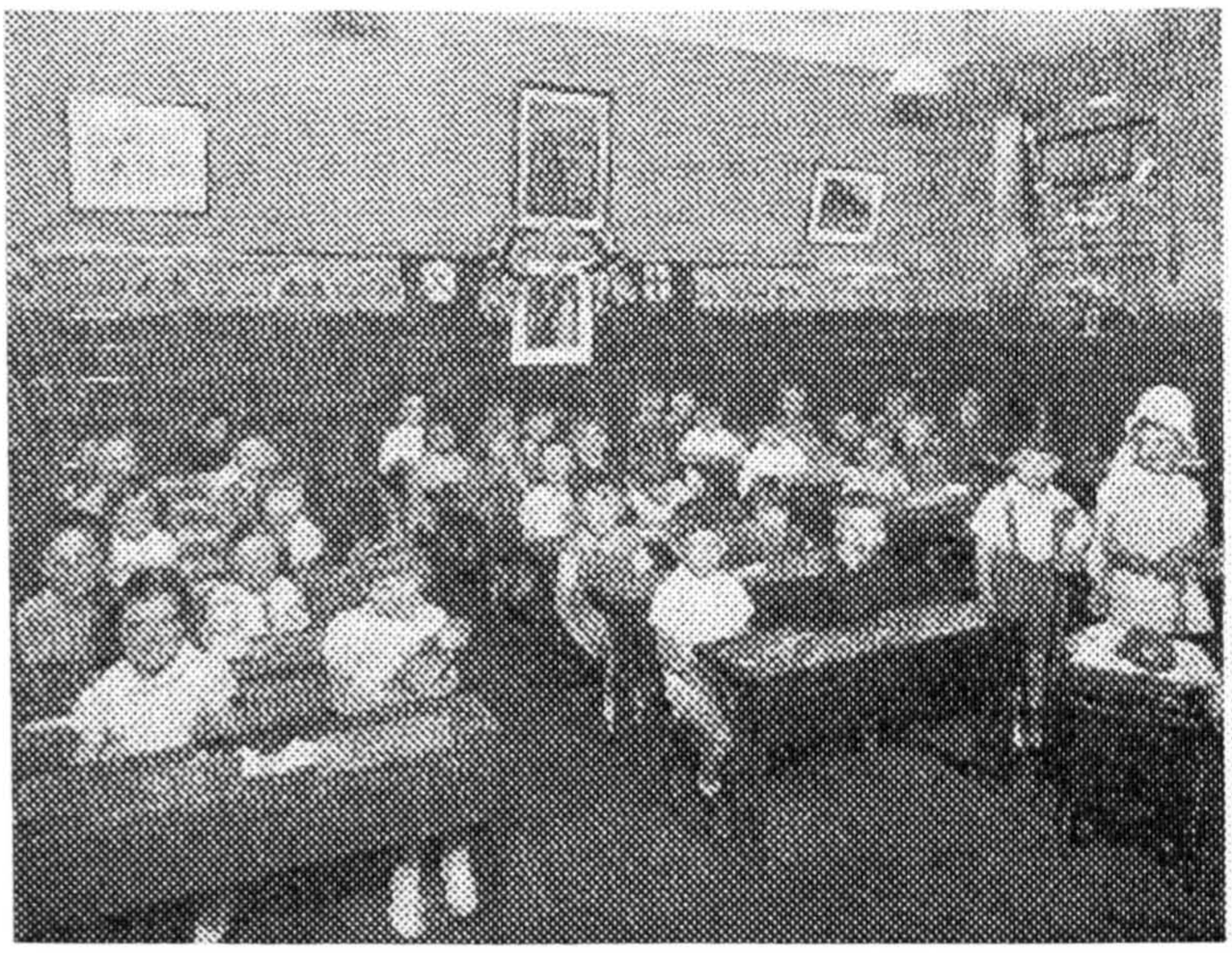
4.1 Introduction

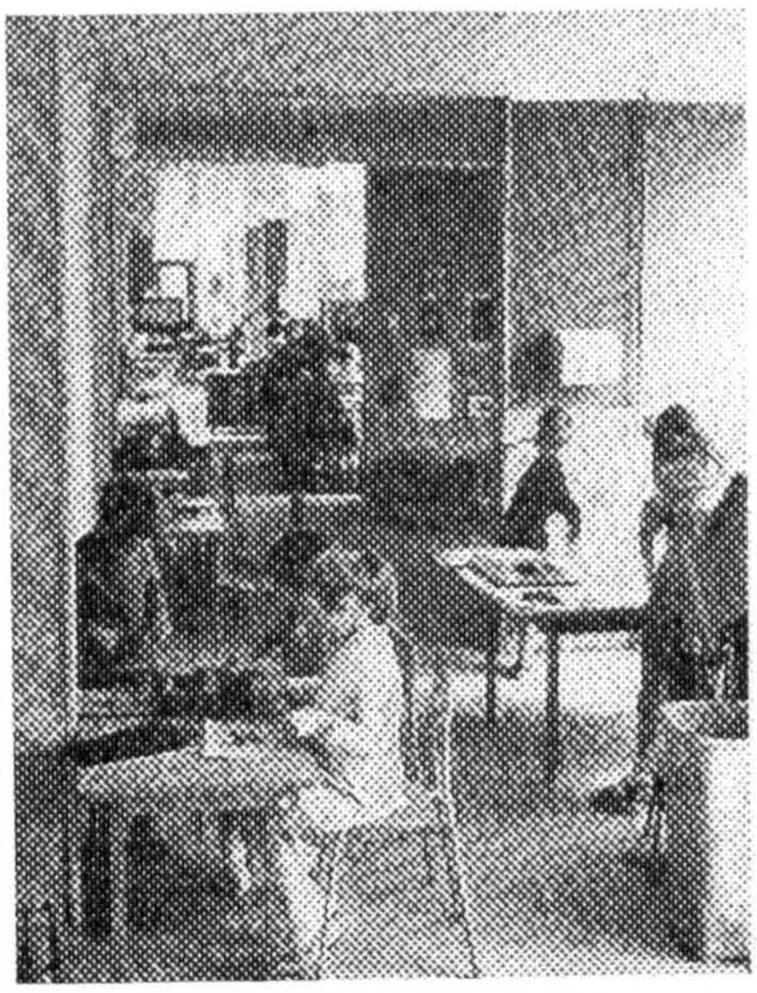
This chapter is about organisation in primary classrooms, the way in which the class and classroom are structured to facilitate teaching and learning. It discusses the different aspects of organisation, providing an overview of how current practice has developed, whilst, in turn, revealing the relationships between classroom organisation and teaching and learning, which are situated and framed by space and time. The chapter presents seven key organisational issues which are: recent developments in classroom organisation, research into organisation, task and activity, forms of class and classroom organisation, the use of the classroom environment, the use of resources, the use of time, organisation in relation to teaching and learning strategies and classroom organisation and layouts

4.2 Recent Developments in Classroom Organisation

In mainland Europe types of classroom organisation differ, although there appears to be a move away from rows to groups. Elsewhere in Russia and India for example, rows remain the norm as they where in primary classrooms until the mid-1960s, when practices changed (Alexander, 2000).

In 1967 a report published by the Central Advisory Council for Education, entitled *Children and their Primary Schools* (DES, 1967) but better known, as 'The Plowden Report' served as a changing point in primary education. Before the Plowden Report existed 'traditional' primary education, in which children were taught as a whole class and typically sat in rows. In the years following its publication grew the 'progressive' era of primary education. The 'progressive' era was characterised by changes to the curriculum and teaching methods that were pupil-centred believing in the need for education to engage with children as individuals. This form of organisation reflected the philosophy of the time which emphasised the child as being the 'heart of education' and which extolled the principle of individualisation, while recognising the educational and social virtues of collaborative learning (DES, 1967:para 1). A glance at the photographs in the Plowden Report shows that teachers in the first half of the 1960s arranged pupils in a variety of ways. The photographs show children working individually, in pairs with other pupils and in larger groups. The only photograph of a class sitting quietly in four rows all facing the same way dates from 1937, although evidence suggest that there were similarly arranged classrooms in the 1960s.





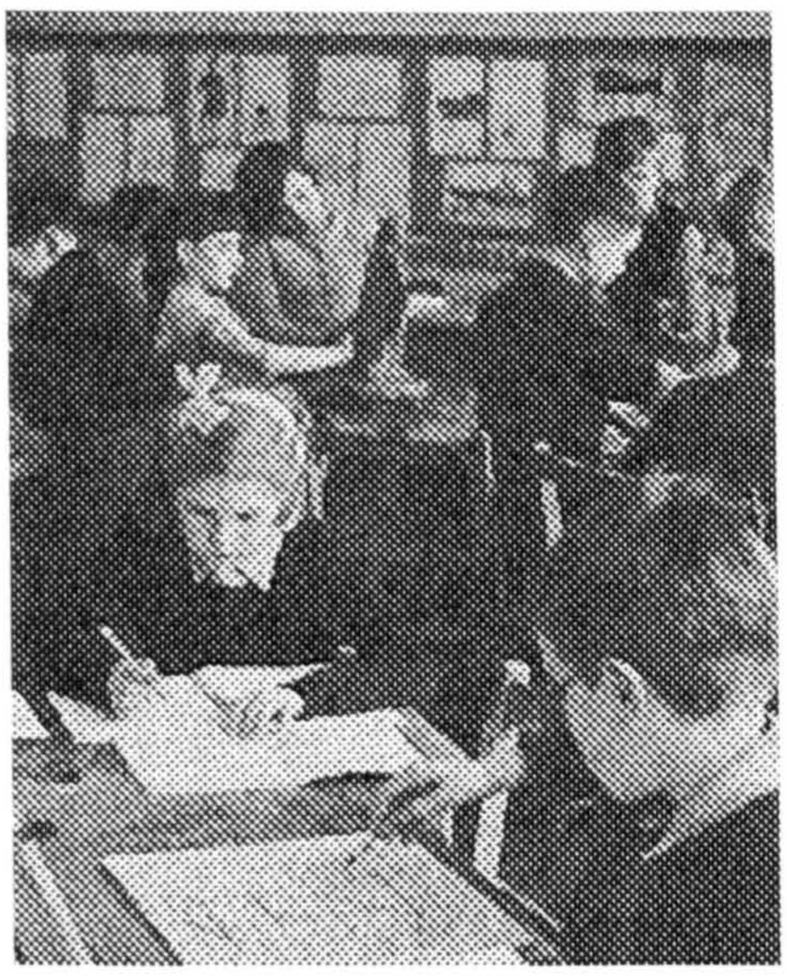


Figure 4.1: Children at work, 1937 (Top left)

Figure 4.2: Children at work, 1966 (Top right)

Figure 4.3: Children at work, 1966 (Bottom Left)

Figure 4.4: Children at work, 1966 (Bottom right)

The Plowden Report endorsed a reduction in the proportion of time that teachers were spending teaching the whole-class (DES, 1967:para 754) and increase the proportion of time that children should be taught as individuals (DES, 1967:para 754) and as members of small groups (DES, 1967:para 755). Nevertheless, this proposition of classroom practice was somewhat false and has been questioned. Galton *et al.* (1999) states that:

> *'Pupils spent most of their time working in the base rather than moving around the class, and communicated only infrequently either with their teacher or with others in their group.'* (Galton *et al.*, 1999:40)

However, it is generally acknowledged that the Plowden Report was substantially responsible for the development and nature of primary practice of subsequent decades. The emphasis the Plowden Report placed on the merits of group teaching and on children working in collaboration, made it rational for classrooms to be arranged to support these activities. In addition, sophisticated forms of classroom organisation such as the 'integrated day' were introduced to manage the problem of providing individual children with appropriate direct learning experiences (Walton, 1971).

During this period the only systematic surveys of junior school classroom organisation were those carried out by Moran (1971) and Bealing (1972), which concluded generally that teacher control remained tight within the 'integrated day' although the transition to 'informal' classroom structures had been widely adopted, stating that:

> *'Despite the relatively informal classroom layouts adopted by the vast majority of teachers there was so much evidence of tight teacher control over such matters as where children sit and move that it seems highly doubtful that there is much opportunity for children to organize their own activities in most classrooms.'* (Bealing. 1972:235)

Later that decade, a report by Her Majesty's Inspectorate, *Primary Education in England* (DES, 1978) showed that most of the teachers surveyed grouped children in various ways for some part of their work, with groups varying according to subjects being taught and activities undertaken and were usually formed or reformed for particular purposes.

4.3 Research into Organisation, Task and Activity

Over the last 30 years there have been two main types of study concerning the use of groups in primary school classrooms, those showing that a particular method can enhance classroom learning and those showing that the groups in which children are seated are unlikely to produce the interaction that promotes classroom learning. Firstly, infant based, such as Bennett *et al.* (1984), who noticed that teachers organised their classrooms to allow children to sit around tables but, for the most part, the children pursued individual courses of work. Secondly, junior based, such as Galton and Williamson (1992), which found a dramatic contrast between the amount of time

children were seated in groups and the amount of time these children worked collaboratively.

The first large scale observational study of primary classrooms undertaken was the research programme, Observational Research and Classroom Learning Evaluation (ORACLE) over the period of 1975 to 1980. The main focus of the ORACLE study was the curriculum; the way teachers taught it and how the pupils responded. The study followed the progress of pupils in their last two years in primary school and through the first year of their new school. The study used systematic observation techniques in a wide range of classrooms to gather data of the nature of classroom events. Galton *et al.* (1980) showed that the majority of primary classroom children sat in groups but rarely interacted and worked as groups, instead children worked individually or as a whole class, an accurate portrayal of classroom organisation at a time when the pre-war image of the primary classroom as a place where children sat behind rows of desks had virtually disappeared, with children only sitting in rows in four of the fifty-eight classrooms observed. Further observations from the study reveal, that the teacher no longer stood in front of the blackboard, or instructed the pupils from behind a centrally positioned desk, but instead, moved around the room interacting with pupils.

As the table below shows, children in the 1976 ORACLE and the 1996 ORACLE studies mainly sat together in groups or as a class and there has been a shift away from pairs towards group work.

Base group	ORACLE 1976	ORACLE 1996
Alone	5.1	5.0
Pair	15.3	11.1
Class	no category	13.3
Group*	74.3	68.8
Not coded	3.3	1.8
Totals	100.0	100.0

Note: * There were no separate categories for the 'class' in the ORACLE 1976 study, so group denoted and arrangement where more than two pupils sat together.

Figure 4.5: Composition of base of pupil during observation sessions (percent of all observations)

More information about the use of collaborative learning comes from the records of activities that pupils were set. The comparison of the data from both studies shows a decline in individual interactions and a corresponding increase of teacher-pupil

interaction with both group and class (Figure: 4.6). Individual interactions have changed from 43.1% to 48.4%, group interactions have changed from 14.6% to 16.4% and class interactions from 31.3% to 35.2% when the two sets of figures representing all interactions (outside the brackets) and teacher-pupil interactions (inside the brackets).

	ORACLE 1976	ORACLE 1996
Individual	55.8[a] (71.2)[b]	43.1 (48.4)
Group	7.5 (9.8)	14.6 (16.4)
Class	15.1 (19.0)	31.3 (35.2)
Total	78.4 (100.0)	89.0 (100.0)

Note: a, Figures in first column represent the percentage of all interaction. b, Figures in brackets represent the percentage of teacher-pupil interaction.

Figure 4.6: Changes in audience categories 1976 –1996

The table below shows the different patterns of pupil-teacher interaction in different audience contexts. The figures are slightly different from the previous table because the nature of teacher's audience for the silent interaction categories was not always recorded. The use of statements was greatest during individual interactions and lowest in class settings in both the 1976 and 1996 ORACLE data. The figures also show a reverse trend for questioning, with the use of questioning greatest during class interactions and lowest in individual settings.

Activity	Individual	Group	Group	All
Questions	15.8	18.1	21.9	18.3
Statements	71.3	65.0	62.3	67.1
Silent Interaction	12.7	14.6	12.9	13.1
No Interaction	1.7	3.8	4.5	2.9

Figure 4.7: Context of pupil-teacher interaction in1996

However, these broad categories mask some important variations:

> *'While most individual interactions involved talking 'at' pupils, much of this talk also appeared to concern telling pupils what to do (task supervision) rather than, for example, providing them with task information.'* (Galton *et al.*, 1999:69)

As figure 4.8 shows, it was in the whole class setting that the percentage of individual task supervision interactions was double that for class audience, and in contrast it was the whole class setting that both task statements and questions were highest. The data also reveals that task interactions were two and a half times as frequent when teachers were interacting with individual pupils, and the proportion of challenging questions was also highest in class and lowest in individual settings.

Activity	Individual	Group	Class
Questions	21.0 (22.4)*	35.9 (30.2)	48.8 (43.0)
Statements	50.9 (54.5)	39.0 (39.0)	24.7 (30.8)
Silent Interaction	28.1 (23.0)	24.8 930.6)	26.5 (26.5)
No Interaction	100.0	100.0	100.0
Task Statements	9.5	13.8	22.7
Challenging questions (open and closed)	5.6	9.5	11.1

Note: * ORACLE data given in brackets where available.

