

**TRAFFIC EDUCATION FOR CHILDREN BY MEANS OF
HEURISTIC LEARNING AND ART THERAPY**

by

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DECLARATION

I hereby declare that this submission is my own work towards the PhD, and that to the best of my knowledge, it contains no material previously published by another person nor material which has been accepted for the award of any other degree of the University, except where due acknowledgement has been made in the text.

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ABSTRACT

Child traffic fatality has given rise to concerns from different kinds of professionals and bodies seeking to find an antidote to the issue. Accounting for such fatalities among children include the diminutive size of children, occluding vehicles, poor distance judgement, minimal utilisation of peripheral vision, and inattentiveness. Child traffic education has been the prescription for this case. But education has been restricted to the conventional “look left and right before crossing the road”, cautions and precautions. The nature of the child, and child road safety have attracted other expertise besides engineering, into education. Consequently new methods of teaching children traffic lessons have evolved. This study used art therapy to assimilate traffic culture into children. Seventy-one children, aged between five and ten from Ghana and the Republic of Ireland, were studied. The children were carefully observed in a one year longitudinal study. The study population wholly went through 11 therapy sessions. Individually, each child went through at least three and at most four therapy sessions, from which they produced a total of 262 drawings which formed the basis for studying the children’s behaviour in traffic in a pre-survey and post-survey design. Theories of child development, psychology and art education were applied to the children to aid teaching and learning. It was recommended, inter alia, that road safety authorities in Ghana should shift focus from knowledge-based learning to behaviour-affecting learning in child traffic education. To easily accomplish this, teachers and parents should engage children in art, especially in the use of colours, to prepare and develop children’s creative and cognitive perceptual abilities, to break their restriction to stereotype thinking.

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DEDICATION

To the cause of child road safety the world over;

and

To the memory of my father, the late Ex-WOI Achampong

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TABLE OF CONTENTS

TITLE PAGE.....	i
DECLARATION	ii
ABSTRACT	iii
ACKNOWLEDGEMENTS.....	iv
DEDICATION	vi
TABLE OF CONTENTS	vii
LIST OF FIGURES	xiii
LIST OF TABLES	xiv
LIST OF PLATES.....	xv
 CHAPTER ONE	 1
INTRODUCTION.....	1
1.1 Background to the Study	1
1.2 Statement of the Problem	2
1.3 Research Questions.....	4
1.4 Objectives	4
1.5 Importance of Study.....	5
1.6 Delimitation.....	6
1.6.1 Kumasi, Ghana	6
1.6.2 Adjikpo, Ghana	9
1.6.3 Dublin, Republic of Ireland	9
1.7 Effects of Geographical Patterns on Traffic in the Study Areas.....	10
1.7.1 Vehicle and Industry	10
1.7.2 Road Network.....	13
1.7.3 Migration and Population	14
1.7.4 Meteorological Effects.....	16
1.8 Limitations.....	17
1.8.1 Research Budget.....	17
1.8.2 Travel Expenses	18
1.8.3 Restraints on Observation.....	18
1.8.4 Inadequate time for Therapy Sessions	19
1.8.5 Interference with Respondents' Drawings	20
1.8.6 Interference with Observation	20

1.9	Organisation of the Rest of Text	21
1.9.1	Chapter One: Introduction	22
1.9.2	Chapter Two: Review of Related Literature	22
1.9.3	Chapter Three: Research Methodology	22
1.9.4	Chapter Four: Road Traffic Education for Children	22
1.9.5	Chapter Five: Data Analyses and Interpretation	23
1.9.6	Chapter Six: Summary, Conclusions and Recommendations	23
1.10	Conceptual Framework / Operational Definitions	23
1.11	Abbreviations	31
1.12	Acronyms	33
CHAPTER TWO.....		35
REVIEW OF RELATED LITERATURE		35
2.1	The Child: History and Regard	35
2.2	Child vulnerability	37
2.2.1	Injuries Among Children	37
2.2.2	Road Traffic Crash Injuries Among Children	40
2.3	Pedestrian Fatalities in Ghana	41
2.3.1	Child Traffic Fatalities in Ghana.....	41
2.4	Child Development	48
2.5	Developmental Processes of the Child	49
2.5.1	Change	49
2.5.2	Stability	49
2.5.3	Domains of Development	50
2.5.4	Periods of Development	52
2.6	The Art of Children.....	53
2.6.1	The Scribble Stage	54
2.6.2	The Pre-schematic Stage.....	55
2.6.3	The Schematic Stage.....	55
2.6.4	The Dawning Realism Stage	56
2.6.5	The Pseudorealistic Stage	57
2.7	Art Therapy and Child Traffic Education	57
2.8	Theories of Child Development and Learning	64
2.8.1	Maturationist Theory	64
2.8.2	Environmentalism Theory	65
2.8.3	Constructivist Theory	66
2.9	The Child and Story-Telling	67
2.10	Child Road Traffic Education in Ghana	71
2.11	Curriculum.....	71
2.11.1	The Use of the Term Curriculum	73