Figure 4.8: Percentage of interaction with different audience categories (1976-77 ORACLE where available in brackets)

The original ORACLE study identifies a number of teaching styles indicating a clear relationship between classroom seating arrangements and pupils' involvement in task. Comparing the ORACLE data from 1976 and 1996 shows that task activity has increased about 5% when the teacher interacted with either a group or the whole class and interactions with individual have also increased by around 5%. However, apart from these small differences, the two studies have shown a consistency over the two decades. Although as stated by Galton *et al.* (1999):

> *'What does seem to have changed is the nature of tactics (the individual moment-by-moment exchanges which take place between teachers and pupils) when teachers are involved with an individual pupil, or a group or a class of children.'*(Galton *et al.*, 1999:70)

In the period between the two ORACLE studies a number of other studies using the same or similar systems of observation were carried out. In the early 1980s the *Curriculum Provision in Small Schools* (Galton, 1990) project used a system in which the observation categories were extended to include more details about the curriculum. The project observed 188 teachers and their classes in sixty-eight small primary schools (less than 100 pupils on the role). They found that pupils sat alone for around

7% of the time, and in pairs and groups for over 70% of the time. However in terms of working arrangements, the pupils worked alone for over 80% of the time. Bennett and Blundell (1983) point out:

> *'Research on the utility and operation of groups in natural classroom settings is rare and provides little support for the benefits perceived by Plowden'*. (Bennett and Blundell, 1983:94)

Their research into the effects of seating arrangements on the quantity and quality of work produced by two classes of 10 and 11 year old children provided evidence to support teaching in rows. The findings of the study supported a marked improvement in quantity of work when children worked in rows and a less marked decline when they were re-seated in groups. Although, the trends for quality of work were more varied, generally quantity was not generally being achieved at the expense of quality. However, this was a small scale study of 80 mixed ability fourth year children in two parallel classes and the research concluded that:

> *'the increasing evidence from experiments of this kind that quantity of work improves with the corresponding maintenance of quality when working in rows should not be taken as a prescription for abandoning classroom groups'*. (Bennett and Blundell, 1983:94)

The existing research provides evidence that there is a mismatch between group seating and the individual work which children are asked to do; classes spend a greater proportion of their time actively involved in individual work in rows rather than in groups; seating arrangements do make a difference for some children, but for some children seating arrangements seem to have little significance. A study by HMI (1985) supports this view, noting that 'individual work, when overdone, allows the teacher little time to discuss difficulties with the children in more than a superficial way and provides too few opportunities for the children to learn from each other.

The *Implementation of the National Curriculum in Small Schools* (INCSS) undertaken in 1989-1990 (Galton *et al.*, 1998) noted that the classroom organisation described in the 1976 ORACLE study had remained remarkably stable. In the same period, Bennett and Dunne (1990) analysed the conventions that took place in groups studying different aspects of the curriculum. They found that children were generally working together, task related talk was very high, averaging 88%. Children working in groups

where they were expected to cooperate to achieve the task demonstrated much greater involvement in their work and the amount of task related talk was 22% higher than in groups where children were working individually.

Galton and Williamson (1992) found a contrast between the amounts of time that children sat in groups and the amount of time they worked collaboratively, revealing that children were seated in groups for 60% of their time but asked to work as a group for only 5% of their tasks. In contrast, the children sat as individuals for 8% of their time but worked as individuals for 80% of their tasks

The *Primary Assessment Curriculum and Experience* (PACE) (Pollard *et al.* 1994; Croll 1996), project tracked the impact of the 1988 Education Reform Act on primary practice. The PACE research indicated a further fall in individual teacher-pupil interactions and a further increase in whole class teaching, showing a considerable increase in class teaching compared with the 1976 ORACLE findings. The table below cited in Galton *et al.* (1999) summarises the main results of a series of studies involving observation in primary classrooms, separated into infants (Key Stage 1) and juniors (Key Stage 2).

	Teacher interacts with:		
	Individuals %	Groups %	Whole class %
ORACLE (Galton and Simon 1980), Late 1970s Junior classes	72*	9	19
PRISMS (Galton and Patrick 1990), Early 1980s Infant classes Junior classes	61 58	13 16	26 26
School Matters (Mortimore et al, 1988), mid-1980s Junior classes	65	10	25
INCSS (Galton et al. 1998), early 1989-90 Junior classes	59	18	23
PACE (Pollard et al. 1994; Croll 1996), 1990-95 Infant classes Junior classes	50 57	19 14	32 30

Note * figures have been rounded up to nearest whole number.

Figure 4.9: Summary: observational studies of teacher-pupil interaction

Different observational instruments and subjects in different studies mean that the results only portray an overall picture of the physical organisation of present primary classroom environments. To summarise, the evidence suggests that work related interactions between pupils have increased, but they still account for less than 15% of pupils' time, with this collaboration mostly taking place in pairs. Within the classroom collaboration within a group is rare as are tasks that intend children to collaborate. However, there is a strong theoretical case for using collaborative learning and the benefits of well structured activities requiring collaboration (Kutnick and Manson, 2000).

Like Plowden, *Curriculum Organisation and Classroom Practice in Primary Schools* (Alexander *et al.*, 1992) also conceptualised primary teaching in terms of individual, group and whole-class teaching activities. Their task was:

> *'to review the available evidence about the delivery of education in primary schools and to make recommendations about curriculum organisation and, teaching methods and classroom practice appropriate for the successful implementation of the National Curriculum, particularly at Key Stage 2'.* (Alexander *et al.*, 1992:5)

Individual teaching was seen as an understandable aspiration as every child is different and may at times need particular help from one teacher.

> *'Pupils, for example, with learning difficulties will need one-to-one teaching for some of the time. However, it must also said that children have much in common, and that, in practice, the effort to teach every pupil in the class as an individual is fraught with difficulties. In such circumstances, the evidence shows that however skilled and energetic the teacher, each individual pupil receives a minute proportion of the teacher's attention'.* (Alexander *et al.*, 1992:27)

Whereas whole class teaching appeared to provide order, control, purpose and concentration, stating that:

> *'Whole class teaching is associated with higher-order questioning, explanations and statements, and these in turn correlate with higher levels of pupil performance... the potential weakness of whole class teaching need, however, to be acknowledged. There is a tendency for the teaching to be pitched too much towards the middle of the ability range, and thus to risk losing the less able and boring the brightest.'* (Alexander *et al.*, 1992:28)

However, despite these potential weaknesses whole class teaching is identified as an essential teaching skill, which all primary school teachers should use appropriately. As for groups, the report had a different emphasis; groups were considered in terms of children collaborating in learning and of the teachers' role as manager of a class comprising groups working in this way. The report points out that:

> *'The practice of organising the class in groups is common in all school. Teachers groups pupils in various ways - by comparable activity, by mixed ability, by friendship, by gender and randomly. Some use groups some of the time; others all of the time. Some maintain the same groupings; others vary the group according to task or subject.*
>
> *Grouping pupils within the class enables resources to be shared; fosters social development ... and above all, provides for pupils to interact with each other and their teacher.*
>
> *The fact, however, that pupils are seated in groups does not necessarily mean that they are working as a group. All too often there may be a mismatch between the collaborative setting of the group and the individual tasks which are given to pupils. The result is that the setting may distract pupils from their work.* (Alexander *et al.*, 1992:29)

The report also affirms that primary teachers had been devoting too much time to teaching individuals and making insufficient use of whole-class teaching, highlight that a balance must be struck and that teachers must have the skills and judgement to select and apply which ever organisational strategy is appropriate.

> *'The organisational Strategies of whole-class teaching, group work and individual teaching need to be used more selectively and flexibly. The criterion for choice must be fitness for purpose. In many schools the benefits of whole-class teaching have been insufficiently exploited.'* (Alexander *et al.*, 1992:35)

The report also went on to make recommendations about the deployment of teachers beyond the traditional 'one teacher one class' model, stating that:

> *'primary teaching roles in the past have been too rigidly conceived and much greater flexibility of staff development is needed.'* (Alexander *et al.*, 1992:43)

Identifying at least four broad teaching roles, including Generalists to teach most or all the curriculum, generalist/ consultant who combine a generalist role with cross-school co-ordination in one or more subjects, Semi-specialists who teach specific subjects but also have a generalist or consultancy role and Specialists who teaches a specific subject full-time.

Another more recent study; *The Nature and use of Classroom Groups in Primary Schools* (Blatchford *et al.*, 1999) found that teachers taught a large range of group sizes including pairs, small groups, and groups with 7-10 pupils in addition to working with individuals or the whole-class, revealing that large groups of 7 –10 pupils were in greater use in Key Stage 2 classrooms and small groups in Key Stage 2 classrooms. It also indicated that there was little relationship between grouping characteristics such as size and composition, learning task type and interaction between group members.

To summarise, the grouping of children for instruction is widespread in the British classrooms, a practice encouraged in the Plowden Report, conceived as the best compromise in achieving individualisation of learning and teaching within the teacher time available. Among the benefits the report envisaged for group work were that children learn to get along together, to help one another and realise there own strength and weaknesses, as well as those of others. It is apparent that most of a child's contact with a teacher happens when the teacher is working with the whole class, consequently in classes where teachers do more while-class activities, children get more teaching contact. This view is supported by, McPake *et al.* (1999), who's study of 12 Scottish primary school classrooms found that overall, children were in direct contact with their teacher for 41% of their classroom time. This was achieved because 32% of the time their teacher was interacting with the whole class.

4.4 Forms of Class Organisation

Bennett and Kell (1989) described poor classroom organisation that showed itself in a lack of pupil involvement, wandering about, interruption, and lack of interest or motivation and poor use of resources. Children played about without the teacher apparently being aware of it. There are four main types of class organisation that take place in primary classrooms: whole-class, individual, paired and group work.

4.4.1 Whole-class Teaching

All the pupils undertake the same activity, at the same time, whilst usually being addressed by the teacher. This is successful for starting and ending the day, for giving out administrative instructions, introducing, teaching, extending and reviewing work. The whole class can be organised so that everyone is being taught the same thing at the same time. This type of organisation is particularly useful where there is a need for a lot of discussion. Group or individual work often follows this, with children coming together again to discuss what they have just being doing.

4.4.2 Individual Work

This is thought to be particularly useful for developing children's ability to work independently at there own pace through a structured scheme. Children may work on an individual task chosen by the child, which may be either their own creative idea or an interpretation of a group theme.

4.4.3 Paired Work

This form of grouping allows children to work on a task together in collaboration. This not only helps by making different aspects of a problem more explicit, but it makes demands on each child's language ability.

4.4.4 Group Work

There are many situations when a class of children needs to be divided in order to undertake particular activities. A powerful argument for grouping is that it encourages collaboration and supports the interactions and discussions through which learning happens. It is often recommended for developing social and language skills and as a means by which pupils can support, challenge and extend their learning together, through problem solving or working on a creative task. Different types of grouping are needed for different activities and children should have the opportunity to be part of different groups and grouping should be flexible and varied. Dean (1992) describes seven types of grouping arrangements, these are: grouping by age, ability grouping, developmental grouping, grouping by learning need, interest groups, social learning groups and friendship groups

4.5 Organisation in Relation to Teaching and Learning Strategies

Learning activities can be thought of as falling into five categories. Teachers plan for children to work through these five main types of activity that differ in many respects including the number of pupils involved, the interactions they involve and the nature of the attention they require. These are:

1. Directly taught by their teachers;
2. As individuals;
3. In small groups;
4. As a whole-class
5. Or, when not with their teacher, alone or in collaboration.

It is also clear from the literature reviewed that the use of these types of activity differs, with individual work and whole class teaching tending to feature most prominently. While group seating makes sense for two of the five types of learning activity, it is not suited for individual work (Hastings and Woods, 2002). An appropriate balance needs to be made regarding the appropriate balance between individual work, class work and group work. This must be made with regard to both pedagogical and practical considerations.

4.6 The Use of the Classroom Environment

Barker (1978) and Bronfenbrenner (1979) have suggested the importance of the quality of the environment and the fact that it can influence behaviour, a view which is commonly expressed by teachers. Space in classrooms is often limited and must be utilised to allow the activities, which form essential parts of the primary school curriculum to occur. Duckenfield (1989) and Herbert (1998) point out that the organisation of space may have a profound effect on learning because pupils tend to feel connected to a school that anticipates their needs, stating that:

> *'When children experience a school obviously designed with their needs in mind, they notice it and demonstrate a more natural disposition towards respectful behaviour and a willingness to contribute to classroom community'.* (Herbert, 1998:69)

In the primary school classroom the teacher's task is to see that children experience the curriculum, develop and learn. Clegg and Billington (1994) express the view that

the environment in the primary school classroom should be aesthetically pleasing; should stimulate children's interests; should set high standards in display and presentation of children's work; and should be created in such a way that is practical to maintain.

4.7 The Use of Resources

Educational attainment has been shown to correlate with spending levels, so the higher the resource provision, the higher the attainment and the greater the educational life chances in that area (Byrne *et al.*, 1974). However, the level of resourcing in individual classrooms relates to a combination of school based decisions, number of pupils on the roll and the priority to education by national and local government (Pollard, 1997).

Resources can be materials and equipment and the quality of learning experiences will be directly effected by their provision. Materials include things such as paper and pencils and can be considered as consumables of the classroom. Equipment is also very significant in primary education because it is often through the use of equipment the pupils are able to get the appropriate learning experiences (Pollard, 1997). Both in quality and quantity these resources have an impact on what it is possible to do in classrooms, with a good supply of appropriate resources being essential (House of Commons, 1986; Stewart, 1986).

However a number of issues need to be considered and as Pollard (1997) illustrates, there are four criteria that need to be considered when organising resources. These are:

1. *'Appropriateness. What resources are needed to support the learning processes which are expected to take place?*
2. *Availability. What resources are available? What is in the classroom, the school, the community, businesses, libraries, museums, resource centres? Are there costs, time or transport factors to be considered?*
3. *Storage. How are classroom resources stored? Which should be under teacher control? Which should be openly available to the children? Are they clearly labelled and safely stored.*
4. Maintenance. What maintenance is required? Is there a system for seeing that this is done?' (Pollard, 1997:220)

4.8 The Use of Time

Children's experiences of the primary school are bound by time as well as space. Most of a child's time in a primary school is spent in the classroom and there might only be two breaks from study during the day, once in the morning and once for lunch, with children working from 1.20pm to 3.15pm. Philip Jackson (1968) said,

> *'The magnitude of 7000 hours spread over six or seven years of a child's life is difficult to comprehend.'* (Jackson, 1968:5)

His book Life in Classrooms is a closely observed and engaging account of the complexities of classroom life. He continues:

> *'Aside from sleeping, and perhaps playing, there is no other activity which occupies as much of a child's time as that involved in attending school. Apart from the bedroom where he has his eyes closed most of the time) there is no single enclosure in which he spends a longer time than when he does in the classroom.'* (Jackson, 1968:5)

The way in which time is used is very important. Jackson (1968) states that:

> *'Time is a necessary, but not sufficient, condition for learning. Learning takes time, but providing time does not itself ensure that learning will take place.'* (Jackson, 1968:5)

Looking at this issue in more detail, Bennett (1979) related pupil progress to the time that was made available for 'curriculum activity' and to the pupil time spent in 'active learning', a qualitative category not a quantitative one. Kounin (1970) provides further evidence to suggest that, in order to main 'active learning, appropriate variety in activities is needed. However, findings from the Pollard *et al.* (1994) study showed considerable variations between the proportion of pupil time with high levels of engagement in different classrooms. Mortimore *et al.* (1988) noted that between 66% and 75% of teachers used a timetable and that this practice increased with older children. The study also found that managerial aspects of a teacher's job took approximately 10% of the time available.

The establishment of the National Curriculum, public accountability and the numeracy and literacy strategies have brought back a stricter allocation of time in the classroom

environment. A study by Campbell and Neill (1994) showed the notion of time available for teaching needs careful analysis. Campbell and Neill show that almost 10% of teaching time is lost as 'evaporated time' in the classroom management activities which are necessary to create teaching and learning opportunities.

4.9 Classroom Organisation and Layout

Of the twenty-eight classrooms observed by Galton *et al.* (1999), twenty-two were of the type generally referred to as 'box like', the key characteristics of which were discrete rooms defined by walls and a door which closed them off from the rest of the school.

The first example of classroom arrangement in an early Victorian building called the 'shoebox' illustrates even more limitations of space that impose severe restrictions on the scope for flexibility, which illustrates how staff delivering the curriculum had to adapt to problems inherent in the building. Teachers used the classroom environment efficiently and ingeniously, so that, although the size of the classroom meant that it was impossible to create work bays for different activities, the teacher successfully taught all curriculum activities in the space available. A high level of organisation and number of space saving techniques achieved this. These included children being assigned a specific group for each activity that were indicated by a sign affixed to the board. The size of the classroom meant that the class could not sit together on a 'carpet space' for whole class activities. By using these organisational devices the, 'the teacher had been able to introduce, in a severely restricted space, a level of flexibility which allowed for individual, group and class work, and which could be tailored to different curriculum activities, without any re-arrangement of furniture.

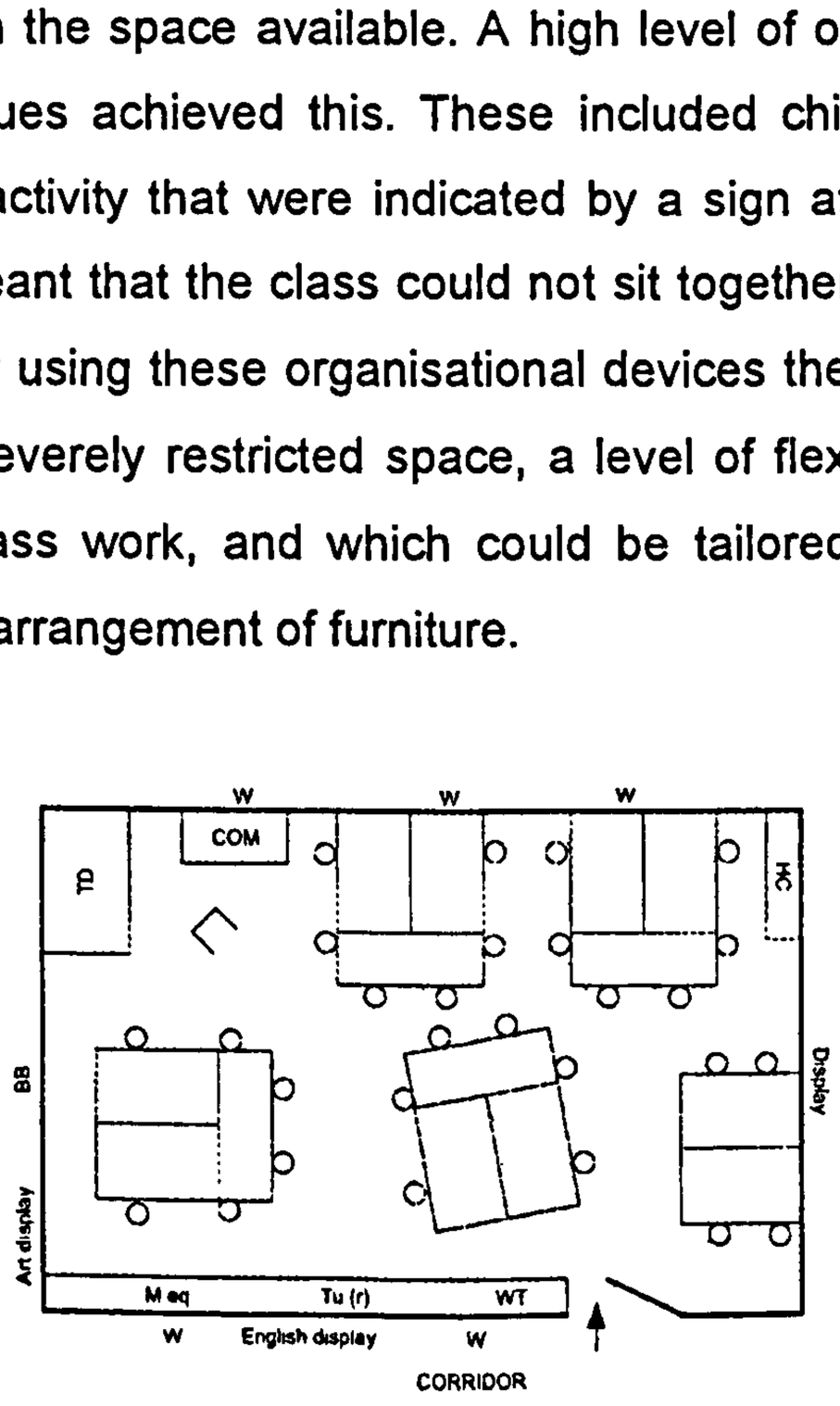


Figure 4.10: Shoebox layout

Another example of classroom type illustrated by Galton *et al.* (1999) is the L-shaped classroom. In this example the smaller part of the 'L' was unsuitable for teaching and was therefore used as a storage area. So the remaining teaching area was actually rectangular, and the presence of fixed storage cupboards down the longer side of the room further reduced the space available, resulting in an awkwardly shaped teaching area to accommodate twenty-eight Year 6 pupils.

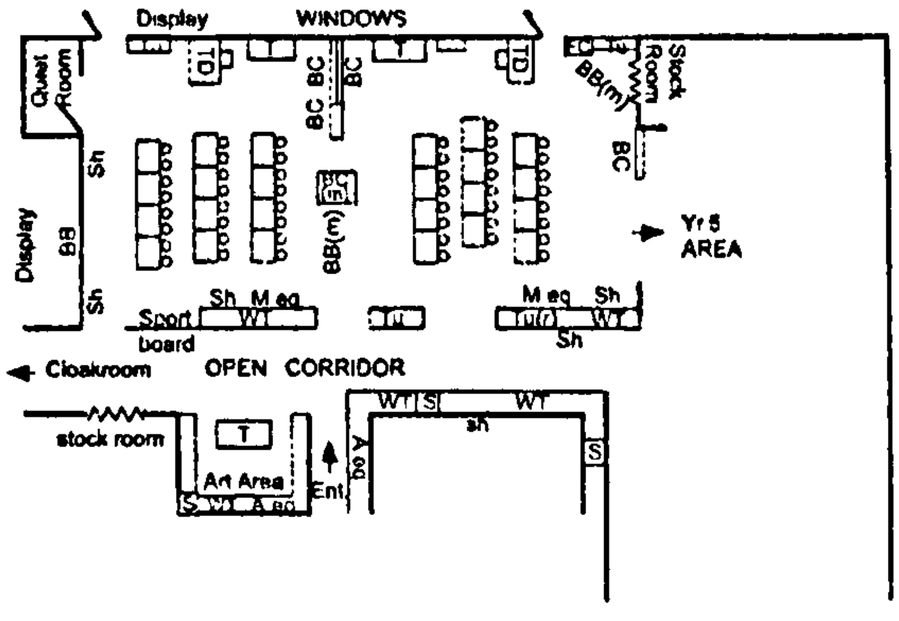


Figure 4.11: L-shaped layout

The 'horseshoe' arrangement was used for many activities including, class discussions and for most written work, and it also facilitated working in pairs. However it should be noted that the teacher used other arrangements according to the demands of the curriculum, particularly when the task required or was designed around small group work, when the tables were rearranged in smaller blocks.

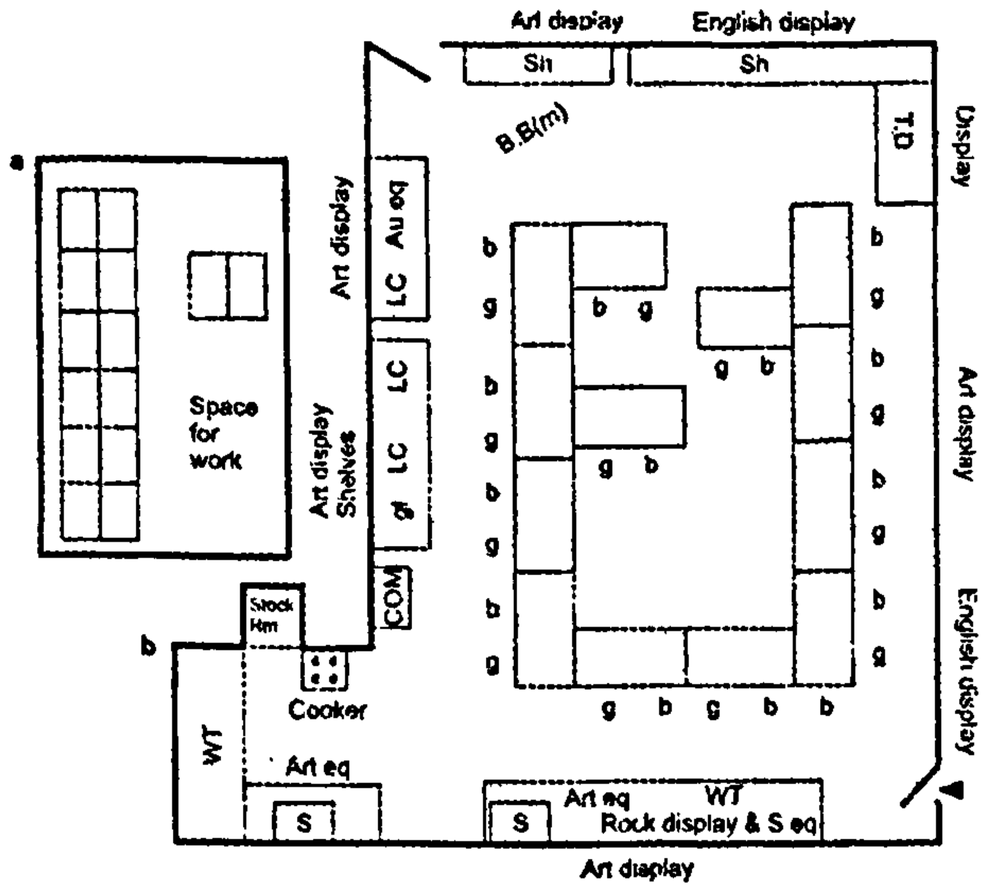


Figure 4.12: Horeshoe layout

This U-shaped arrangement is also supported by McNamara and Waugh (1993) who suggest that it is the most effective for allowing the three main working styles, individual, group and whole class, with a minimum of modification. The other six classrooms were part of open-plan teaching spaces referred to as 'home units'. The reviewed evidence suggests that the U-shaped or 'horseshoe' arrangement can be an extremely effective way of making the most of any rigid classroom environment.

As Galton *et al.* (1999) states that the 'horseshoe' and 'shoebox' accounts demonstrate a high degree of flexibility on the part of the teachers in question. Both responses represent a considered and deliberate response to a difficult situation, overcoming the constraints on an inadequate or difficult classroom environment.

An earlier study by Bennett *et al.* (1980) assessed the use made of available spaces by both teachers and pupils in open-plan classrooms. A scale drawing was used on which was indicated the differing spaces as identified by the teachers in the unit. Observations of the number of pupils and teachers in each space and the activities in which they were engaged were made every 20 minutes, through the whole day for a total of three days. The descriptions Bennett *et al.* (1980) of use of available space include 'Quiet Rooms' which are defined as:

> *'rooms varying in size but not larger than 32m^2, having four walls and a door located within the teaching unit. Originally they were conceived to be a self contained room of less than classroom size for the purpose of small class teaching or for noisy activities such as music or TV which could be carried on without distracting children in the rest of the unit.'* (Bennett, 1980:168)

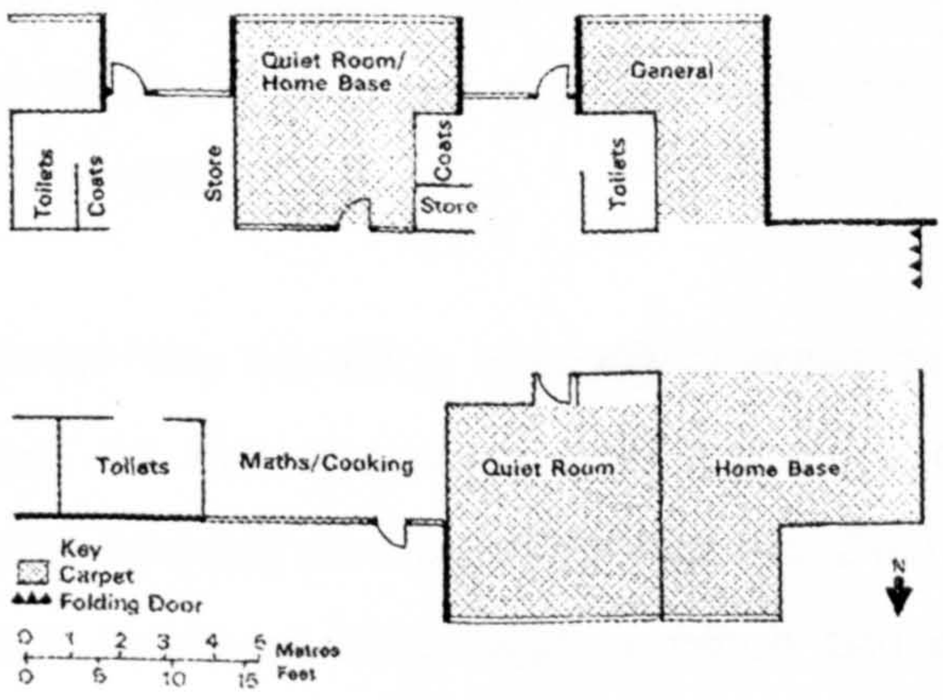


Figure 4.13: Typical open-plan classroom showing quiet rooms

Bennett *et al.* (1980) notes that patterns of use were very diverse with the average use of such rooms in both infant a junior units ranging from between 4% and 5% for both pupils and teachers, with major factors of under use including, the space being too small for use by the whole class or large groups, or their location away from other working areas making supervision of the children difficult. The units that teachers felt worked well had two quiet rooms ($20m^2$) either side of a central link area that was used constantly by teachers accessing other areas summarising that:

> *'Quiet rooms that are square and large enough to take the whole class sitting on the floor and placed centrally for easy supervision would seem to be the most satisfactory from the teacher's point of view.'* (Bennett, 1980:169)

The next types of space described are 'Practical Areas' defined as:

> *'those areas which have sinks and floor finishes that is suitable for wet activities such as quarry tiles and vinyl tiles, and is situated within the teaching unit.'* (Bennett, 1980:170)

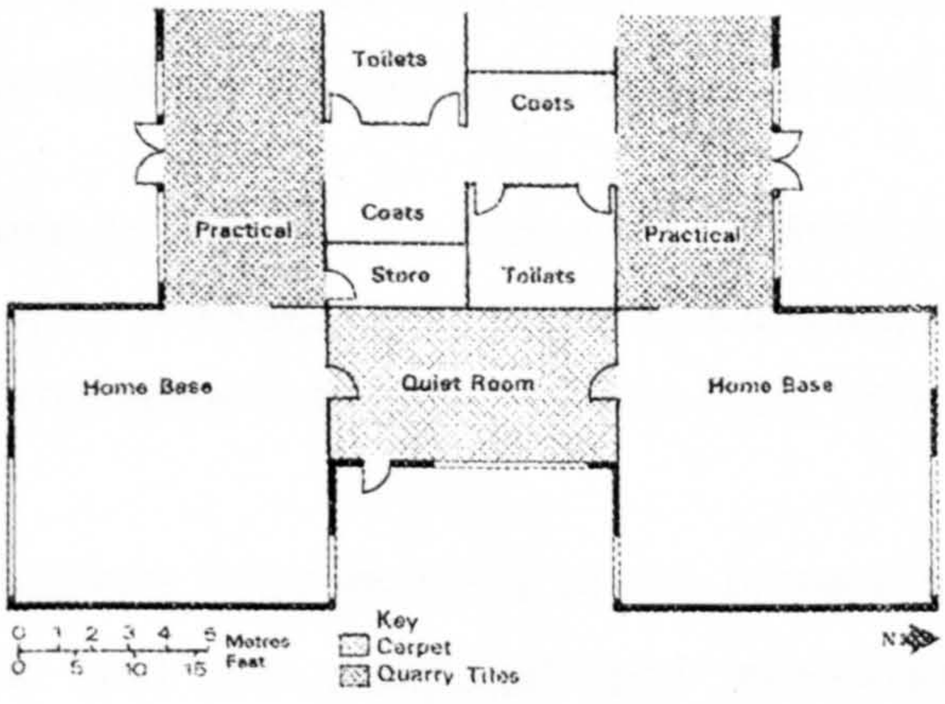
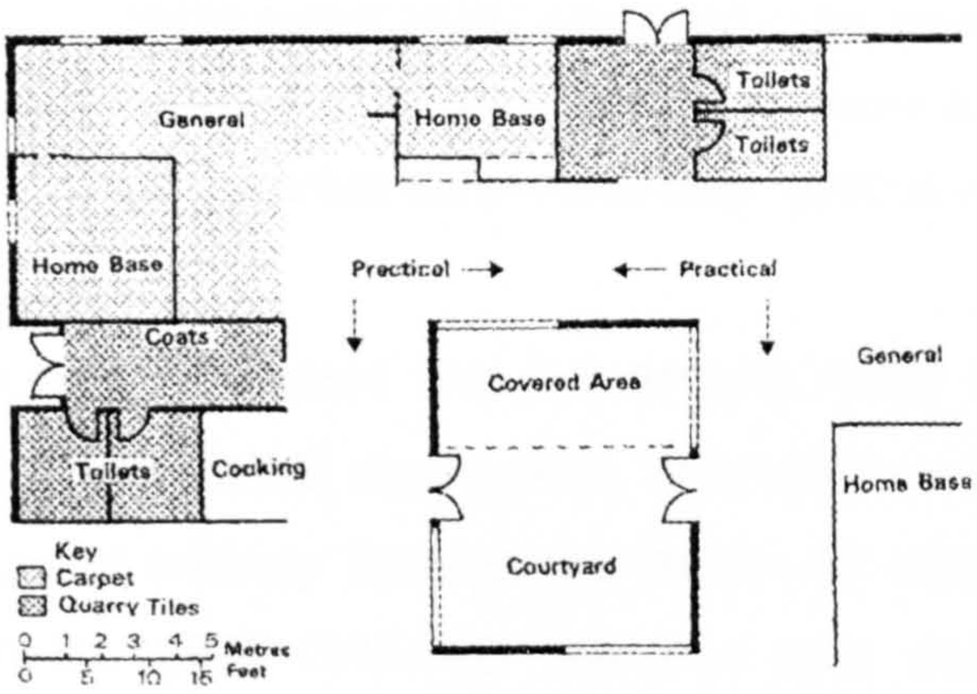


Figure 4.14: Typical open-plan classroom showing location of practical areas.

It was found that the use of these areas was slightly more than that of 'Quiet Rooms' with 8.4% of pupils and 13.2% of teachers in infant units, but less, at just over 6% of pupils and teachers in junior units.

The study goes on to reveal how the siting of practical areas can affect its use, with the majority being positioned so that circulation and therefore organisational problems were inevitable. Examples of good and bad practice are illustrated, including, placing the area around a central courtyard which was common and worked well when areas were sufficiently wide to allow circulation, work space and storage of materials. But if

the area was used for dining, or contained toilets, or was used to access other parts of the school it was an area with continual disturbance and distraction. Placing the activity area centrally generally worked well, however, poor access and visibility were unsatisfactory.



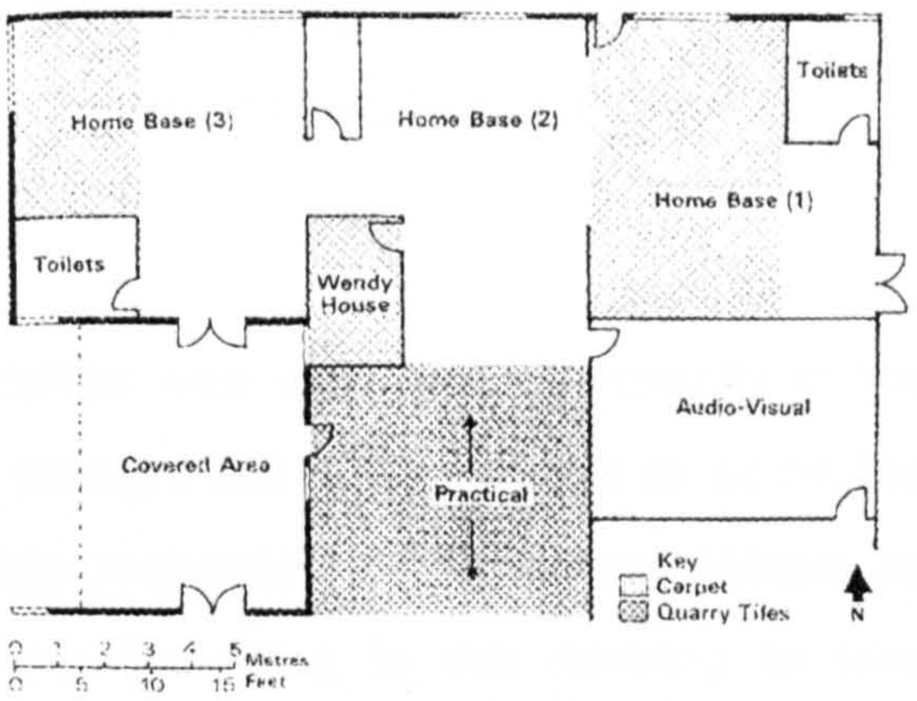


Figure 4.15: Typical open-plan classroom showing location of practical areas (left).
Figure 4.16: Typical open-plan classroom showing location of practical areas (right).