2.11.2	Curriculum Redefined	76
2.11.3	The Structure of Curriculum	76
2.11.3.1	The Platform	76
2.11.3.2	Features of Curriculum Platform	77
2.11.4	The Curriculum Deliberations	80
2.11.5	Evaluation	82
CHAPTER THREE		83
METHODOLOGY		83
3.1	Longitudinal Experiment	83
3.2	The Survey Method	83
3.2.1	The Descriptive Survey	84
3.2.1.1	Field Studies / Observation	84
3.2.1.2	Random Observation	84
3.2.1.3	Clinical Observation	85
3.2.1.4	Concealed Observation	88
3.2.1.5	Participant Observation	88
3.2.2	Analytical Survey	89
3.2.2.1	Ordinal Scale of Measurement (OSM)	89
3.2.2.2	ANOVA	90
3.2.2.3	Content Analysis	91
3.3	Primary Sources	91
3.4	Secondary Sources	91
3.5	Research Tools	92
3.5.1	Interviews / Sources of Information	92
3.5.2	Libraries Used for the Study	93
3.5.2.1	Research Institutions	93
3.5.2.2	Academic and other institutions	93
3.5.2.3	Public libraries	94
3.5.2.4	Private libraries	94
3.6	Measurement Techniques	94
3.6.1	Pre-test Survey	94
3.6.2	Post-test Survey	95
3.7	Research Approach	96
3.7.1	Ethics	96
3.7.2	Art Therapy Sessions	96
3.7.3	St. Peter's School	97
3.7.4	Adjikpo Dokuyo School, Ghana; and Scoil Aonghusa School, Ireland	98
3.7.5	The Test Group and Control Group	98
3.8	Sampling and Sampling Frame	99

CHAPTER FOUR	100
CHILD ROAD TRAFFIC EDUCATION	100
4.1 Child Traffic Education in Ghana	100
4.1.1 Curriculum Implementers	102
4.1.2 Curriculum Content	103
4.1.3 Teaching Methodology	105
4.1.4 Instructional Media	106
4.1.5 Books	107
4.2 Child Traffic Education in Ireland	107
4.2.1 Instructional Media	108
4.2.2 Curriculum Implementers	109
4.3 Assessment of Child Traffic Education in Ghana	109
4.3.1 Class Size	110
4.3.2 Whole-group Instruction	112
4.3.3 Duration of Teaching	113
4.3.4 Methodology	114
4.3.5 Administration of Instructional Media	115
4.3.5.1 The Pedestrian Crossing	115
4.3.5.2 Posters	117
4.3.6 Urban-Concentrated Educational Campaigns	118
4.3.7 Ad-hoc Educational Programmes	118
4.3.8 Clinical Studies	119
4.3.8.1 St. Peter's School	120
4.3.8.2 Adjikpo Dokuyo School	132
4.3.8.3 Scoil Aonghusa	143
4.4 Art Therapy and Experiential Sessions	143
4.4.1 Art Therapy Sessions in Selected Schools	146
4.4.1.1 Methods	147
4.4.1.1.1 Zone of Proximal Development (ZPD)	152
4.4.1.1.2 Scaffolding	153
4.4.1.2 St Peter's School	153
4.4.1.3 Adjikpo Dokuyo School	154
4.4.1.4 Scoil Aonghusa	154
4.5 Drawings by Respondents	154
4.5.1 Semiological Appraisal of Respondents' Drawings	191
4.5.2 Signified and Signifiers in Respondents' Drawings	193
4.6 Cross-Cultural Orientations	195
4.7 Colour	197

CHAPTER FIVE.....	198
PRESENTATION AND DISCUSSION OF FINDINGS.....	198
5.1 Child Traffic Education	198
5.1.1 Duration of Teaching	198
5.1.2 Class Size.....	198
5.1.3 Curriculum Implementers.....	199
5.1.4 Books	199
5.1.5 Child Access to Traffic Education	200
5.2 Relationship between the NRSC and the GES.....	200
5.3 Deriving System of Child traffic education	201
5.4 Performance Assessment of Respondents	202
5.4.1 St. Peter's School	202
5.4.1.1 Performance of the CG in the pre-survey and post-survey	203
5.4.1.2 Performance of TG in the pre-survey and post-survey	204
5.4.1.3 Relative Performance of TG and CG in the pre-survey	206
5.4.1.4 Relative Performance of TG and CG in the post-survey	208
5.4.2 Adjikpo Dokuyo School	209
5.5 Specific Performances	211
5.2.1 St. Peter's School	211
5.6 Performance Improvements	212
5.7 ANOVA Computations	212
5.8 New Approach to Child Traffic Education	216
5.8.1 Approach.....	216
5.8.1.1 Classroom setting	216
5.8.1.2 Art therapy	216
5.8.1.3 Scaffolding.....	217
5.8.1.4 Heuristics	217
5.8.1.5 Zone of Proximal Development (ZPD)	217
5.9 Research Questions.....	217
CHAPTER SIX	219
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS	219
6.1 Summary of Findings	219
6.1.1 Impact of NRSC Educational Campaigns	219
6.1.2 Continuation of Traffic Education in Schools.....	219
6.1.3 Distribution of Text Books and Traffic Teaching and Learning Materials	220
6.1.4 Class Size.....	220
6.2 Conclusions	220
6.3 Recommendations.....	221

6.3.1	Inclusion of other Professionals in Child Road Traffic Education	221
6.3.2	Perceptions of Art	222
6.3.4	Junior Highway Code	223
6.3.5	Objectives of Child Road Safety Education	223
6.3.6	Teachers and Teaching Methods.....	224
6.3.7	Traffic-induced Environment	224
6.3.8	Re-design Simulated Zebra Crossing	225
REFERENCES		226
APPENDICES		232

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LIST OF FIGURES

Figure 2.1: Annual Child Fatalities	43
Figure 2.2: Age group of child fatalities compared with other age groups	43
Figure 2.3: Action of Child Pedestrian Fatality	44
Figure 2.4: Distribution of Fatalities by Region and Road Environment	44
Figure 2.5: Distribution of Child Fatalities by Region	45
Figure 2.6: Distribution of Child Fatalities by Age Groupings and Sex	46
Figure 2.7: Distribution of Fatalities by Hour of Day	46
Figure 2.8: Distribution of Child Pedestrian Fatalities by Month.....	47
Figure 4.2 (a): Left, graphic complement of Plate 4.9. The Pedestrian Crossing instructional media indicating pedestrian and traffic flow	116
Figure 4.2 (b): Right, the Pedestrian Crossing as occurs on the ground, indicating agreeable discordance of flow of pedestrians and vehicles	116
Figure 4.3 (a): Left, graphic complement of Plate 4.4. The Pedestrian Crossing instructional media indicating pedestrian and traffic flow	117
Figure 4.3 (b): Right, the Pedestrian Crossing as occurs on the ground, indicating agreeable discordance of flow of pedestrians and vehicles	117
Figure 4.4: Schematic depiction of the road layout of the study area of St. Peter's School, Kumasi, Ghana	122
Figure 4.5: Schematic depiction of road layout of Adjikpo Dokuyo School area ...	133
Figure 4.6: Schematic depiction of the road layout of Scoil Aonghusa area	142
Figure 5.1: Relative performance of Control Group in pre-survey and post-survey	204
Figure 5.2: Relative performance of Test Group in pre-survey and post-survey	206
Figure 5.3: Relative performance of Test Group and Control Group in pre-survey	207
Figure 5.4: Relative performance of Test Group and Control Group in post-survey	209
Figure 5.5: Relative Adjikpo Dokuyo respondents in the pre-survey and post-survey	211

LIST OF TABLES

Table 2.1: Annual rates of injury per 100 000 population of children hospitalised by mechanism and age (n = 677).....	38
Table 2.2: Types of private speech as advanced by Piaget and Vygotsky	70
Table 3.1: Observation data, St. Peter's School, Ghana	86
Table 3.2: Observation data, Adjikpo Dokuyo School, Ghana	86
Table 3.3: Observation data, Scoil Aonghusa School, Ireland.....	87
Table 4.1: Traffic Education in the School Education System	104
Table 4.2: Evaluation of children's information retention rate after a traffic education session	112
Table 4.3: First assessment of road crossing behaviour of respondents. St. Peter's School, Kumasi, Ghana	127
Table 4.4: Second assessment of road crossing behaviour of respondents. St. Peter's School, Ghana.....	128
Table 4.5: Third assessment of road crossing behaviour of respondents. St. Peter's School, Ghana.....	129
Table 4.6: Third assessment of road crossing behaviour of respondents. St. Peter's School, Ghana.....	130
Table 4.7: First assessment of road crossing behaviour of respondents, Adjikpo Dokuyo School	138
Table 4.8: Second assessment of road crossing behaviour of respondents, Adjikpo Dokuyo School	139
Table 4.9: Third assessment of road crossing behaviour of respondents, Adjikpo Dokuyo School	140
Table 4.10: Fourth assessment of road crossing behaviour of respondents, Adjikpo Dokuyo School	141
Table 4.11: Number of therapy sessions in selected schools	146
Table 5.1: ANOVA sample analyses using <i>t</i> -test.....	215

LIST OF PLATES

Plate 1.1: Eye-irritating glare from the setting sun that disturbs driver vision towards the east.	8
Plate 1.2: HGV in a nose-tail collision with a car while descending hill.	11
Plate 1.3 (a): HGV plunging into houses along the road. Tafo, Kumasi	11
Plate 1.3 (b): Another view of the crash scene showing presence of children.	12
Plate 1.4: Child hawkers at a toll booth on the Kumasi - Sunyani road.	15
Plate 2.1: A group of school children bound together by rope to prevent them from ‘spilling’ on to the street	58
Plate 2.2: Junior Traffic Training Centre, Kempton Park, South Africa	61
Plate 2.3: JTTC in Cavendish Primary School, South Africa	62
Plate 2.4: Layout of JTTC, Cavendish and Eldomaine Primary Schools, South Africa	62
Plate 2.5: The tabletop model. Children explaining the danger of crossing the road behind a parked car	63
Plate 4.1: Photographic complement of Appendix4. Traditional classroom arrangement (backview and frontview) of audio-visual lessons	101
Plate 4.2: Teaching activity by the NRSC in a school in Accra.....	103
Plate 4.3: Demonstration method by personnel from the RRSC. St. Peter’s School	105
Plate 4.4: Participation of school children in the demonstration exercise. St. Peter’s School	105
Plate 4.5: Administration of visual instructional media. St. Peter’s School.....	106
Plate 4.6: Lollipop Woman directing school children to cross the street. Ireland. ..	108
Plate 4.7: School children, spontaneously run after HGV in the school compound	111
Plate 4.8: Small Group instruction type.	111
Plate 4.9: Simulated vehicular - pedestrian use of the street	116
Plate 4.10: Porridge seller located in the study area, St. Peter’s School, where respondents stopped over to buy porridge before crossing the road.....	123