From the 'use of space' observations Bennett *et al.* (1980) concluded that, the way in which teachers and children used space was different in every instance even when the design of the unit was identical. It was also noted by Galton *et al.* that:

> *'Whilst the dimensions and design of a classroom are fixed, and therefore largely beyond the control of the teacher, the challenge is, and always has been, to make the optimum use of what space is available.'* (Galton *et al.*, 1999:39)

Galton *et al.* (1999) examines three features of the primary classroom (the teachers desk, the 'carpet area' and the computer) and examines their effects on the organisation of the primary classroom. They state that:

> *'In earlier times it was the teachers desk which dominated the class, symbolising both the authority of the teacher and a pedagogic style of teaching.'* (Galton *et al.*, 1999:42)

This had changed by the 1970s with the desk often being found in the corner of the room. The second feature, 'carpet areas' are described as, spaces which have traditionally marked off as places of shared activities which often involve the whole class or the teacher.

In both the 1976 and 1996 ORACLE studies the 'carpet area' was an important space, used by teachers who wanted to talk to the whole class and spontaneously by children who required additional work space, or as a place for silent reading. Galton *et al.* (1999) noted that:

> *'these carpet areas continued to be an important part of classroom life, and even in the case of some modern classrooms that were carpeted throughout, a space was often marked out in some way.'* (Galton *et al.*, 1999:43)

It was also noted that this area in many classrooms was used more frequently in the 1996 ORACLE classrooms, with children being brought out of their desks to sit on the carpet midway through the lesson for whole class instruction or discussion. Where as in the 1976 ORACLE carpeted area was mainly first thing in the morning to take register or outline activities, or at the end of the day to sit and listen to a story. Another development found in the 1996 ORACLE study of classrooms was the increase in the importance of Information Technology (IT) or as it is now used in National Curriculum documentation, Information Communication Technology (ICT). The 1996 ORACLE study confirmed the general findings of the Mckinsey survey, *The Future of Information Technology in UK Schools*, which showed a national average of one computer to every seventeen pupils, and that 40% of primary schools the ratio was 1:20. The 1996 ORACLE study showed that:

> *'although there was often a dedicated space for a computer, occasionally accompanied by a printer, much of the equipment was relatively old, of varying make, of low specification, and rarely used, so that out of almost a 1,000 records of curriculum activity, just twelve recorded the use of IT.'* (Galton *et al.*, 1999:46)

4.10 Summary

This chapter has discussed the ways in which class and classroom organisation facilitates teaching and learning strategies through reference to several major classroom observational studies that have provided an accurate portrayal of class and classroom organisation.

Class organisation can be thought to fall into four categories: whole-class, individual, paired and group work. The existing research reveals that the majority of primary school pupils sit in groups and that there has been an increase in whole-class and group work over the last 30 years. In addition to this there has been a corresponding increase of pupil-teacher interaction with both group and whole-class arrangements (Galton, *et al.*, 1980; Alexander, *et al.*, 1992; Galton *et al.* 1999). It is also clear that the four types of class organisation differ in relation to teaching and learning strategies with whole-class and individual teaching featuring more prominently, highlighting that the teaching and learning strategies that best justify group seating are infrequently used (Hastings and Woods, 2002).

From this it seems clear that teachers and pupils are often organised in a manner that does not match and support the teaching and learning activity. Research has tended to identify where grouping is ineffective rather than inform how groups may be used to an advantage. This has evidence of a mismatch between group seating arrangements and the infrequent periods of time pupils work collaboratively in contrast to lack of observed individual seating arrangements and the frequent number of individual tasks pupils are required to undertake (Galton and Williamson, 1992; Galton *et al.* 1999). Therefore the ability to provide alternative arrangements may benefit some pupils ability to concentrate on individual tasks, or enable the teacher to gather the whole class together for discussions.

However, despite the subtle changes in primary education and that classroom practices have changed over the two decades between the 1976 and 1996 ORACLE studies (Galton *et al.* 1999), the layout of primary classrooms in the 1990s is remarkably similar to that of the 1970s and 1980s.

There is no single best method to organise the classroom and a combination of layouts will be needed to exploit the strengths and minimise the weaknesses of each form of class organisation and teaching and learning strategy, which will involve not only

teachers and pupils but support staff and the teaching resources required. However, it is clear that the physical context of the classroom should support the teaching and learning methods and each organisational arrangement should support the particular teaching and learning strategy.

In light of this it seems clear that the size and layout of the classroom environment in which learning takes place and its overall design have implications on the way teachers organise its layout. The range of classrooms in the present school building stock provide both spacious classrooms, which allow for adaptation and movement, while others are small, confined and awkwardly shaped which place constraints on the degree of flexibility available. How then do teachers in current classroom environments responded to the demands placed on them, and what is the impact of the National Curriculum on the use of the classroom environment?

In order to further the understanding of the organisational requirements of the primary classroom and identify the physical requirements an evaluation of the documentation supporting the National Curriculum, National Literacy Strategy and National Numeracy Strategy will be undertaken, both of which provide guidance not only on curriculum matters but also on the organisation of teaching and place considerable emphasis on whole-class teaching and on teachers actively working in small groups. The following chapter focuses on identifying the spatial implications of the National Curriculum.

4.11 References

Alexander, R. (2000) *Culture & Pedagogy: International Comparisons in Primary Education.* Oxford: Blackwell.

Alexander, R., Rose, J., and Woodhead, C. (1992) *Curriculum Organisation and Classroom Practice in Primary Schools: A Discussion Paper.* London: DES

Barker, R. G. (1978) *Habitats, Environments and Human Behaviour.* San Francisco: Jossey-Bass.

Bealing, D. (1972) The Organization of Junior School Classrooms, *Educational Research*, 14, 231-235.

Bennett, N., Andreae, J., Hegarty, P. and Wade, B. (1980) Open plan schools: teaching, curriculum, design, Windsor: NFER Publishing for the Schools Council.

Bennett, N., Desforges, C., Cockburn, A and Wilkinson, B. (1984) *The Quality of Pupil Learning Experiences,* London: Lawrence Erlbaum Associates.

Bennett, N. and Blundell, D. (1983) Quantity and Quality of Work in Rows and Classroom Groups, *Educational Psychology*, 3, 2, 93-105.

Bennett, N. and Dunne, E. (1990) *Talking and learning in groups*. Basingstoke: Macmillan Education.

Bennett, N. and Kell, J. (1989) *A Good Start? Four Year Olds in Infant School*, Oxford: Blackwell.

Blatchford, P., Kutnick, P. and Baines, E. (1999) *The Nature and Use of Classroom Groups in Primary Schools. Final* report to ESRC.

Bronfenbrenner, U. (1979) *The Ecology of Human Development; Experiments in Nature and Design*. Cambridge, MA: Harvard University Press.

Byrne, D., Williamson, B. and Fletcher, B. (1974) *The Poverty of Education*, Oxford: Martin Robertson.

Campbell, R. J. and Neill, S. R. (1994) *Primary Teachers at Work*. London: Routledge.

Clegg, D. and Billington, S. (1994) *The Effective Primary Classroom: Management and Organisation of Teaching and Learning*. London: David Fulton.

Croll, P. (1996) Teacher-pupil interactions in the classroom, in Croll, P. and Hastings, N. (eds) *Effective Primary Teaching: Research based on Classroom Strategies*, London: David Fulton.

Dean, J. (1992) *Organising learning in the primary school classroom* (2nd ed.). London: Routledge.

DES (1967) *Children and their Primary Schools. A Report of the central Advisory Council for Education (England). Vol. 1: The Report. (Plowden Report)*, London: HMSO.

DES (1978) *Primary Education in England*, London: HMSO

Dukenfield, M. (1989) *The Quality of the Physical Environment of the School and the Quality of Education.* Paris: OECD Publications.

Galton, M., Simon, B., Croll, P. (1980) *Inside the Primary Classroom*. London: Routledge & Keegan Paul.

Galton, M. and Patrick, H. (1990) *Curriculum Provision in Small Primary Schools*, London: Routledge.

Galton, M. and Williamson, J. (1992) Groupwork in the Primary School, London: Routledge.

Galton, M., Hargreaves, L., Comber, C., Wall, D. and Pell, A. (1999) *Inside the Primary Classroom: 20 Years On*. London: Routledge & Keegan Paul.

Hastings, N., and Wood, K., C. (2002) *Reorganizing Primary Classroom Learning*. Buckingham: Open University Press.

Herbert, E. (1998) Design matters: How School Environment Affects Children. *Educational Leadership*, 56, 1, 69-70.

House of Commons, Select Committee on Education, Science and the Arts (1986) *Achievement in Primary Schools*, London: HMSO

HMI (1985) *Education 8-12 in combined and middle schools*, HMSO.

Jackson, P., W. (1968) *Life in Classrooms*. New York: Holt Rinehart and Winston.

Kounin, J.S. (1970) *Discipline and Group Management in Classrooms*. New York: Holt, Rhinehart & Winston.

Kutnick, P. and Manson, I. (2000) *Enabling Children to Learn in Groups*, in Whitehead, D. *The Psychology of Teaching and Learning in the Primary School.* London: RoutledgeFalmer.

McNamara, D. and Waugh, D. (1993) 'Classroom Organisation: A Discussion of grouping Strategies in the light of the " 3 Wise men's Report", *School Organisation* 13,1, 44-50.

McPake, J., Harlen, W., Powney, J. and Davidson, J. (1999) *Teachers' and Pupils, Days in the Primary Classroom, Report No. 93*, The Scottish Council for Research in Education.

Moran, P. R. (1971) 'The Integrated Day', *Educational Research*, 14, p.65-69.

Mortimore, P., Sammons, P., Stoll, L., Lewis, D. and Ecob, R. (1988) *School Matters: The Junior Years.* Wells: Open Books.

McKinsey & Company (1987), *The Future of Information Technology in UK Schools*, London: McKinsey & Company.

Pollard, A. (1997) *Reflective Teaching in the Primary School: A Handbook of the Classroom* (3rd ed.), London: Cassell Education.

Pollard, A., Broadfoot, P., Croll. P., Osborn, M. and Abbott, D. (1994) *Changing English primary schools? The Impact of the Education Reform Act at Key Stage 1.* London: Cassell.

Stewart, J. (1986) *The Making of the Primary School*, Milton Keynes: Open University Press.

Walton, J. (1971) *The Integrated Day: Theory and Practice*. London: Ward Lock.

CHAPTER 5: THE PRIMARY CURRICULUM

5.1 Introduction

The 1988 *Education Reform Act* began the recent process of educational development with the introduction of the National Curriculum for all children of compulsory school age. This chapter is an evaluation of the current National Curriculum at Key Stage 2 and the associated teaching methodologies, focusing on developing and understanding the key ideas of the curriculum and how these are put into effect in the primary classroom, which in turn will identify the physical implications of the National Curriculum. The impact on primary changes in both curriculum and pedagogy is considered from the implementation curriculum requirements in 2000.

5.2 Background of the Curriculum

There have been some significant developments in primary education in recent years, due to legislative changes within the educational system. The National Curriculum exists to facilitate the teaching and learning process. However, the early stages of its implementation were problematic; there was confusion over Programmes of Study and most teachers found it difficult to cope with the large amount of subject content and knowledge they were meant to cover. During the 1990s the National Curriculum underwent a period of review which led to a reduction in the amount to be taught in most subjects and reintroduced an element of time to be spent as the teachers decide (Ashcroft and Palacio, 1995). Although the pace of change has not slowed and subsequent changes to the National Curriculum, including the introduction of the National Literacy, Numeracy Strategies and information technology becoming a separate subject have all had an effect on the curriculum and its delivery.

The primary school curriculum is a valuable tool that helps the teaching staff provide an effective learning experience for the pupils. Primary schools should give all pupils the opportunity to achieve their best, within a broad and balanced curriculum. The National Curriculum, including assessment, plays an important part of providing this opportunity. The Office for Standards in Education inspects schools, and they have confirmed that the National Curriculum is raising standards. The government has taken control over not only the objectives, but also the methods of teaching. The numeracy and literacy strategies for primary schools give guidance ranging from how each individual minute of the taught hours should be used to the arrangement of classroom furniture.

5.3 Purposes of the Curriculum

The National Curriculum applies to all pupils of compulsory school age in all state run schools and is organised on the basis of four stages. These are called key stages, which relate to specific ages and year groups. These are defined precisely in section 355(1) a-d of the *Education Act* 1996. As stated in *National Curriculum Handbook for Primary Teachers in England* (1999) the four main purposes of the National Curriculum are:

'1. To establish an entitlement: The National Curriculum makes expectations for learning for all pupils, irrespective of social background, culture, race, gender, differences in ability and disabilities, an entitlement to a number of areas of learning and to develop knowledge, understanding, skills and attitudes necessary for their self-fulfilment and development as active and responsible citizens.

2. To establish standards: The National Curriculum makes expectations for learning and attainment explicit to pupils, parents, teachers, governors, employers and the public, and establishes national standards for the performance of all pupils in the subjects it includes. These standards can be used to set standards for improvement, measure progress towards those targets, and monitor and compare performance between individuals, groups and schools.

3. To promote continuity and coherence: The National Curriculum contributes a coherent national framework that promotes curriculum continuity and is sufficiently flexible to ensure progression in pupils learning. It facilitates the transition of pupils between schools and phases of education and provides a foundation for life long learning.

4. To promote public understanding: The National Curriculum increases public understanding of, and confidence in the learning and achievements resulting from compulsory education. It provides a common basis for discussion of educational issues among lay and professional groups, including pupils, parents, teachers, governors and employers.' (DfEE and QCA, 1999:12)

While these four purposes do not change over time, the curriculum itself cannot remain static. It must be responsive to changes in society and the economy, and changes in the nature of schooling itself. Education only flourishes if it successfully adapts to the demands and needs of the time.

5.4 Framework of the Curriculum

The National Curriculum Handbook for Primary Teachers in England (1999) reveals the considerable emphasis and detailed prescription in core subjects and the more flexible content of all other subjects. It identifies the core subjects in the curriculum as English, Mathematics, Science.

In addition to these, there are 7 non-core foundation subjects, Design and Technology, Information Communication Technology, History, Geography, Art and Design, Music, Physical Education. For each subject and each key stage, programmes of study set out what pupils should be taught, and attainment targets set out the expected standards of pupils' performance. It is for the school to choose how they organise their school curriculum to include the programmes of study (DfEE and QCA, 1999:17).

In addition the national frameworks for literacy and mathematics are published by the DfEE, and the exemplar schemes of work jointly published by the DfEE and QCA, show how the programmes of study and the attainment targets can be translated into practical, manageable teaching plans.

5.5 Promoting Skills Across the Curriculum

At all key stages pupils learn, practise, combine, develop and refine a wide range of skills in their work across the National Curriculum. Some of these skills are subject specific (painting in art and design), some are common to several subjects (enquiry skills in science, history and geography).

Some skills are universal, for example the skills of communication, improving own learning and performance, and creative thinking. These subjects are also embedded in the subjects of the National Curriculum and are essential to effective learning. Opportunities for teaching and learning all these skills across the key stages can be identified when planning. Pupils can be encouraged to reflect on what and on how they learn, and how these skills can be applied to different subjects, different problems and real-life situations (DfEE and QCA, 1999:20).

The National Curriculum identifies six skills areas, which are described as key skills because they help learners to improve their learning and performance in education, work and life (DfEE and QCA, 1999:20). These skills are: Communication; Application

of number; Information technology; Working with others; Improving own learning performance and Problem solving

In addition to these key skills the National Curriculum identifies five thinking skills which complement the key skills. These are: Information-processing skills; Reasoning skills; Enquiry skills; Creative thinking skills and Evaluation skills.

5.5.1 Core Subjects

The core subjects of the National Curriculum are English, mathematics and science. These are thought to encompass knowledge, skills and understanding without which other learning cannot take place effectively (Pollard, 2001). The National Curriculum Programmes of Study set out what pupils should be taught in each subject and provide a basis for planning schemes of works. The programme of study sets out two sorts of requirements:

> • *'Knowledge, skills and understanding – what is to be taught in the subject during the key stage.*
> • *Breadth study - the contexts, activities areas of study and range of experiences through which the knowledge, skills and understanding should be taught.'* (DfEE and QCA, 1999:26).

5.5.1.1 English

The skills of oracy and literacy are a fundamental part of English as a subject at both Key Stage 1 and 2. The Programme of Study for English states that:

> *'In English, during key stage 2 pupils learn to change the way that they speak and write to suit different situations, purposes and audiences. They read a range of texts and respond to different layers of meaning in them. They explore the use of language in literacy and non-literacy texts and learn how language works. Speaking and listening: during key stage 2 pupils learn how to speak in a range of different contexts, adapting what they say and how they say it to the purpose and the audience. Taking varied roles in groups gives them opportunities to contribute to situations with different demands. They also learn to respond appropriately to others, thinking about what has been said and the language used.'* (DfEE and QCA, 1999:50).

5.5.1.2 Mathematics

Mathematics is an area of the curriculum which can either be taught in a lively and interesting manner, or it can be reduced to a series of exercises which are ineffective in allowing objectives to be achieved (Jones, 1997). The Programme of Study for mathematics states that:

> *'During key stage 2 pupils use the number system more confidently. They move from counting reliably to calculating fluently with all four number operations. They always try to tackle a problem with mental methods before using any other approach. Pupils explore features of shape and space and develop their measuring skills in a range of contexts. They discuss and present their methods and reasoning using a wider range of mathematical language diagrams and charts. The mathematics programmes of study and the National Numeracy strategy Framework for teaching mathematics are fully aligned. The framework provides a detailed basis for implementing the statutory requirements of the programme of study for key stage 2 in mathematics'.* (DfEE and QCA, 1999:67).