Plate 4.11: Visibility of Pedestrian Crossing disturbed by muddy puss from a nearby pothole.....	123
Plate 4.12 (a): Serial road crossing movement of respondent (post-survey).....	124
Plate 4.12 (b): Serial road crossing movement of respondent (post-survey)	124
Plate 4.13: Respondents stop at the kerb to observe the ‘look left and right’ drill (post-survey).....	125
Plate 4.14 (a): Serial observation: respondent waiting at the kerb to cross the road (pre-survey)	125
Plate 4.14 (b): Serial observation. Respondent runs to cross street after looking left and right (pre-survey).....	126
Plate 4.15: Noticing Field Assistants, respondents’ spontaneous behaviour is influenced	126
Plate 4.16: Geographical setting of Adjikpo Dokuyo School	134
Plate 4.17 (a): Part of stretch of road used for the study. Absence of road markings and other traffic features were synonymous with the traffic environment of Adjikpo	134
Plate 4.17 (b): Part of stretch of road used for the study. Absence of road markings and other traffic features were synonymous with the traffic environment of Adjikpo	135
Plate 4.18: Traffic behaviour of respondents (pre-survey).....	135
Plate 4.19: Traffic behaviour of respondents (post-survey)	136
Plate 4.20: Respondents in a therapy session, supervised by teacher. St. Peter’s School, Ghana.....	148
Plate 4.21: Art therapy session in Adjikpo Dokuyo School, Ghana	148
Plate 4.22: Art therapy session for Senior Infant class, Scoil Aonghusa, Ireland...	149
Plate 4.23: Art therapy session for Junior Infant class, Scoil Aonghusa, Ireland	149
Plate 4.24: Respondents interact with classmate during story-telling. St. Peter’s School, Ghana.....	150
Plate 4.25: Respondent telling her story to the class. Adjikpo Dokuyo School, Ghana	150
Plate 4.26: Respondent telling her story to the class. Notice drawing held high up in the air. Scoil Aonghusa, Ireland	151

Plate 4.27: Respondents of the Senior Infant class display drawings after therapy session, Scoil Aonghusa, Ireland.....	151
Plate 4.28: Respondents in Adjikpo Dokuyo School display their works	152
Plate 4.29: Drawing by Rita Adansi, 8 years old. St Peter's School, Ghana	156
Plate 4.30: Drawing by Samuel Quacoe, 9 years old, St. Peter's School, Ghana	157
Plate 4.31: Drawing by Bafatu Muntari, 9 years old, St. Peter's School, Ghana.....	158
Plate 4.32: Drawing by Precious Mante, 7 years old, St. Peter's School, Ghana. ...	159
Plate 4.33: Drawing by Bernice Agyei, 8 years old, St. Peter's School, Ghana.	160
Plate 4.34: Drawing by Peter Cephas Sieman, 7 years old, St. Peter's School, Ghana.	161
Plate 4.35: Drawing by Dorothy Sarpong, 7 years old, St. Peter's School, Ghana.	162
Plate 4.36: Drawing by Ama Prempeh Duah, 8 years old, St. Peter's School, Ghana	163
Plate 4.37: Drawing by Otis Achampung, 9 years old, St. Peter's School, Ghana ..	164
Plate 4.38: Drawing by Emmanuel, 8 years old, St. Peter's School, Ghana	165
Plate 4.39: Drawing by Doe Nanor Madel, 7 years old, Adjikpo Dokuyo School, Ghana.	166
Plate 4.40: Drawing by Daytey Michael, 10 years old, Adjikpo Dokuyo School, Ghana.	167
Plate 4.41: Drawing by Aggwey Ogwerety, 7 years old, Adjikpo Dokuyo School, Ghana.	168
Plate 4.42: Drawing by Abaya Mary, 8 years old, Adjikpo Dokuyo School, Ghana.	169
Plate 4.43: Drawing by Tettey Emmanuel, 10 years old, Adjikpo Dokuyo School, Ghana.	170
Plate 4.44: Drawing by Dede Hannah, 9 years old, Adjikpo Dokuyo School, Ghana	171
Plate 4.45: Drawing by Ngamade Raymond, 9 years old, Adjikpo Dokuyo School, Ghana.	172
Plate 4.46: Drawing by Abaya Michael, 9 years old, Adjikpo Dokuyo School, Ghana.	173

Plate 4.47: Drawing by Aziz Abduni, 7 years old Adjikpo Dokuyo School, Ghana.	174
Plate 4.48: Drawing by Dorothy Djabatey, 9 years old, Adjikpo Dokuyo School, Ghana.	175
Plate 4.49: Drawing by Emma, 5 years old, Scoil Aonghusa, Ireland	176
Plate 4.50: Drawing by Michael Quinn, 8 years old, Scoil Aonghusa, Ireland	177
Plate 4.51 (a): Drawing by Ross Fewnell, 8 years old, Scoil Aonghusa, Ireland. The drawing is titled “The End”	178
Plate 4.51 (b): Title of drawing (Plate 4.51 a) “The End” written at the back of sheet Plate 4.51 a.....	179
Plate 4.52: Drawing by Tony, 8 years old, Scoil Aonghusa, Dublin, Ireland	180
Plate 4.53 (a): Drawing by Jennifer, 8 years old, Scoil Aonghusa, Ireland	181
Plate 4.53 (b): Back sheet of Jennifer’s paper, Plate 4.53 (a)	182
Plate 4.54: Drawing by Lenuta, 6, Scoil Aonghusa, Ireland	183
Plate 4.55: Drawing by William, 6 years old, Scoil Aonghusa, Ireland	184
Plate 4.56: Drawing by Mohammed, 7 years old, Scoil Aonghusa, Ireland	185
Plate 4.57: Drawing by Glenn Bennett, 8 years old, Scoil Aonghusa, Ireland	186
Plate 4.58: Drawing by Shane Lopez, 9 years old, Scoil Aonghusa, Ireland	187
Plate 4.59: St. Peter’s School, Kumasi, Ghana: Respondent, front row, right, talking to himself in a therapy session.....	188
Plate 4.60: Scoil Aonghusa School, Ireland: Respondent, back row, right, talking to herself in a therapy session. In the front row extreme left, another respondent exhibits hand movement along a shape being drawn	188
Plate 4.61: Adjikpo Dokuyo School, Ghana: Respondent bends over her drawing in a therapy session	189
Plate 4.62: Adjikpo Dokuyo School, Ghana: different body movements by respondent in a therapy session	189
Plate 4.63: Class work (art) by Kofi Tuo Divine, Adjikpo Dokuyo School, Ghana	190
Plate 4.64: Class work (art) by 5-year-old Jessica, Scoil Aonghusa School, Ireland	190

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Escalating trends in child traffic fatalities commonly discernible in countries all over the world spurred on discussions and concerns which eventually culminated into the first ever World Youth Assembly for Road Safety held at the United Nations Palais des Nations in Geneva, Switzerland, 23 - 24 April 2007. The Youth Assembly made an eight-point declaration which sought to make the roads of the world safer and more secure, not only for the youth but also for everyone and for generation to come (WHO, 2007:2,10). Prior to this global youth activity, individuals, organisations and nations independently strove to work on the problem of child traffic fatality. These preliminary stages of segmented problem-solving was what prepared grounds for a more collective universal approach to child road safety.

In Ghana, until the year 2001, road traffic education was not institutionalised. The only identifiable system of road traffic education was driving schools. Driving schools operated without interference, supervision or control from the government. The schools increasingly churned out drivers though, accident situation did not improve. When the depth of road traffic fatalities caught up with statesmen and other famous personalities such as presidents of the state (Ghana), a general concern was elicited from Ghanaians, organisations and the media (Woode, 2003:7; Badu, 2002:6; Mustapha, 2002:28), which challenged road safety authorities to be more proactive in arresting the menace.

The government quickly reacted. The National Road Safety Committee, (a committee), was upgraded to a Commission, and a Chief Executive appointed. With increased powers, the Commission was charged to oversee road traffic administration in Ghana, with the primary aim of reducing road fatalities. The Commission drew up a working plan called the 2001 - 2005 Road Safety Strategy which aimed at reducing fatalities to 5% by the year 2005. The strategy included concerns for pedestrians, besides motorists. Among pedestrians, it was realised that children were the most vulnerable. For the first time in the traffic history of Ghana, children were given independent attention in road traffic education. However, the initial stages of educating the child were plagued with challenges which suffocated the expected positive yields.

1.2 Statement of the Problem

Child road traffic education was introduced in 2002. It took advantage of the school education system for the achievement of its objectives. Road traffic education was made part of the core curriculum in basic schools in Ghana. From its inception, school children were taught how to cross roads, where and how pedestrians should walk along the road. Teachers in the Ghana Education Service (GES) were trained to impart knowledge in road traffic education to school children. Parents were occasionally drawn into the education process as a way of complementing the efforts of teachers by instilling safety consciousness in their wards. Thus, indirectly, child road traffic education captured other categories of adults - teachers and parents - some of whom may not ever have been direct recipients of road traffic education

generally. The introduction of traffic education for children in the school education system had been yielding the needed results (q.v. 4.3.0).

However, a deeper look at child traffic education lays bare some inadequacies. There was a sharp line between the tenets of the Strategy, and its implementation. Teachers complained that they did not have mastery over the traffic subjects they were required to teach. Besides, there were not adequate textbooks and teacher's guide books for teaching the subjects (Table 4.1). This is attributable to improper sequences. Training of teachers occurred after the subject had been introduced in the school education system or about the same time as it was introduced. Nsiah-Achampong (2004:268) indicated that out of 24 teachers sampled for study in Kumasi and Tepa in the Ashanti Region, only one teacher had been trained by the National Road Safety Commission (NRSC) training workshops. In some cases, teachers called policemen into the classroom to teach traffic subjects. These policemen were also not well-versed in the ethics and professionalism of teaching. There was no assessment of the police teachers' performance as to whether their teaching was effective enough to cause learning.

Most remarkable in child traffic education, is the pragmatist education by way of demonstrative teaching. The NRSC put together different age groups of children from primary school to junior secondary school, and taught them the same things at the same time in a duration exceeding two hours uninterrupted. Within the period, about six topics were taught. This contravenes educational principles establishing different time periods for different age groups for purposes of effective teaching and learning. Additionally, new forms of learning, such as learning through art, especially suitable for children and mostly used in other countries, was not a

noticeable feature with child traffic education in Ghana. Since the introduction of child traffic education into the school curriculum, there had not been a significant recorded reduction in child traffic fatalities.

Summarily, traffic education for children in Ghana, is not effective enough to cause learning in children for the intended reduction in child road traffic fatalities.