5.5.1.3 Science

Science is both a way of working, which enables people to collect information about the world, and a body of knowledge, understanding and ideas (Marshall & Palacio, 1997). The Programme of Study for science states that:

> *'During key stage 2 pupils learn about a wider range of living things, materials and phenomena. They begin to make links between ideas and to explain things using simple models and theories. They apply their knowledge and understanding of scientific ideas to familiar phenomena, everyday things and their personal health. They begin to think about the positive and negative effects of scientific and technological developments on the environment and in other contexts. They carry out more systematic investigations, working on their own and with others. They use a range of reference sources in their work. They talk about their work and its significance, and communicate ideas using a wide range of scientific language, conventional diagrams, charts and graphs'.* (DfEE and QCA, 1999:83).

5.5.2 Foundation Subjects

The foundation subjects of the National Curriculum are design and technology, information communication technology (added in 1995), history, geography, art, music and physical education. These subjects are thought to cover the range of knowledge,

skills and understanding commonly accepted as necessary for a broad education (Pollard, 2001).

5.5.2.1 Design and Technology

Design and technology capability lies at the heart of the subject and the basis of this is to design and make things (Coates & Harding, 1997). The Programme of Study for design and technology states that:

> *'During key stage 2 pupils work on their own and as part of a team on a range of designing and making activities. They think about what products are used for and the needs of the people who use them. They plan what has to be done and identify what works well and what could be improved in their own and other people's designs. They draw on knowledge and understanding from other areas of the curriculum and use computers in a range of ways.'* (DfEE and QCA, 1999:94).

5.5.2.2 Information and Communication Technology

There are two different aspects of information communication technology in the primary school which are emphasised by the fact that it appears in two distinctly different ways in the National Curriculum. It is treated as a subject in its own right with an associated Programme of Study, but it also appears in the detail of the Programmes of Study of other curriculum areas (Higgins, 1997). The Programme of Study for information communication technology states that:

> *'During key stage 2 pupils use a wider range of ICT tools and information sources to support their work in other subjects. They develop their research skills and decide what information is appropriate for their work. They begin to question the plausibility and quality of information. They learn how to amend their work and present it in a way that suits the audience'.* (DfEE and QCA, 1999:100).

5.5.2.3 History

In the history National Curriculum there are five key elements: chronology; range and depth of historical knowledge and understanding; interpretation; historical enquiry; and organisation and communication (Jordan & Taylor, 1997). The Programme of Study for history states that:

'During key stage 2 pupils learn about significant people, events and places from both the recent and more distant past. They learn about change and continuity in their own area, in Britain and other parts of the world. They look at history in a variety of ways, for example from political, economic, technological and scientific, social, religious, cultural or aesthetic perspectives. They use different sources of information to help them investigate the past both in depth and in overview, using dates and historical vocabulary to describe events, people and developments. They also learn that the past can be represented and interpreted in different ways'. (DfEE and QCA, 1999:105).

5.5.2.4 Geography

Geography involves locality studies in both the school's immediate environment and a slightly wider locality and also includes contexts from different parts of the world (Halocha and Roberts, 1997). The Programme of Study for geography states that:

'During key stage 2 pupils investigate a variety of people, places and environments at different scales in the United Kingdom and abroad, and start to make links between different places in the world. They find out how people affect the environment and how they are affected by it. They carry out geographical enquiry inside and outside the classroom. In doing this they ask geographical questions, and use geographical skills and resources such as maps, atlases, aerial photographs and ICT.' (DfEE and QCA, 1999:112).

5.5.2.5 Art and Design

It is important to remember that children are the centre of learning in art and design and this has important implications for the way art is taught (Chapman, 1997). The Programme of Study for art and design states that:

'During key stage 2 pupils develop their creativity and imagination through more complex activities. These help to build on their skills and improve their control of materials, tools and techniques. They increase their critical awareness of their roles and the purposes or art, craft and design in different times and cultures. They become more confident in using visual and tactile elements and materials and processes to communicate what they see, feel and think.' (DfEE and QCA, 1999:120).

5.5.2.6 Music

The most successful lessons in schools are likely to be those where children are engaged in music making (Thompson, 1997). The Programme of Study for music states that:

> *'During key stage 2 pupils sing songs and play instruments with increasing confidence, skill, expression and awareness of their own contribution to a group or class performance. They improvise, and develop their own musical compositions, in response to a variety of different stimuli with increasing personal involvement, independence and creativity. They explore their thoughts and feelings through responding physically, intellectually and emotionally to a variety of music from different times and cultures.'* (DfEE and QCA, 1999:126).

5.5.2.7 Personal, Social and Health Education and Citizenship

Personal, social and health education and citizenship help to give pupils the knowledge, skills and understanding they need to lead confident, healthy, independent lives and become informed, active responsible citizens. The Programme of Study for personal, social and health education and citizenship states that:

> *The following are non-statutory guidelines. ' During key stage 2 pupils learn about themselves as growing and changing individuals with their own experiences and ideas, and as members of their communities. They become more mature, independent and self-confident. They learn about the wider world and the interdependence of communities within it. They develop their sense of social justice and moral responsibility and begin to understand that their own choices and behaviour can affect local, national or global issues and political and social institutions. They learn how to take part more fully in school and community activities.'* (DfEE and QCA, 1999:139).

5.6 Spatial Implications of the Curriculum

The way in which the classroom is organised effects the extent of each child's contact with the teacher, the opportunities and resources available. A well-organised classroom will be functional with materials, tools and equipment arranged efficiently so that it is easy to find, use and keep in order. The planned layout of an activity area should match the intentions of the activity, with resources in close proximity.

There should be a definite place for everything and storage should be labelled appropriately, making it easily accessible. This will enable children to be given responsibility for taking out and putting away their own materials and equipment. Materials should also be stored at appropriate levels, so that limited access can be controlled to certain equipment by keeping it out of the reach of pupils.

There is very often surplus equipment and resources lying unused in classrooms throughout most primary schools. The development of Information Technology resources in schools is essential for every pupil, which can also contribute to the development of other curriculum themes, skills and personal qualities. Grouping such resources and sharing them between selected classrooms would be more efficient and economies could be made in the provision of specialised equipment and resources such as information technology suites. The pairing of classrooms enables the sharing of practical areas, allowing teachers to work together or separately as and when required, with a variety of different teaching group sizes.

Primary classrooms should not simply provide a neutral space for teaching and learning, but as a physical space they should tell children something about what is being offered and what is expected from them as pupils. An ordered spacious environment gives them a natural sense of well being

The National Framework for Literacy also offers guidance. The greater emphasis on whole-class work means that in a Literacy Hour, pupils will spend about three quarters of their time being taught as members of a whole class or smaller groups arranged by ability. About a quarter of their time will be spent on independent reading or writing work. Careful management of demands and responses in whole class and group sessions offer high levels of involvement for all pupils, particularly the least able, many of whom quickly gain confidence (DfEE 1998, section 1: 10).

Space in classrooms is always limited; yet the space there is must be utilized in such a way that a wide range of activities which form essential elements of the National Curriculum can occur simultaneously.

5.7 The National Literacy Strategy

The National Literacy Framework for teaching sets out objectives for Reception to Year 6 to enable pupils to become fully literate. Literacy unites the important skills of reading and writing. It also involves speaking and listening, which although are not separately identified within the framework, are an essential part of it (DfEE, 1998: 3).

The National Literacy Strategy contains detailed guidance on the implementation of literacy hour in which the teaching will take place. The Literacy Hour is designed to provide a practical structure of time and class management which reflects the structure of teaching objectives in the National Literacy Strategy (DfEE, 1998: 8).

5.7.1 Classroom Organisation and the National Literacy Strategy

The National Literacy Strategy defines the structure of the Literacy Hour to include the following:

1. 'Key Stage 1 and Key Stage 2: Shared text work, a balancing of reading and writing [Whole class, approximately 15 minutes]
2. Key Stage 1: Focused word work. Key Stage 2: A balance over the term of focused word work or sentence work. [Whole class, approximately 15 minutes]
3. Key Stage 1: Independent reading, writing or word work, while the teacher works with at least two ability groups each day on guided text work, reading or writing. Key Stage 2; Independent reading, writing or word and sentence work, while the teacher works with at least one ability group each day on guided text work, reading and writing. [Group and independent work, approximately 20 minutes]
4. Key Stage 1 and Key Stage 2: Reviewing, consolidating teaching points, and presenting work covered in the lesson. [Whole class, approximately 10 minutes]'. (DfEE, 1998: 9).

The literacy hour offers a structure of classroom management, designed to maximise the time teachers spend directly teaching their class. It is intended to shift the balance of teaching from individualised work, especially in the teaching of reading, towards more whole-class and group teaching (DfEE, 1998: 10).

The essential elements of the Literacy Hour are: Shared reading is a class activity using a common text e.g. a big book, poetry poster or text extract. At *Key Stage 1*, teachers should use shared reading to read with the class, focusing on comprehension and on specific features e.g. word-building and spelling patterns, punctuation, the layout and purpose, the structure and organisation of sentences. Shared reading provides a context for applying and teaching word level skills and for teaching how to use other reading cues to check for meaning, and identify and self-correct errors. Shared reading, with shared writing, also provide the context for developing pupils' grammatical awareness, and their understanding of sentence construction and punctuation. At *Key Stage 2* shared reading is used to extend reading skills in line with the objectives in the text level column of the Framework. Teachers should also use this work as a context for teaching and reinforcing grammar, punctuation and vocabulary work. At both Key Stages, because the teacher is supporting the reading, pupils can work from texts that are beyond their independent reading levels. This is particularly valuable for less able readers who gain access to texts of greater richness and complexity than they would otherwise be able to read. This builds confidence and teaches more advanced skills which feed into other independent reading. Lesson structures are as follows:

1. Approximately 15 minutes shared reading and writing – whole-class

> *'Shared writing provides many opportunities for pupils to learn, apply and reinforce skills in the context of a larger group with careful guidance from the teacher. Teachers should use texts to provide ideas and structures for the writing and, in collaboration with the class, compose texts, teaching how they are planned and how ideas are sequenced and clarified and structured. Shared writing is also used to teach grammar and spelling skills, to demonstrate features of layout and presentation and to focus on editing and refining work. It should also be used as a starting point for subsequent independent writing. Wherever possible, shared reading and writing should be interlinked. For example, over a five-day period a teacher, may plan to (a) introduce a text, (b) work on it through shared reading and then (c) use the text as a 'frame' for writing or as a stimulus to extend, alter or comment on it.'* (DfEE, 1998: 11)

2. Approximately 15 minutes word level work - whole-class

> *'There must be a systematic, regular and frequent teaching of phonological awareness, phonics and spelling throughout Key Stage 1. Teachers should follow the progression set out in the word level objectives carefully. It sets out both an order of teaching and the expectations of what pupils should achieve by the end of each term. The work must be given a specific teaching focus in the Literacy Hour.*
>
> *Although it is essential that these decoding skills are practised and applied in shared reading, they also need to be taught through carefully structured activities, which help pupils to hear and discriminate regularities in speech and to see how these are related to letters and letter combinations in spelling and reading. The majority of pupils can learn these basic phonic skills rapidly and easily. Word recognition, graphic knowledge, and vocabulary work should also have a teaching focus during this period of 15 minutes. At Key Stage 2, this time should be used to cover spelling and vocabulary work and the teaching of grammar and punctuation from the sentence level objectives. For Key Stage 1 pupils, these sentence-level objectives should be covered in the context of shared reading and writing and this remains an important context for teaching skills at Key Stage 2. Nevertheless, teachers will need to plan a balance of word and sentence level work for this second part of the Hour, across each half- term, to ensure that all these objectives are covered.'* (DfEE, 1998: 11)

3. Approximately 20 minutes guided group and independent work

> *'This section of the Literacy Hour has two complementary purposes:*
> - *to enable the teacher to teach at least one group per day, differentiated by ability, for a sustained period through guided reading or writing;*
> - *to enable other pupils to work independently - individually, in pairs or in groups - without recourse to the teacher.*
>
> *Guided reading is the counterpart to shared reading. The essential difference is that, in guided reading and writing, the teacher focuses on independent reading and writing, rather than modeling the processes for pupils. Guided reading should be a fundamental part of each school's literacy programme. In effect, it takes the place of an individualised reading programme and, as a carefully structured group activity, it significantly increases time for sustained teaching. In ability groups of four to six, pupils should have individual copies of the same text. The texts need to be carefully selected to match the reading level of the group. In the early stages*

pupils should meet texts of graded difficulty as they progress. These texts will often be selected from reading schemes or programmes and can usually be built up from existing book stocks with some careful supplementation. At Key Stage 1, teachers should introduce the text to the group, to familiarise them with the overall context of the story and point out any key words they need to know. Pupils then read it independently, while the teacher assesses and supports each pupil in the group. The same principles apply at Key Stage 2. However, as pupils progress, the teaching should focus increasingly on guided silent reading with questions to direct or check up on the reading, points to note, problems to solve etc., to meet the text level objectives in the Framework.

Guided writing - as with guided reading, these writing sessions should be to teach pupils to write independently. The work will normally be linked to reading, and will often flow from work in the whole- class shared writing session. These sessions should also be used to meet specific objectives and focus on specific aspects of the writing process, rather than on the completion of a single piece of work. Often, these teaching inputs can be followed through during independent work in subsequent sessions. For example, pupils might focus on:

- *planning a piece of writing to be continued independently later;*
- *composing a letter;*
- *expanding or contracting a text to elaborate, summarise, etc.;*
- *constructing complex sentences;*
- *connecting points together in an argument;*
- *editing work into paragraphs, headings, etc. for clarity and presentation.*

Independent work - often this happens at the same time as the guided group work. The class needs to be carefully managed and the pupils well trained so that they are clear about what they should be doing and do not interrupt the teacher. There are many forms of organisation ranging from a carousel of ability groups, with a rotation of activities for each group, to completely individual work e.g. a whole-class writing activity derived from an earlier shared writing session. Independent tasks should cover a wide range of objectives including:

- *independent reading and writing;*
- *phonic and spelling investigations and practice;*
- *comprehension work;*
- *note-making;*
- *reviewing and evaluating;*

- *proof-reading and editing;*
- *vocabulary extension and dictionary work;*
- *handwriting practice;*
- *practice and investigations in grammar, punctuation and sentence construction;*
- *preparing presentations for the class.*

Pupils should be trained not to interrupt the teacher and there should be sufficient resources and alternative strategies for them to fall back on if they get stuck. They should also understand the importance of independence for literacy, and how to use their own resources to solve problems and bring tasks to successful conclusions.' (DfEE, 1998: 12).

4. Final 10 minutes - plenary session with the whole-class:

'The final plenary is at least as important as the other parts of the lesson. It is not a time for clearing up and should be clearly signalled as a separate session when the whole-class is brought together. It should be used to:

- *enable the teacher to spread ideas, re-emphasise teaching points, clarify misconceptions and develop new teaching points;*
- *enable pupils to reflect upon and explain what they have learned and to clarify their thinking;*
- *enable pupils to revise and practise new skills acquired in an earlier part of the lesson;*
- *develop an atmosphere of constructive criticism and provide feedback and encouragement to pupils;*
- *provide opportunities for the teacher to monitor and assess the work of some of the pupils;*
- *provide opportunities for pupils to present and discuss key issues in their work.'* (DfEE, 1998: 13).

5.8 The National Numeracy Strategy

The framework for teaching mathematics illustrates the intended range and balance of work to ensure that pupils become properly numerate. It includes guidance on daily mathematics lesson in which the teaching will take place.

5.8.1 Classroom Organisation and the National Numeracy Strategy

'The approach to teaching recommended by the National Numeracy Strategy is based on four key principles:

1. *dedicated mathematics lesson everyday;*
2. *direct teaching and interactive oral work with the whole class and groups;*
3. *an emphasis on mental calculation;*
4. *controlled differentiation, with all pupils engaged in mathematics related to a common theme.'* (DfEE, 1999: 11)

The National Numeracy Strategy compliments the literacy strategy, with schools providing a structured daily mathematics lesson of 45 minutes to one hour for all pupils of primary age. 'A typical 45 to 60 minute lesson in Years 1 to 6 will be structured like this:

- *Oral work and mental calculation [about 5 to 10 minutes]*

Whole-class work to rehearse, sharpen and develop mental and oral skills

- *The main teaching activity [about 30 to 40 minutes]*

Teaching input and pupils activities

Work as a whole class, in groups, in pairs or as individuals

- *A plenary to round of the lesson [about 10 to 15 minutes]*

Work with the whole class to sort out misconceptions and identify progress, to summarise key facts and ideas and what to remember, to make links to other work and discuss the next steps, and to set work to do at home.' (DfEE, 1999: 13)

The National Numeracy Strategy offers limited guidance on how furniture may be arranged. Stating that:

> *'How you arrange the furniture will depend on the size and shape of your room but each child needs to be able to see you, the board and their table top easily when they are seated, for both whole-class and group work. Seating arrangements for mathematics don't need to dictate the arrangements for other subjects. In mainstream classes there are children who are capable of moving the tables and*

chairs and they soon get used to a brisk routine of doing so. One solution is to arrange clumps of three or four tables in rectangles, with the narrow ends of the rectangles towards the front. Six to eight pupils can then sit in a U-shape round three sides of the rectangle so that no child has his or her back to the front. When you sit down to teach the group you can work from the vacant short edge, so aim to keep a spare chair there. Another solution is to arrange the tables in one large U-shape. This has the advantage that all the pupils can see each other as well as you, and the central area can be used for floor demonstrations. Or you could arrange one U-shape within another, with the inner U reserved for those who might need to sit closer to you or the board, or who showed misunderstandings in a previous lesson. It is not essential for a class of any age to sit in a carpeted area for part of their mathematics lessons. They can just as easily sit at tables. Bear this in mind when you are organising your classroom, especially if it is small. If you do teach in a carpeted area, make sure that a board or flip chart is available on which you and the class can demonstrate and explain, and that there is enough space for pupils to do so without climbing over others. Make sure too that any pupils whose special needs warrant that they sit in particular positions are well placed. Where necessary an assistant should give discreet support by using a small, hand-held white board to mirror the work on the main board. (DfEE, 1999: 29)

Guidance on required resources is also given:

'Beside a board, each classroom should have a large, long number line for teaching purposes, perhaps below the board, and at a level at which you and the children can touch it. A 'washing line' of numbers strung across the room, and which can be added to or altered, is useful. Provide table-top number lines, marked and unmarked, for individual use.'