1.3 Research Questions

The high rate of child fatality (Figure 2.1) on roads had been a source of worry for researchers, opinionists and road safety authorities to the extent that they repeatedly raised critical questions and discussed them at road safety fora, seminars and conferences. This study zeroes in on two of the questions:

- (a) Why is child traffic fatality high irrespective of the intense road traffic education for children?
- (b) Why is child traffic behaviour incommensurate with the rate of road traffic education for children?

1.4 Objectives

The study is intended to:

- (a) study the curriculum of child traffic education in Ghana
- (b) find the relationship between the NRSC and the GES in the implementation of child road traffic education at the basic school level

- (c) establish a conscious system of child traffic education, on the theories of child development, developmental psychology and art therapy.

1.5 Importance of Study

By studying the curriculum of traffic education, its constituents such as objectives, curriculum implementers, content of syllabi, instructional media and textbooks will be critically examined to indicate the extent to which they affect teaching and learning.

An exposition on the NRSC - GES relationship in the child road safety education programme will determine whether their operational relationship has been healthy for effective teaching and learning in child road traffic education. It would also lend details of what the establishing policy indicates about the relationship. It would sort out the establishing policy's conformity with existing GES policy on issues of educational administration in Ghana.

Establishing a system for child traffic education would mean an organic transition from the existing synoptic educational campaign, to a formally entrenched educational synthesis. Based on proven theories of child development, educational psychology and art education, the psyche of the growing child is expected to be gradually synthesised and inculcated with a traffic culture and attitude that becomes a permanent feature of the child's being.

1.6 Delimitation

The study is a clinical observation of a population required from a rural and urban setting on one hand, and a foreign setting on the other hand. The population involved in the study is school children. To this end, three schools were selected for the study. These schools were geographically located differently. Two of the schools, St. Peter's school and Adjikpo Dokuyo school are located respectively in urban Kumasi, in the Ashanti Region of Ghana, and rural Adjikpo, in the Eastern Region of Ghana. The other school, Scoil Aonghusa School is located in Dublin, Republic of Ireland. These areas possess exclusive and national characteristics that influenced traffic situation in the areas, and influenced the study as well. Thus, the scope of the study encompassed Kumasi and Adjikpo (Ghana, Appendix 1), and Dublin (Republic of Ireland, Appendix II).

1.6.1 Kumasi, Ghana

Kumasi is the capital town of Ashanti Region, Ghana (Appendix 1). It is located on latitude $6^{\circ} 41' N$, longitude $1^{\circ} 36' W$ and has a population of 1,170,270 (Ghana Statistical Service 2002:42). It is the most populous town in the Ashanti Region and the second largest city in Ghana after Accra, the national capital. It is located in the most developed District in the Ashanti Region and has attained a metropolitan status, the Kumasi Metropolitan Assembly. Kumasi is a nodal settlement with major roads passing through it to other regions, making Kumasi a traffic-dense city. Kumasi is linked directly to Accra and Cape Coast in the South of Ghana, and Sunyani and

Tamale in the North. Kumasi is approximately 300 miles north of the Equator and 100 miles north of the Gulf of Guinea. It is popularly known as ‘the Garden City’ because of its many beautiful species of flowers and plants.

Public transport in the city is provided by a mix of privately owned mini-buses (known as trotros), taxis and buses. Trotros are usually converted mini-buses that run a regular, well-known route. They are cheap and frequent but often in poor repair and over-crowded. Some taxis also run regular routes, which cost more but provide for a comparatively comfortable ride.

Meteorology influences weather pattern which in turn influences outdoor activity of children, mainly involving playing. The weather pattern usually has longer periods of rain and storm and other atmospheric conditions which may prevent children from playing outdoors. Besides these severe atmospheric conditions which may prevent children from playing outdoors, weather temperature could also be a barring agent. Temperature in Ashanti Region is high most of the year owing to its relative position of about 50⁰ north of the equator. The annual mean maximum temperature in Kumasi is 27⁰C. The length of the day or night is almost equal with only a little variation in some seasons. The extreme hours of dawn and dusk are quick to come at 0600 hours and 1800 hours respectively. From November to January, the setting sun exhibits eye-irritating illumination that is inimical to clear vision for driving (Plate 1.1). The tropical rainforest of Ashanti Region influences a lot of rainfall. The humidity of the forests sometimes reaches 90%. Ashanti Region experiences three major seasons. From December to January, a hot dry wind blows south from the Sahara. This is the harmattan season when the air is dry and dust-filled. From May to June and September to October are two major rainy seasons.

Though in these seasons, large amounts of rainfall may be recorded in a day, small amounts of rainfall throughout the year, such that the total annual rainfall is around 127 – 178 cm (McLeod, 1984:10, 11). The meteorological conditions in all three seasons are not too severely inimical to children playing outdoors. Accordingly, in Ghana, children have more time to play outdoors than in the snow regions of Europe which have one play-friendly season, summer occurring from June to August (www.blurtit.com). The more the period opened to children to play outside the more risk children encounter. In Ghana, the harmattan period is known to be dangerous because of the foggy conditions associated with the period. Driver vision is obstructed; the child, who can hardly judge the danger of an approaching vehicle, is perception-hindered, worsening the situation for both parties. Child pedestrian fatality is highest in the harmattan period (Fig. 2.8).



Plate 1.1: Eye-irritating glare from the setting sun that disturbs driver vision towards the east. Location: Atonsu, Kumasi High School road.