'Equip each child with their own pack of digit cards 0 to 9 to hold up when answering questions in a whole-class setting.

'A large 100 square, displayed where children can touch it, is essential for work in Years 2 to 4 on patterns such as 43 + 8, 43 + 18, 43 + 28, 43 + 38... or to illustrate addition or subtraction of two-digit numbers: for example, when 38 + 23 is treated as 38 + 10 + 10 + 3. Similarly, 72 – 47 can be treated by counting back first 4 tens then 7 ones to reach 25. Another way to illustrate 72 – 47 is to count up from 47 to 67 in tens, then from 67 to 72 in ones.'

'From resources kept in each classroom it ought to be possible to equip each group

with small apparatus such as counters, interlocking cubes, wooden cubes, pegs and pegboard, straws, rulers, coins, dominoes, dice, and calculators when needed. Each class needs ready access to a variety of squared paper, and a good range of number games, measuring equipment, sets of shapes and construction kits.'

'Your library corner might have some interest books on mathematics and mathematical dictionaries suitable for the age of the children. For activities and practice exercises for class work and homework there are many useful books of suggestions for teachers and pupils produced by educational publishers, mathematical associations, local education authorities and others. You may need particular equipment, books and materials for pupils with special needs.'

'An aim of the daily mathematics lesson is to keep the class working together and to link but limit to no more than three the number of different activities going on during group work. Most schools with pupils in Key Stages 1 and 2 don't have enough computers for all the children in a class to do the same activity simultaneously. But you or another adult can make good use of a single computer in the daily lesson by working with the whole class, if the monitor's screen is large enough. An alternative is for you to work with part of the class – perhaps a group of six to eight pupils. As with other ways of teaching mathematics, your role is to demonstrate, explain and question, stimulate discussion, invite predictions and interpretations of what is displayed and ask individual children to come to the keyboard to enter an instruction or a response.'

'A small group of pupils working together can also make effective use of one or two computers in the daily mathematics lesson, provided that the activity is consistent with the lesson's objectives, the activities of other groups and the overall number of activities. You need to intervene in the computer work from time to time to teach and develop the children's learning, and make sure that they are all participating. You should also invite them to contribute to the plenary part of the lesson.'

'Individual use of computer programs is usually inappropriate in the daily lesson, except where pupils with profound special educational needs or exceptional ability are doing individualised work. But programs which allow any pupil to practise number skills independently, or to investigate a mathematical problem with a partner, have a valuable part to play in breaks and after-school clubs, and at home.' (DfEE, 1999: 31)

5.9 Summary

The classroom is an important space of the primary school as it is where pupils spend most of their time; it therefore seems important that it caters for all the complexities of the primary curriculum. In order to comprehend the function of the primary classroom an understanding of the National Curriculum is of great value to architects and other building professionals involved in the design of primary classrooms, something that is difficult due to the prescriptive style in which the documents are often written.

The nature of the primary school curriculum and the climate in which primary schools function has changed quite dramatically since the passing of the *Education Act* 1988 and the introduction of the National Curriculum. It provides the programmes of study and attempts to provide coherence and progression in the teaching of pupils, whilst clarifying what should be taught and the attainment targets of pupils' performance (DfEE and QCA, 1999). Although the National Curriculum does not refer to the environment specifically it is possible to identify the spatial implications from its content. In addition the related frameworks of the National Literacy and Numeracy Strategies both contain detailed guidance about implementing, planning and teaching from which spatial implications can be ascertained (DfEE, 1998; DfEE, 1999).

The diverse range of teaching and learning strategies associated with the National Curriculum requires the primary classroom to be flexible to use without compromising performance criteria such as lighting and acoustics for good speech intelligibility. The subjects of the primary curriculum referred to in this chapter all have fundamental implications for classroom organisation.

Thus, across the curriculum the classroom will need to enable various forms of class organisation from whole-class teaching with pupils focusing on the teacher, the merits of which are advocated by the National Curriculum as it enables the teacher to interact with more pupils at any one point in time, to investigational and collaborative group work in subjects such as mathematics and science and also to paired or individual work either in the main classroom space or in small dedicated alcoves to enable one-on-one sessions with teachers or support staff.

In addition some specific spatial implications can be identified, for example the classroom would be improved by a dedicated space to gather the whole class together for story telling and discussion, allowing the teacher to speak clearly and audibly whilst

allowing pupils to distinguish between similar sounding words. Alternatively encouraging pupils to be independent and explore new ideas is equally as important, which seems best done by providing an area within the classroom where pupils can be encouraged to access new texts and other educational resources. Practical subjects including art and design, design and technology, music and science call for classroom layouts that allow for experimentation and creativity, with resources positioned in close proximity. Additionally the increase of information communication technology across the curriculum creates implications for designing classrooms. It offers an holistic approach to education that should be integrated into both teachers' and pupils' classroom experiences as an integral part of the classroom and not as an after thought.

To summarise, all the forms of class organisation have implications for not only the classroom layout but also the positioning of resources as well as other physical attributes such as lighting and acoustics. This is especially important for the separation of incompatible activities or where specific activities such as using computers require a different quality of lighting, with the best solutions being those that fulfil more than one curriculum function.

In addition it seems clear that the primary curriculum is broad and constantly evolving and that the primary classroom environment is an essential element of its delivery that needs to be flexible in the short term and adaptable in the longer-term. In addition it appears there is no best way to organise the primary classroom and a combination of layouts will be needed to exploit the strength and minimise the disadvantage of the different teaching and learning strategies associated with the National Curriculum.

5.10 References

Aschcroft, K. and Palacio, D. (Eds.) (1995) *The Primary Teacher's Guide to the New National Curriculum*, London: Falmer Press.

Aschcroft, K. and Palacio, D. (Eds.) (1997) *Implementing the Primary Curriculum: A Teacher's Guide*, London: Falmer Press.

Chapman, J. (1997) *Art*, in K. Aschcroft and D. Palacio (Eds.) (1997) *Implementing the Primary Curriculum: A Teacher's Guide*, London: Falmer Press, 112-131.

Coates, D. and Harding, J. (1997) *Design and Technology,* in K. Aschcroft and D. Palacio (Eds.) (1997) *Implementing the Primary Curriculum: A Teacher's Guide*, London: Falmer Press, pp.161-173.

DfEE and QCA (1999)*The National Curriculum Handbook for primary teachers in England, Key Stages 1 and 2.* London: HMSO

DfEE (1998) *The National Literacy Strategy Framework for Teaching.* London: DfEE.

DfEE (1999) *The National Numeracy Strategy: Framework for teaching mathematics from Reception to Year 6.* London: DfEE.

Great Britain (1988) *Education Reform Act 1988.* London: HMSO.

Great Britain (1996) *Education Reform Act 1996.* London: HMSO.

Halocha, J and Roberts, M. (1997) *Geography*, in K. Aschcroft and D. Palacio (Eds.) (1997) *Implementing the Primary Curriculum: A Teacher's Guide*, London: Falmer Press, pp. 99-111.

Higgins, C (1997) *Information Technology,* in K. Aschcroft and D. Palacio (Eds.) (1997) *Implementing the Primary Curriculum: A Teacher's Guide*, London: Falmer Press, pp. 174-186.

Jones, M (1997) *Mathematics*, in K. Aschcroft and D. Palacio (Eds.) (1997) *Implementing the Primary Curriculum: A Teacher's Guide*, London: Falmer Press, pp. 49-65.

Jordan, A. and Taylor, P. (1997) *History,* in K. Aschcroft and D. Palacio (Eds.) (1997) *Implementing the Primary Curriculum: A Teacher's Guide*, London: Falmer Press, pp. 85-98.

Marshall, C & Palacio, D (1997) *Science,* in K. Aschcroft and D. Palacio (Eds.) (1997) *Implementing the Primary Curriculum: A Teacher's Guide*, London: Falmer Press, pp.66-84.

Pollard, A. (2001) *Reflective teaching in the Primary School: A Handbook for the Classroom* (3rd ed.), London: Continuum.

Thompson, P. (1997) *Music*, in K. Aschcroft and D. Palacio (Eds.) (1997) *Implementing the Primary Curriculum: A Teacher's Guide*, London: Falmer Press, pp, 132-144.

CHAPTER 6: RESEARCH METHODOLOGY

6.1 Introduction

The research instruments used in this study relate to assessing teachers' experiences and observing and describing what is going on in the primary classroom. This chapter provides an overview of different research methods comparing the advantages and disadvantages to select the most suitable combination of techniques. This will include describing the general methods and then the specific focus of the research questions, which in turn lead to the chosen research instruments. The starting point for this is a quotation from Proshansky (1976) which describes the methodological approach for investigating the built environment appropriately:

> *'We worry far less about experimental controls in doing our research and far more about what, when and how to describe ongoing events. This is because we are not looking for the usual independent-dependent variable relationships. We are looking for that pattern of relationships between the observed and the described properties of physical settings and the similarly observed and described reactions of people in these settings.'* (Proshansky, 1976: 68)

In order to investigate the classroom environment and the behaviour that occurs within it, a succession of processes and methodologies have been developed by researchers which establish how to study an environment. The diagram below outlines the model of research discussed in this chapter.

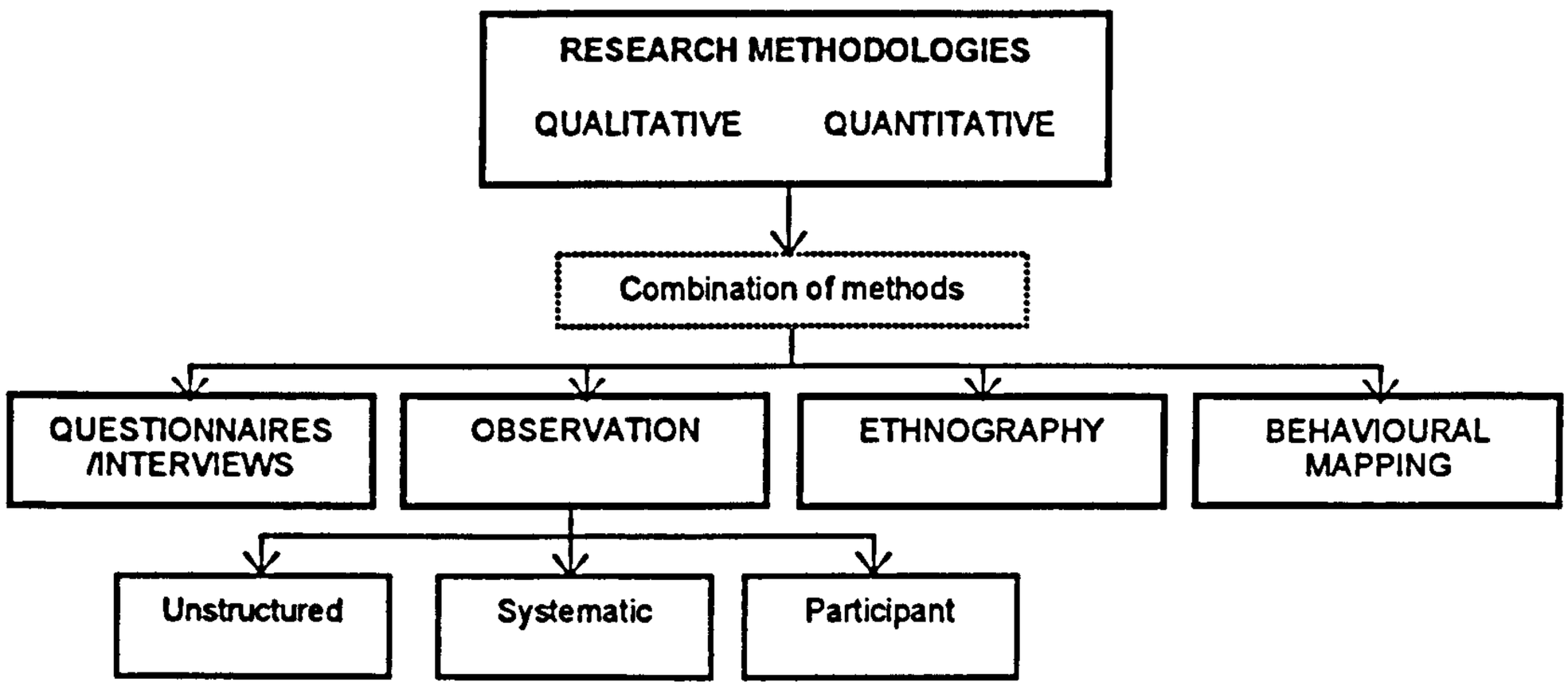


Figure 6.1: Model of Research Methodologies

6.2 Quantitative and Qualitative Research

There are two recognised types of research strategies, quantitative and qualitative. Quantitative research has generally been associated with the positivist approach following the natural sciences in an attempt to measure the social world in a similar manner to the physical world (Bryman, 2001). Quantitative methodologies have been defined as testing theory deductively from existing knowledge, through developing hypothesised relationships and proposed outcomes for study; while qualitative researchers have been seen to be guided by certain ideas, perspectives or hunches regarding the subject to be investigated.

Quantitative research techniques take the form of social surveys and questionnaires, with a numerical basis that is highly structured, leaving scope for only a limited range of answers. It has a very systematic response offering little flexibility or creativity, the aim being to generate data in terms of numbers which will allow measurable results in terms of statistical significance. However, qualitative research embraces different methods of data collection. Marshall and Rossman (1999) note that:

> *'The strength of the qualitative study that aims to explore a problem or describe a setting, a process, a social group, or a pattern of interaction will be its validity. An in-depth description showing the complexities of the variables and interactions will be so embedded with data derived from the setting that it cannot help but be valid. Within the parameters of that setting, population, and theoretical framework, the research will be valid. A qualitative researcher must therefore adequately state those parameters.'* (Marshall and Rossman, 1999: 145)

Quantitative research is most often defined as the collection and analysis of data (Bryman, 1988). Research subjects are controlled and manipulated according to the will of the researcher, assuming that the social world can be separated into categories and compartmentalised. Quantitative methodology uses numbers to test a hypothesis (Seale and Kelly, 1998):

> *'The world is essentially a qualitative experience; the quantitative researcher imposes categories upon the world and counts them.'* (Seale and Kelly, 1998: 150)

In contrast, qualitative research is the source of well-grounded theory, illustrated with rich description and an explanation of processes that occur in an identifiable local context (Miles and Huberman, 1994). With qualitative methodology, the intention is to

see the environment through the eyes of those being researched and in terms of their meaning and understanding, with techniques generally being used for exploration in greater depth with fewer subjects. In qualitative research the theory appears first and dictates the process of empirical research generated in the inspection and analysis of the data (Bryman, 2001).

A summary of the current elements in qualitative research is given by Miles and Hubermann (1994) and is reproduced here:

> *'Qualitative research is conducted through an intense and/or prolonged contact with a 'field' or life situation. These situations are typically 'banal' or normal ones, reflective of the everyday life of individuals, groups, societies, and organizations.*
>
> *The researchers role is to gain a 'holistic' overview of the context under study: its logic, its arrangements, its explicit and implicit rules.*
>
> *The researcher attempts to capture the data on the perceptions of local actors 'from the inside', through a process of deep attentiveness, of empathetic understanding and suspending or 'bracketing' preconceptions about the topics under discussion.*
>
> *Reading through these materials, the researcher may isolate certain themes and expressions that can be reviewed with informants, but that should be maintained in their original forms throughout the study.*
>
> *A main task is to explicate the ways people in particular settings come to understand, account for, take action, and otherwise manage their day to day situations.*
>
> *Many interpretations of this material are possible, but some are more compelling for theoretical reasons or on grounds of internal consistency.*
>
> *Relatively little standardized instrumentation is used at the outset. The researcher is essentially the main 'measurement device' in the study.*
>
> *Most analysis is done with words. The words can be assembled, sub clustered and broken into semiotic segments. They can be organised to permit the researcher to contrast, compare, analyse, and bestow patterns upon them.'* (Miles and Hubermann, 1994: 6-7)

The main differences between the two approaches lie in the nature of their data and in the methods for collecting and analysing data. Quantitative research is more concerned with the deductive testing of hypotheses and themes, whereas qualitative research is more concerned with explaining a topic and with generating hypotheses and theories.

Although qualitative and quantitative research has a common concern with theory as a goal of the research, the relationship between theory and the research processes are different. In quantitative research the theory appears first and directs the process of the empirical research. In qualitative research the theory is generated in the course of the close inspection and analysis of the data. This is known as grounded theory, a term coined by Glasser and Strauss in their work published in 1967. Grounded theory is best described as a research strategy thats purpose is to generate theory from data.

Other differences lie in the securing of rich descriptions, common to qualitative but not quantitative research. Qualitative research focuses on verbal rather than numeric data and it has been argued that visual images can lend themselves to similar kinds of analysis (Ball and Smith, 1992). Denzin and Lincoln (1994) use the term 'qualitative empirical materials', and point out that these include interview transcripts, recordings and notes, observational records of material culture, audio visual materials, and personal experience materials (such as artefacts, journal and diary information, and narratives). Thus the qualitative researcher has a much wider range of possible empirical materials than the quantitative researcher and will typically use multiple data sources in a study.

Qualitative research does not pretend to be replicable. The main ways in which qualitative researchers ensure the reliability of their analyses is in maintaining meticulous records of interviews and descriptions and by documenting the process of analysis in detail. The researcher avoids controlling the research conditions and concentrates on recording the complexity of situational contexts and interrelations as they occur.

6.2.1 Combining Quantitative and Qualitative Research

Within this context, qualitative and quantitative research may be perceived as different ways of examining the same research problem. Indeed the credibility of the findings are enhanced by the comparison of the data obtained from different sources or from different methods of data collection. By combining the two, the researcher claims further validity of the conclusions are enhanced (Bryman, 1988).

The focus on methods of investigation should not lose sight of the significance of a distinction between qualitative and quantitative data. For example, some findings from an ethnographic study may be presented in a quantified form. If there is a combination of quantitative and qualitative approaches, there will be a mixture of strategies.

Thus there are three possibilities for any study. It can have all quantitative data, it can have all qualitative data, or it can combine both types in any proportion. The type of data collected should be determined primarily by what is trying to be found out, considered against background and context, circumstances and practical aspects of the particular research project. As Miles and Huberman (1994) state:

> *'Both types of data can be productive for descriptive, reconnoitring, exploratory, confirmatory, hypothesis testing purposes.'* (Miles and Huberman, 1994: 42)

It is proposed therefore, to use a variety of methods of data collection within the study, including classroom surveys, participatory observation and semi structured interviews, as this is more appropriate to the research questions and will enable research findings from different methods to be collaborated.

6.3 Research Methods

6.3.1 Variables

Empirical research is concerned with the importance of observation and the collection of the facts assumed to exist prior to the development of a theory (Seale and Kelly, 1998). Measuring variables is a fundamental part of most forms of research. A variable is a class or category of objects, event or situation, which through control and manipulation define what constitutes an experiment so that they can be studied empirically.

There are two types of variable: independent and dependent. The independent variable is that which is controlled or manipulated, whereas the dependent variable is the behaviour made by the researcher, which may or may not, depending on the hypothesis, be predicted to depend on the independent variables (Byman, 2001). The hypothesis proposes that the independent variable will actually cause the change in the dependent variable. At it's simplest:

> *'An experiment involves making a change to one variable- called the independent variable – and observing the effect of change on another variable – called the dependent variable.'* (Cohen and Manion, 1994: 187)

In quantitative research there are two general ways variables can be controlled: physical and statistical. Physical control means that the variables are actually physically controlled in the design of the study. In statistical control variables are controlled in the analysis of data.

Variables can be classified in several ways. One fundamental way is to distinguish between discrete and continuous variables. Discrete variables also known as categorical variables vary in kind or vary qualitatively, rather than in degree, amount or quantity. Thus if an educational researcher wants to compare computerized and non-computerized classrooms, the discrete variable involved is the presence or absence of computers (Wallen and Fraenkel, 1991)

However, in environmental and behavioural research it is more common to look into the patterns of relationships between observed and described properties of the physical setting, and similarly observed and described reactions of the people in these settings (Proshansky, 1976).

6.3.2 Questionnaires

The word survey is used to describe any research that collects data (quantitative or qualitative) from a sample of people. This form of data collection uses questions and statements to stimulate responses to set items which are usually given to the respondents to fill in.

The questionnaire is a very versatile data gathering technique, thus it is difficult to generalise about its appropriate uses. However, it is useful to classify common aims to

focus the questionnaire design process. These include, 'hypothesis generating' using exploratory types of questions, test development and validation to test reliability and or validity of standard procedures associated with the use of the questionnaire and 'hypothesis and model testing' where key constructs exist (Fife-Schaw, 2000).

Questionnaires are a relatively well understood method and there are numerous guides to designing good questionnaires. Sudman and Bradburn (1982) and Oppenhiem (1992) provide a good clear introduction to the subject. When designing a questionnaire there are a number of elements that need to be considered. The questionnaire is less intrusive than an interview in that the respondent can answer the questions at a time of their own choosing. However, the questionnaire requires the respondent to accept the researcher's agenda rather than discussing areas of their own personal interest.

Another major distinction lies between open-ended and closed-ended response formats. With open-ended, respondents are asked to write down their response to a question in any terms that they see fit. This format often prompts people into providing multiple responses even if these responses are basically the same. Closed-ended formats require the researcher to have a reasonable idea of the likely responses to the questions. However these can create artificially forced choices and rule out unexpected responses. The wording and design of questionnaires is important so that the respondents do not misunderstand, or are led to respond in any particular way. There are 3 common forms of response format to be considered; categorical responses, rating scales and ranking formats. In addition to this are the elements of presentation and formatting, the media by which to distribute the questionnaire, and whether this is to be mailed or handed to the respondent or distributed online.

6.3.3 Interviews

There are many advantages to interviews, primarily the fact that they enable the researcher to learn more about things that cannot be seen in an observation, such as the reasoning behind an action.

Interviews can produce both quantitative and qualitative data (Seale and Kelly, 1998). They can be structured, involving a fixed set of questions. Respondents are asked to choose an answer from a fixed series of options given by the researcher. Or

unstructured, where the researcher has a number of topics to cover but precise questions and their order are not fixed. In both cases the richness of the data is determined by the appreciation that the researcher has of the topic.

Whichever typology is used, the main dimensions of variation are the degree of structure in the interview, the depth of the interview and the degree to which the interview is standardised across respondents and situations.

6.3.4 Observation

Observation has a long tradition in the social sciences and has been extensively employed by educational researchers (Foster, 1996). What is to be observed will depend on the nature of the research question and the specific relationships being examined. It would clearly be impossible to observe everything and the greatest difficulty is in deciding what to observe. Croll (1986) writes:

> *'It is probably fair to say that there is general agreement about the value of direct observation of classrooms in educational research but there is much less agreement about the appropriate methodology for such observation.'* (Croll, 1986: 1)

Observation can often be difficult and complex, but it is also one of the most versatile ways of gathering information. It can be organised to give both quantitative and qualitative data and can be used in a wide variety of studies. Simpson and Tuson (1995) provide evidence of some of the strengths of observation:

> *'it can give direct access to social interactions; it can give permanent and systematic records of social interactions; there are a number of ways in which observations may be recorded (field notes, detailed records, rating scales, structured observation schedules or videotape); whatever type of record is made, it offers a permanent account of transient situations, an account which can be used in a variety of ways at a later date; observation can supplement data gathered by other techniques and although observation techniques are extremely varied, the main feature of observation is its extreme flexibility.*
>
> *and weaknesses: it has a high demand on time, effort and resources and it is susceptible to observer bias'.* (Simpson and Tuson, 1995: 16-19)

The simplest form of observation is unstructured observation, which does not use an observation schedule for the recording of behaviour. Instead, the aim is to record in as much detail as possible the behaviour of participants with an aim to develop a narrative account of that behaviour (Bryman, 2001). The other two main approaches associated with observational research are systematic and participant observation. Psychologists developed systematic or structured observation in the early 1920s in the United States and used observational systems of classroom behaviours to collect data for correlation and later analysis (Delamont and Hamilton, 1983).

Systematic observation is a process using standard procedures to obtain data. In order to conduct this type of observation, categories and units of behaviour are defined and ways of measuring them worked out. Information collected in this way can be easily quantified and frequencies and distribution patterns of the listed behaviours can be calculated. The purpose of systematic classroom observation is to provide an accurate description of selected features of activities and interactions in classrooms. Educational observers have developed a large number of systematic observation systems. Such studies include, *One in Five* (Croll and Mosses, 1985), the *ORACLE 1976* study (Galton *et al*, 1980) and the *ORACLE 1996* study (Galton *et al*, 1999) and *The Teacher's Day* (Hilsum and Cane, 1971).

For example, the *ORACLE 1976* study described and analysed pupil and teacher activities and interactions in the primary school classroom and related these to the progress children were making in their school achievements. The research involved two separate observation systems: a 'pupil record' and a 'teacher record', which involved selecting moments in time and coding the observation schedule in terms of the activities and interactions of the child or the teacher being observed at that moment.

However, criticism of systematic observation arises from the way that it utilizes a limited number of pre-defined categories as the basis for describing classroom activity, thus giving only a partial view of classroom environments. Other criticisms are, the inflexibility of observation procedures, that they 'de-contextualize' the phenomena being observed, that they result in individual isolated pieces of data which are in themselves meaningless, and reservations about quantification, and the use of statistical data. (Croll, 1986)

The second approach to observation associated with ethnographic or other qualitative observational techniques is very different.

> *'The ethological approach is characterised by a particular method of direct observation which aims to record the behaviour completely and impartially in all its detail, correlating it with the stimuli which evoke it.'* (Wilkinson, 2000: 226)

In investigating the environment, we find relationships between behaviour and human experience on the one hand and the design of the physical setting on the other (Proshansky, 1976). The most common method used in qualitative research is participant observation, which entails the sustained immersion of the researcher among those whom he or she seeks to study with a view to generating a rounded, in-depth account of the group (Bryman,1988).

Participant observation is a central ethnographic data collection technique, referring to a way of actively, carefully and self-consciously describing and recording what people do whilst one is, oneself, part of the action.

The observer will also try to discuss the situation observed to elicit the participants' interpretation of events, and a process of triangulation may be employed. Recording is usually done in the form of field notes, which contain detailed descriptions of events, incidents or issues.

6.3.5 The Ethnographic Approach

Ethnography means describing a culture and understanding a way of life from the point of view of its participants: it is the art and science of a group or culture (Fetterman, 1989).

Ethnography and grounded theory are different sorts of strategies the qualitative researcher might use. Ethnography can be viewed as both a method of data collection and a philosophical framework (Hammersley & Atkinson, 1995), designed to explore how people interpret their experiences of the world. Ethnography is distinctive in three ways. Firstly there are no distinct stages of theorizing, hypothesis construction, data gathering and hypothesis testing. Instead the research process is one of a constant interaction between problem and formulation, data collection and data analysis.

Secondly, ethnography uses a variety of techniques in an attempt to observe things that happen in the setting under investigation. Thirdly, the observer is the primary research instrument, accessing the field, establishing field relations, conducting and structuring observation, writing field notes, recording and finally writing up the research (Walsh, 1989).

Hence there are a number of ways of recording observational data and strategies can be described in two terms. Firstly, what is to be observed and secondly how it is to be recorded. In order to determine this, a pilot study should be undertaken to test out various research methods.

Ethnography can be summarised by using the words of the prominent educational ethnographer, Wolcott, who states:

> *'Ethnography means, literally, a picture of the 'way of life' of some identifiable group of people. Conceivably, those people could be any culture-bearing group, in any time and place. In times past, the group was usually a small, intact, essentially self-sufficient social unit, and it was always a group notably 'strange' to the observer. The anthropologist's purpose as ethnographer was to learn about, record, and ultimately portray the culture of this other group. Anthropologists always study behaviour in terms of cultural context. Particular individuals, customs, institutions, or events are of anthropological interest as they relate to generalised description of the life-way of a socially interacting group. Yet culture itself is always an abstraction, regardless of whether one is referring to culture in general or to the culture of a specific social group.' (Wolcott, 1988: 188)*

6.4 Behavioural Mapping

The term behavioural mapping is associated with the work of Barker and Wright, who, in their work on behaviour settings provided information which allowed explanations of the behaviour observed. They concluded that behaviour could not be separated from its setting and that there seems to be a fit between the behaviour and the characteristics of the setting (Barker, 1968; Barker and Wright, 1955).

Behavioural mapping is a form of direct observation tracking the movements of subjects through existing physical settings, whilst observing the kinds of behaviour that occur in relation to these settings. Behaviour always occurs in a specific place within the limits of some physical surroundings. Behavioural mapping is empirical, describing

observed behaviour both quantitatively and qualitatively through amounts of categories of behaviour in addition to qualitative descriptions of it.

Behavioural mapping is a naturalistic time-sample technique for describing patterns of activity and the use of the physical space (Rivlin and Rothenberg, 1976). In naturalistic observation, observers neither manipulate nor stimulate the behaviour of those whom they are observing. A scaled drawing or a floor plan of a physical space provide the basis of all behavioural maps with each area labelled according to the kinds of behaviour expected to occur there (Ittelson *et al.*, 1976). According to Moore (1979) behavioural maps have three major components: description of the environmental setting, description of the subject characteristics, and description of behaviour. The setting (physical environmental variables) and the subject descriptions (social environmental variables) constitute the independent variables, while the behaviour observed constitutes the dependent variables (Moore, 1994). In outlining the standard procedure for behavioural mapping Ittelson *et al.* (1976) states:

> 1. *Identification of observational categories. This is done by continually observing the areas to be mapped and reordering in narrative style the observed behaviours. These narratives are then analysed for the major behaviour categories relevant to the particular study. Emphasis is on overt, easily identifiable behaviours, requiring a minimum of interference by the observer.*
> 2. *Identifying the physical area to be mapped – the room, playground, or street that is under observation.*
> 3. *Preparation of the observer instructions and observation forms, permitting easy recording of who is doing which of the behaviour categories in what locations.*
> 4. *Preparation of an observation schedule. In most common schedules the entire physical space to be mapped on a time sampling basis is covered typically every 15 minutes. Variations include continuous observation of smaller areas and sampling of spaces as well as time.* (Ittelson *et al.*, 1974:232)

6.5 Research Setting

The research focuses on primary school classrooms, a very specific school environment in which teachers and pupils interact during the process of learning. The research refers to classrooms built within the existing building stock. The main body of

the research refers to Key Stage 2 classrooms, which accommodate children aged between 7 and 11 in year groups 3 to 6, and explores the relationship between the classroom environment and the implementation of the National Curriculum.

Progressively through the early stages of this research the relationship between the classroom environment and teaching and learning associated with the National Curriculum became a core of the study. However, this study does not attempt to describe the ideal classroom environment but rather describe and analyse the effects of classroom environments on the implementation of the National Curriculum. The focus is on the teacher, pupils and on primary classrooms physical environment.

6.6 Sample Size

The sample size inherent with an in-depth qualitative study has been recognised as being typically small due to the intensive study of behaviour in question. Small samples have been seen to be adequate in capturing the full range of themes emerging in relation to the behaviour of interest, whilst, moreover, qualitative analysis is typically a time consuming procedure that would become unwieldy with large samples (Bryman, 2001).

6.7 Research Questions

The study's research questions provided the structure for the research methods applied. The prime research question is:

Is it possible to design more effective primary classrooms and support the delivery of the National Curriculum by enabling the briefing process?

From this 5 sub-questions can be extracted to determine the parameters of the research. The first question challenges existing methods of classroom design. The subsequent three questions examine the structure of teaching and learning activities, the use of the classroom and the organisation of teaching resources. The final question utilises teachers' experiences in classrooms as a method of gauging how classroom environments currently work.

1. How do existing primary classroom design guidelines enable the effective delivery of the National Curriculum?

2. What is the structure of teaching and learning activities associated with the National Curriculum?

3. How is the classroom environment used during the teaching and learning activities associated with the National Curriculum?

4. How does the organisation of teaching resources support the teaching and learning activities associated with the National Curriculum?

5. What are teachers' perceptions of their classroom environments?

6.8 Summary

This chapter has provided an introduction to the theoretical issues and practical techniques of undertaking research within the classroom environment. This combined with the research questions leads to the development of the research instruments that is described in the Chapter eight.

The study focuses on the physical environment of primary classrooms and the area of enquiry is the National Curriculum, covering the potential physical attributes of classrooms that enable or inhibit the delivery of the National Curriculum. The research instruments: Classroom Survey Questionnaire and Observation Schedules combine both quantitative and qualitative data collection methods with a view to enhancing findings by comparing the data. Initially data will be gathered from teachers working in classroom environments to assess their experiences in classrooms as a method of gauging an overview of the classroom environments presently in use. This is a versatile method of data collection which will provide an oversight of the views and thoughts of teachers.

The study also explores through the observation of lessons and through interviews with teachers in their classroom the relationships between teaching, activities and the use of space in relation to the National Curriculum. Observing, measuring and describing behaviour within the classroom environment without controlling the research conditions will provide a rich set of data that through a multi-strategy analysis framework will identify if and how it is possible to support and improve the design of primary classroom environments.

It is hoped that the information gained will be of interest to three groups: teachers (the users of the classroom); Local Education Authorities or diocese (clients); architects and other building professionals. Providing evidence to support and improve the design of primary classroom environments to enhance a better delivery of the National Curriculum. The following chapter examines the ways in which the data was collected, organised and analysed.

6.9 References

Ball, M.S. and Smith, G. W. H. (1992) *Analyzing Visual Data*, London: Sage.

Barker, R. G. (1968) *Ecological psychology: Concepts and methods for studying the environment of human behaviour*, Stanford, CA: Stanford University Press.

Barker, R. G. and Wright, H. (1955) *Midwest and its Children*, New York: Row and Peterson.

Bryman, A. (1988) *Quantity and Quality in Social Research*, London: Routledge.

Bryman, A. (2001) *Social Research Methods*, Oxford: University Press.

Cohen, L. and Manion, L. (1994) *Research Methods in Education*, London: Routledge

Creswell, J. W. (1994) *Research Design: Qualitative & Quantitative Approaches*, London: Sage Publications.

Croll, P. (1986) *Systematic Classroom Observation,* London: Falmer Press.

Croll, P. and Mosses, D. (1985) *One in Five: The assessment and Incidence of Special Educational Needs*, London: Routledge and Kegan Paul.

Delmont, S. and Hamilton, D. (1983) *Classroom research; a critique and a new approach to Interaction Analysis* in Stubbs, M. and Delmont, S. (Eds.) *Explorations in Classroom Observation*, Bath: Wiley.

Denzin, N. K. (1989) and Lincoln, Y. S. (Eds.) (1994) *Handbook of Qualitative Research*, Thousand Oaks, CA: Sage.

Fetterman, D. M. (1989) *Ethnography Step by Step*, Newbury Park, CA: Sage.

Fife-Schaw, C. (2000) Questionnaire Design, in G. M. Breakwell, S. Hammond and C. Fife-Schaw , *Research Methods in Psychology* (2nd ed.), London: Sage Publications.

Foster, P. (1996) *Observing Schools: A Methodological Guide*, London: Paul Chapman.

Fraser, B. J. and Walberg, H. J. (1991) *Educational Environments: Evaluation, Antecedents and Consequences*, Oxford: Pergamon Press.

Galton, M., Simon, B., Croll, P. (1980) *Inside the Primary Classroom*. London: Routledge & Keegan Paul.

Galton, M., Hargreaves, L., Comber, C., Wall, D. and Pell, A. (1999) *Inside the Primary Classroom: 20 Years On*. London: Routledge & Keegan Paul.

Glasser, B. G. and Strauss, A. L. (1967) *The Discovery of Grounded Theory: Strategies for Qualitative Research.* Chicago: Aldine Publishing Co.

Hammersley, M. and Atkinson, P. (1995) *Ethnography*, London: Routledge.

Hilsum, S. and Cane, B. (1971) *The Teacher's Day*, Windsor: NFER.