(Source: Nsiah-Achampong, 2004)

1.6.2 Adjikpo, Ghana

Adjikpo is a rural settlement located in the Somanya District of the Eastern Region, Ghana (Appendix 1). It is located on latitude $6^{\circ} 07' 00''$ N and longitude $2^{\circ} 00' 00''$ E. Adjikpo is closely located to the district capital, Somanya which is situated on latitude $6^{\circ} 6' 36''$ N of the equator and longitude $0^{\circ} 6' 35''$ W of the prime meridian on the map of the world. The meteorological conditions which prevail in Kumasi (q.v. 1.7.1) are the same in Adjikpo, giving children much room to play outdoors most of the year.

1.6.3 Dublin, Republic of Ireland

Dublin is the largest city and capital of Ireland. It is located near the midpoint of Ireland's east coast, at the mouth of the River Liffey and at the centre of the Dublin Region (Appendix I). Dublin is a historical and contemporary cultural centre for Ireland as well as a modern centre of education, the arts, administrative function, economy and industry. Dublin is a popular shopping spot for both Irish people and tourists. Dublin city centre has several shopping districts, including The Square in Tallaght. One of the libraries visited by the researcher was located in The Square (3.4.0). The City of Dublin is the area administered by Dublin City Council, but the term normally refers to the contiguous urban area which includes the adjacent local authority areas of Dun Laoghaire - Rathdown, Fingal and South Dublin. Together the four areas form the traditional County Dublin. This area is sometimes known as urban Dublin or the Dublin Metropolitan Area.

1.7 Effects of Geographical Patterns on Traffic in the Study Areas

1.7.1 Vehicle and Industry

The study areas possess peculiar geographical characteristics that influence vehicular and human traffic which ultimately affect fatality. In Ghana, one of the study areas, Kumasi, is located in the Ashanti Region where rich forest has given rise to logging activity that has resulted in the presence of heavy duty, slow-moving timber-carrying vehicles. These vehicles frequently conflict with normal traffic. They are road-safety-threatening and contribute to crashes in the Region. The crashes and traffic inconvenience patterns caused by these vehicles include, running over smaller objects (such as cars and children) in traffic and causing multiple crashes, running into other vehicles while descending steep gradients (Plate 1.2), parking on the shoulders of the road to interfere with visibility, causing slow traffic flow on a gradient, timber falling off to crash into other vehicles and pedestrians including child pedestrians running into houses along the roads, especially in areas of linear settlements (Plate 1.3 (a) and (b)). Besides logging, the growing number of industries in the Region has also given rise to Heavy Goods Vehicles (HGVs) that transport goods to and from the Region. Sometimes, these vehicles lose stability when they suddenly enter excavated spots or potholes resulting in multiple crashes. In these forms of crashes, the child pedestrian is most affected because of his biological and physiological limitations (q.v. 2.3.1).

Adjikpo is fairly free from industrial stress and high vehicular traffic density. The major occupation and industry in Adjikpo is farming and beads-making. The location of Adjikpo off a major road and its position as a rural settlement awards it

the advantage of serenity. Child pedestrians hardly meet the traffic challenges besetting their counterparts in Kumasi and other busy places.



Plate 1.2: HGV in a nose-tail collision with a car while descending hill. Location: Top High intersection, Kumasi.



Plate 1.3 (a): HGV plunging into houses along the road. Tafo, Kumasi

(Source: Nsiah-Achampong 2004)



Plate 1.3 (b): Another view of the crash scene showing presence of children.

(Source: Nsiah-Achampong, 2004)

Compared to Kumasi, Dublin is industrially heavier and more dense in traffic, but traffic and industry are judiciously managed such that they do not mix up to interfere much with pedestrians. Commuter buses are assigned independent routes, heavy goods vehicles operate separately from light-weight vehicles and are found mostly on the M50 road, pedestrian walkways are adequately provided, and most importantly, children are not allowed on the streets without adult escort.

Dublin has been the centre of Ireland's economic growth and subsequent current economic contraction over the last 10 to 15 years, a period referred to as the Celtic Tiger years. In 2009, Dublin was listed as the fourth richest city in the world. Dublin is now the world's 25th most expensive city. It is also listed as the tenth expensive city in the world. Historically, brewing has probably been the industry

most often associated with the city: Guinness has been brewed in St. James's Gate Brewery since 1759.

1.7.2 Road Network

The road network of Ghana shows a major road from Accra, the national capital, through the Ashanti Region, to the Northern Sector. The Trans-Ecowas trade allows easy flow of vehicles from one country to another. Burkina Faso is a land-locked country which transports her goods from the Tema Harbour (Greater Accra Region) to the country. The route from the harbour to Burkina Faso passes through Kumasi in the Ashanti Region, thereby increasing the incidence of safety problems in these areas.

Dublin is also the main hub of the country's road network. The M50 motorway (the busiest road in Ireland), a semi-ring road runs around the south, west and north of the city, joining the most important national primary roads in the country that run out from the capital to other places. One respondent's drawing in Ireland (Plate 4.51) depicted the M50 highway. Dublin is served by an extensive network of about 200 bus routes which serve all areas of the city and suburbs. Majority of these are controlled by Dublin Bus (Bus Átha Cliath) which was established in 1987. Dublin is at the centre of Ireland's transport system. Dublin Port is the country's busiest sea port and Dublin Airport is the busiest airport on the island.