Ittelson, W., Rivlin, L., Proshansky, H. M. (1976) *The Use of Behavioural Maps in Environmental Psychology*, in H, Proshansky, W. H. Ittelson and L. G. Rivlin (Eds.) *Environmental Psychology – People and Their Physical Settings* (2nd ed.), New York: Holt, Rinehart and Winston, pp. 340-351.

Ittelson, W., Rivlin, L., Proshansky, H. M. and Winkel, G. (1974) *An Introduction to Environmental Psychology,* New York: Holt Rinehart and Winston.

Marshall, C., Rossman, B. (1999) *Designing Qualitative Research* (3rd ed.) Thousand Oaks, CA: Sage Publications.

Miles, M. and Huberman, A. (1994) *Qualitative Data Analysis: an expanded sourcebook* (2nd Ed.), Thousands Oaks CA: Sage.

Moore, G. T. (1979) *Environment-Behaviour Studies*, In J. C. Snyder and A. J. Catanese (Eds.) *Introduction to Architecture*, New York: McGraw-Hill Book Company, pp. 46-71.

Moore, G. T. (1994) *Early Childhood Physical Environment Observation Schedules and Rating Scales*, University of Wisconsin - Milwalkee, Milwalkee, WI, USA: Publications in Architecture and Urban Planning.

Oppenhiem, A. N. (1992) *Questionnaire Design, Interviewing and Attitude Measurement*, London: Printer.

Proshansky, H. M. (1976) *Environmental Psychology: A Methodological Orientation*, in H, Proshansky, W. H. Ittelson and L. G. Rivlin (Eds.) *Environmental Psychology – People and Their Physical Settings* (2nd ed.), New York: Holt, Rinehart and Winston, pp. 59-69.

Rivlin, L. G. and Rothenberg, M. (1976) *The Use of Space in Open classrooms*, in H, Proshansky, W. H. Ittelson and L. G. Rivlin (Eds.) *Environmental Psychology – People and Their Physical Settings* (2nd ed.), New York: Holt, Rinehart and Winston, pp. 479-489.

Seale, C. and Kelly, M. (1998) *Coding and Analysing Data*, in C. Seale (Ed.) *Researching Society and Culture*, London: Sage Publications, pp. 146-163

Simpson, M. and Tuson, J. (1995) *Using Observation in Small-Scale Research*, Edinburgh: Scottish Council for Research in Education.

Sudman, S. and Bradburn, N. M. (1982) *Asking Questions: A Practical Guide to Questionnaire Design,* San Fransisco: Jossey-Bass.

Wallen, N. E. and Fraenkel, J. R. (1991) *Educational Research: A Guide to the Process*, New York: McGraw-Hill.

Walsh, D. (1989) *Doing ethnography*, in C. Seale (Ed.) *Researching Society and Culture*, London: Sage Publications, pp. 227-232.

Wilkinson, J. (2000) Direct Observation, in G. M. Breakwell, S. Hammond and C. Fife-Schaw (Eds.), *Research Methods in Psychology* (2nd ed.), London: Sage Publications.

Wolcott, H. F (1988) *Ethnographic research in education*, in R. M. Jaeger (Ed.), *Complementary Methods of Research in Education*. Washington, DC: American Educational Research Association, pp. 187-249.

CHAPTER 7: DATA ANALYSIS FRAMEWORK

7.1 Introduction

This chapter explains the way in which the data was classified, categorised and analysed. It also describes how the data was stored and processed and generated into new analysis constructs. The quantitative data obtained from the Classroom Survey Questionnaire and the Observational Schedules was analysed statistically and the qualitative data was analysed as grounded theory. The following diagram illustrates the analytical framework discussed in this chapter.

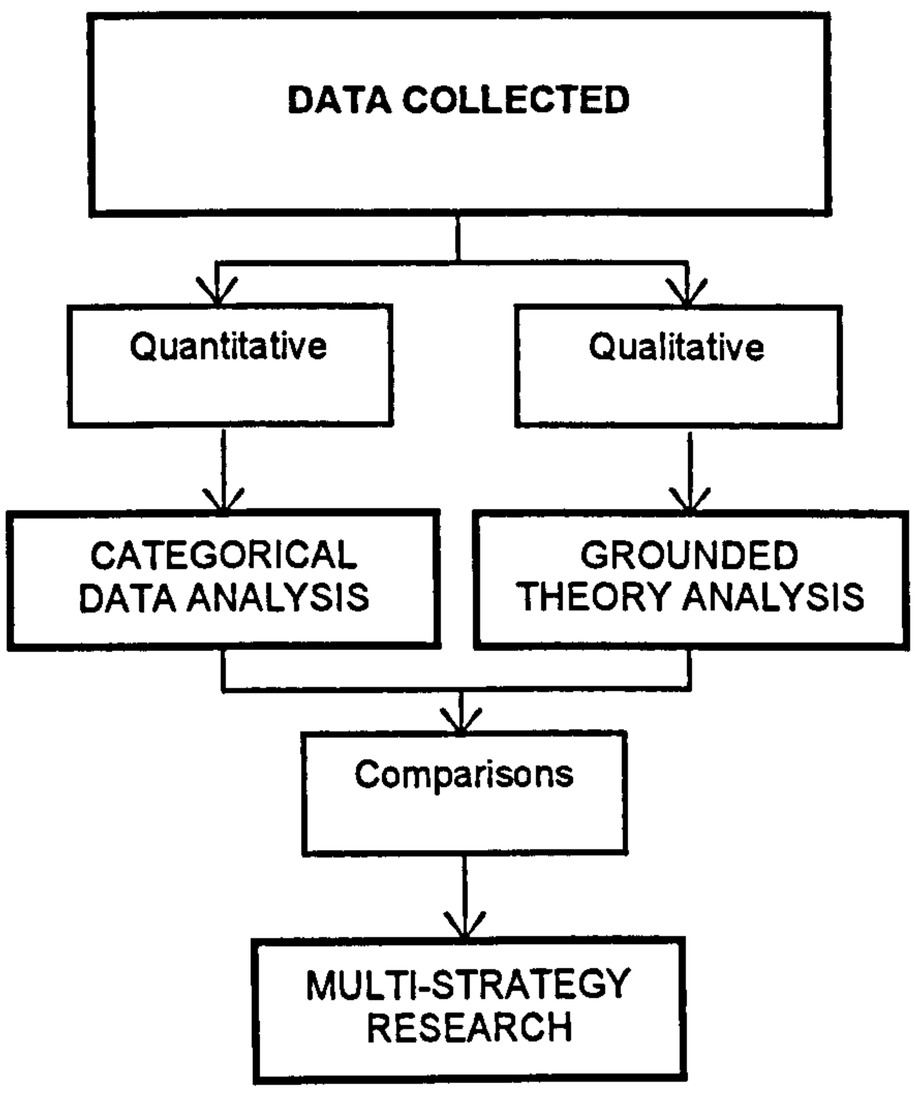


Figure 7.1: Model of data analysis framework

7.2 Data Collected

As described in chapter 4, there are two principal methods of data collection: the Classroom Survey Questionnaire and the Classroom Observation Schedules. Permission to undertake the study was obtained from the schools where the observations took place. Schools were contacted by letter and responded either verbally or in written form. All the schools and teachers were volunteers and had equal opportunity to take part in the study. Schools that took part represented the full age range of the existing primary school building stock.

The Classroom Survey Questionnaires were mailed to schools in November 2001. Observations and interviews began in April 2002 and continued through to October

2002. The amount of data collected was ample, consequently so was the time spent collecting, transcribing and analysing.

Method	Quantity	Format	Content
Classroom Survey Questionnaire	67 Responses	Questionnaire	Teachers' attitudes towards the classrooms in their schools.
Classroom Observation Schedules	44 Lessons observed 51.35 hours of observations	Classroom Data Sheet	An inventory of what is in the classroom. Records of the physical features of the classroom Layout of room with location of teacher's and pupils movement throughout the lesson
		Observation Data Sheet	Lesson Structure Teacher Activity Support Staff Activity Pupil Activity Class Organisation Observer's personal impressions in relation to measures of the physical environment Descriptive and additional information
		Teacher Interview Sheet	Teachers impression of the classroom in relation to measures of the physical environment

Figure 7.2: Summary of data collected

7.3 Data Analysis

This study uses two types of research method combining different techniques and data sources to examine the topic from different standpoints. Initially descriptive statistics were produced as a guide to applying the appropriate analyses of variance. The structured methods employed enabled the analysis of the quantitative data. This enabled the comparison between different observations so that patterns of similarity and difference could be identified.

Despite the main body of the study being rooted in quantitative methodology, an element of qualitative design exists in some aspects of the data collection. This included the open-ended questions in the Classroom Survey Questionnaire (question

12), the Teacher Interview Sheets (questions 6-8) and the descriptive and additional information collected during the observations. This qualitative research, by its nature, aims to increase the understanding of the research phenomena.

The data collected had to be dealt with in several formats that allow triangulation and cross referencing of different variables. During the observations the case for using the lesson as the principal unit of analysis became apparent, which through comparison of lesson structure and form gave a recurrent point of reference for the data analysis. Lessons observed were fixed in time; the shortest of the lessons observed lasted for 30 minutes, the longest for 100 minutes, with the median lesson length being 65 minutes.

The analysis of the qualitative data gathered by the Classroom Survey Questionnaire and Classroom Observation Schedules was focused by the research questions and the emerging themes of the quantitative data. The qualitative data was also used to illuminate the quantitative data from the Classroom Observation Schedules.

7.3.1 Multi-strategy Research

The multi-strategy approach to this study is based on the idea of triangulation. This implies that the results of a study employing a method associated with one research strategy are cross-checked against the results of another method associated with a different research strategy.

There are many arguments when combining qualitative and quantitative research, some have to do with the commitment to one method and that the two research methods are from different paradigms which cannot be mixed. Nevertheless, qualitative and quantitative research have some common ground (Bryman, 2001). Hammersley (1996) has proposed three approaches to multi-strategy research:

- Triangulation. This refers to the use of quantitative research to corroborate qualitative research findings or vice versa.

- Facilitation. This approach arises when one research strategy is employed in order to aid research using the other research strategy.

- Complementary. This approach occurs when the two different research strategies are employed in order that different aspects of an investigation can be dovetailed.

Quantitative research tends to bring out a static picture of a phenomenon, whereas qualitative research is more procedural. Qualitative data collected in this study allowed access to the different perspectives of the environment being studied, and quantitative data allowed the explanation of specific issues. It also facilitated the interpretation of the relationship between variables and was used to illustrate and corroborate the qualitative data. In general one research method facilitated the other. The qualitative research was very useful at providing an in-depth knowledge of a context, first to find out the appropriate themes to be used in later data collection, and second to provide ideas that could be tested through quantitative research.

7.3.2 Categorical Data Analysis

Where quantitative data category systems had already been developed, the search for descriptive features and patterns involved the comparisons between the frequencies with which instances were allocated to different categories across differing units of analysis.

The use of closed-ended questions in the Classroom Survey Questionnaire and the Teacher Interview allowed them to be pre-coded. This allowed the categorical responses and the pre-coded data collected from the Observation Schedules to be input into a frequency table, providing the number of responses and the percentages for each of the categories for the variable in question.

When analysing the qualitative material collected, data was compared to develop category systems through which the key features and patterns in the data could be described. These responses were initially scanned to acquaint the researcher to relevant ideas and themes and then analysed to quantify content in terms of predetermined categories. A coding schedule was developed so the data relating to a specific could be recorded.

Coding became a crucial stage in the process of content analysis. The coding of responses for the open–ended questions was organised according to positive and

negative responses relating to measures of the physical environment. Each time a specific unit was mentioned in a response it was highlighted as a specific unit. This coding is a key process in grounded theory and in approaches to qualitative data analysis more generally, whereby data is broken down into component parts.

7.3.3 Grounded Theory Analysis

The two well-known routes for the analysis of qualitative data are analytic induction and grounded theory. Analytic induction refers to the approach where the researcher seeks universal explanation of phenomena by collection of data until no cases are found that are inconsistent with the hypothetical explanation of the phenomena. Grounded theory by contrast is the theory that is derived from the data, systematically designed and gathered through the research process (Bryman, 2001).

Glaser and Strauss (1967) refer to the process of comparing pieces of data as '*the constant comparative method*', explaining that comparison allows the researcher to establish the range of particular categories and the variation within these categories.

The basic process of grounded theory is to break data into its component parts, both during the process of collecting the data and while analysing it. The data are separated into categories defined as the data emerges and which reflect the researcher's interpretation of the data. These categories are parts of the transcripts or field notes that are of potential theoretical significance and/or that appear to be particularly relevant in the context of being studied (Bryman, 2001).

However, grounded theory has certain limitations, the fact that knowledge of other theories or literature can make the observations less neutral, the fact that grounded theory is sometimes more a rigorous approach to the generation of concepts and explanation of something other than a theory, sometimes the data loses its narrative flow as it is categorised. However, despite these limitations, grounded theory is largely used and it is considered one of the best methods of analysing qualitative data derived from interviews and observation.

Thus, two central features of grounded theory are that it is concerned with the development of theory out of data and the approach is iterative or recursive as it is

sometimes called, meaning that data collection and analysis proceed in tandem, repeatedly referring back to each other (Bryman, 2001).

7.4 Data Entry System

Because of the qualitative and quantitative nature of the data from the two principal formats: the Classroom Survey Questionnaire and the Classroom Observation Schedules, the raw data had to be dealt with in several formats that allow triangulation and cross-referencing of different variables. This also allowed the merging of data for later comparisons.

In order to manage the amount of data and the diversity of both the qualitative and quantitative data collected a system of data entry, storage and retrieval was established, which in turn, determined the employment of computer applications to support the analysis. These tools were chosen to give the proper accessibility and compatibility between the different sets of data.

The electronic spreadsheet programme Excel has a series of tools that support a number of different uses. It supported the quantitative data and the coding of the qualitative data of the project by allowing the statistical analysis and organisation of information. It also permitted the interchange, triangulation and cross-referencing of qualitative and quantitative data. The plans from the classroom data sheets were transferred into a digital format using the computer aided design package, Vectorworks. The combination of these systems provided a powerful and rich source of data for analysis.

7.5 Validity and Reliability

Conclusions to any research must be based on the actual evidence, which has to be cautiously interpreted. What goes on in the primary school classroom is not easy to assess nor, necessarily, to understand. It is, however, important to know what goes on if there is to be a firm basis for any action that might be taken to improve the effectiveness of teaching and learning.

During the observations the extensive contact with the classroom environment enabled the context of the subjects (teachers, support staff and pupils) behaviour and activities

to be mapped out fully. Conducting interviews with teachers to increase the thinking behind the actions in turn complemented the observations.

Similarly by employing existing knowledge, concepts and theories, what was observed could be recognised and meaning established. However, the researcher's own values and beliefs, whilst having importance, must not contaminate the evidence or distort the results. The triangulation of the data collected involved checking the validity of findings and observational data by cross checking them with other sources of data. The research findings are supported by data from three sources: questionnaires, observations and interviews.

However there could be some criticism of the approach. For example, a weakness of this circumstance may be that this situation is too unique and results cannot be generalised. However, the sample that responded to the Classroom Survey Questionnaire was representative of the age range of the present building stock, as were the classrooms in which the observations took place.

Nevertheless, the research is validated by triangulation with different data sources substantiating the findings. The methods used involved direct observations and subsequent teacher interviews, and it is these various sources of data that create greater understanding and increase their reliability. This results in a chain of evidence that establishes validity, providing conclusions that are important to all those involved in the study and planning of new and existing primary classroom environments.

7.6 Limitations

The data collected from the Classroom Survey Questionnaire is based on teacher perceptions and is limited in the terms of detail that it is possible to achieve. The number of questionnaires already circulating in the educational environment was also an important limitation, as the respondents have many similar requests for information from many other organisations. The Classroom Survey Questionnaire was undertaken to provide a broad picture of teachers' attitudes to the classrooms in which they work and it required the respondents to accept the researchers' agenda rather than discussing areas of their own personal interest.

The observational studies were limited to the classroom environment and did not investigate the other school learning environments, such as specialist teaching areas, halls and outdoor spaces accessible from the classroom. The classrooms in the sample were deliberately chosen to include only Key Stage 2 classrooms, covering an age range of children from 7-11 and to provide a number of differently aged classrooms.

The size of the observational sample crucially depended on the amount of time that was spent doing the observations. A number of other considerations were relevant here, including the number of pupils to be observed, the number of observations required to ensure reliability and validity, the constraint of only having one observer in a classroom at any given time and the additional time required for analysing the data.

Observational studies, whilst not claiming to reveal the whole truth about what goes on in classrooms, nevertheless add an important dimension to describing and understanding these events and the sample was adequate in capturing the full range of themes emerging in relation to the phenomenon of interest. Moreover, qualitative analysis is typically a time consuming procedure that can become unwieldy with large samples.

The Teacher Interviews took place under tight time constraints between lessons or during breaks. It is felt that lengthier or more informal interviews with teachers could have been more informative and enlightening. However, despite these limitations I conclude that the study contains useful information about the primary classroom environments.

7.7 Summary

The data analysis framework for this study is explained in this chapter. The quantitative means of research was thought to be too limiting and inflexible for the complexities of the classroom situation. Thus data analysis combined both quantitative and qualitative approaches. It is expected that the collection of qualitative data will result in the accumulation of a large quantity of information. Also although there are common themes for analysing quantitative data there are different approaches to analysing the qualitative data analysed, with grounded theory being the most prominent.

The strategy for analysing the qualitative data is to develop the theory (Classroom Design Brief) out of the data meaning the data collection and analysis will progress together, constantly referring back to each other. The following chapter describes the development of the research instruments.

7.8 References

Bryman, A. (2001) *Social Research Methods*, Oxford: University Press.

Glaser, B. G. and Strauss, A. L. (1967) *The Discovery of grounded Theory; Strategies for Qualitative Research*, Chicago: Adeline.

Hammersley, B. (1996) *The Relationships between Qualitative and Quantitative Research: Paradigm Loyalty versus Methodological Eclecticism*, in Richardson, J., T., E. (ed.), *Handbook of Research Methods for Psychology and the Social Sciences*, Leicester: BPS Books.