1.7.3 Migration and Population

Employment in the northern half of Ghana is relatively low due to its geographical patterns influencing fewer industries. In the farming industry for example, the Northern Sector has only one farming season. The soil is fertile for a limited number of crops. The Southern Sector, on the other hand, has two farming seasons and the soil is fertile for many crops. Prompted by the desire for jobs, people in the Northern Sector migrate to the Southern Sector. Travelling from the Northern Sector, Ashanti Region is the nearest of havens with job opportunities. Migrants moving in search of jobs usually operate on limited funds. Many of them who would have travelled farther stop short in the Ashanti Region to commence work or job hunting (Appendix II: Compare relative position of Ashanti Region to the Northern and Southern Sectors). A number of unskilled job seekers take to hawking and portering. A fairly large percentage of porters, popularly referred to as ‘paopaa’ are for instance people from tribes of the Northern Sector. Migrants from a number of tribes in the northern half of Ghana formed 10.4% (Solomon-Ayeh, 2009) of the ‘paopaa’ population, a second place to Akans who, by indigene-occupation advantage, formed 75.8%. The hawkers and ‘paopaa’ are concentrated mostly in the market places, lorry parks, toll booths (Plate 1.4) and along streets where vehicles are likely to slow down or stop temporarily, a convenient atmosphere for them to do business. Ashanti Region is not the largest region in Ghana. But due to its geographical position and richness in commerce and industry, many migrants have been attracted to the region and thus increased the population. The Region topped the year 2000 population census (Nsiah-Achampong, 2004).



Plate 1.4: Child hawkers at a toll booth on the Kumasi - Sunyani road.

There is hardly any attraction that draws migrants to Adjikpo for prolonged sojourning. Population only fluctuates on-and-off on eventful days like festivals and market days. In Dublin, the population of the administrative area controlled by the City Council was 505,739 at the census of 2006. At the same census, the County Dublin population was 1,186,159, and that of the Greater Dublin Area 1,661,185. Today, approximately 40% of the population of the Republic of Ireland live within a 100 km radius of the city centre. The associated peculiarities of an urban area are found in Dublin. Significantly, prolonged daylight between sunrise and sunset in some parts of the year influences child outdoor activity in the immediate neighbourhoods for longer periods.

1.7.4 Meteorological Effects

(a) Rain and Sunlight

In Ghana, at mid-day the intensity of the sunlight in contrast with the illumination from traffic lights is such that road users can hardly visualise the Red, Umber and Green flashes of traffic lights. This is worse in the case of children. Flashes from vehicle trafficator lights are equally sometimes affected. From November to January, the setting sun gives out an irritating glare that sends direct beams into the eyes of the driver moving towards the east. A variety of sunlight illumination interferes greatly with driver vision and causes strain in driving (Plate 1.1). During this period, the diminutive size of children worsens motorists' detection of children.

Dublin has a maritime temperate climate characterised by mild winters, cool summers, and a lack of temperature extremes with moderate rainfall. However, Dublin does not experience as high rainfall as the west of Ireland, which receives over twice that of the capital city. Dublin has fewer rainy days, on average, than London. Measured at Dublin Airport, the average maximum January temperature is 7.6°C, the average maximum July temperature is 18.9°C. The sunniest months, on average, are May and June. During this period, the weather is free of atmospheric severity and is therefore suitable for children's play outdoors. This research in Ireland was carried out in June. Seventy percent of respondents' drawings depicted the sunny weather associated with this season (q.v. 4.6.0). The wettest months, on average, is December with 76 mm of rain. Due to Dublin's northerly latitude, it experiences long summer days, around 17 hours of daylight between official sunrise and sunset time for the longest day of the year in June and short winter days, as short as seven and a half hours between official sunrise and sunset time for the shortest day

of the year in December. These are lengthened slightly when dawn and dusk are taken into consideration. In summer, dawn can come as early as 0400 hours before the official sunrise time of 0456 hours on the longest day of the year. Dusk is lengthened also, sometimes up to 2300 hours after the sun has set just before 2200 hours on the longest day of the year. The main precipitation in winter is rain. The city can experience some snow showers during the months from October to May, but snow is uncommon. Hail occurs more often than snow, and is most likely during the winter and spring months.

(b) Fog

The high relief and density of forests in the Ashanti Region make the area good for fog collection. From December to January, highlands for instance, collect dense fog in the early hours of the morning that is inimical to driving. Located in a valley, Adjikpo also experiences dense fog during this period. The St. Peter's school area of the study was located on a highland that was engulfed by dense fog during some periods of the study.

1.8 Limitations

1.8.1 Research Budget

The research budget was approximately Gh¢1,500.00 (\$100,000). Source of funds for the research was largely personal (over 50%), and minimally from statutory government sources (about 15%) in the form of bursary and thesis grants given to Ghanaian postgraduate students. This means that the research budget fell about 30%

short. The study was thus affected in diverse ways. In the Republic of Ireland, for instance, accommodation and travel expenses for the projected stay of one academic year for the study could not be met; the study period was thus contracted to four weeks (q.v. 3.2.1; Table 3.3; see other details in 1.8.2 and 1.8.3). The 30% drop in budget also affected administrative expenses generally. The study of one school in a rural settlement to compare with Scoil Aonghusa in urban Dublin, as was done in Ghana, could not be possible in Ireland.

1.8.2 Travel Expenses

The researcher could afford only one month restricted stay in the Republic of Ireland for the study. A study that should have lasted for, at least, half of the academic year. It means that so much could have been done in Ireland as was done in the researcher's home country. Table 4.11, at least shows the relative volume of work done in the two regional study areas. The researcher could for instance afford to travel to only one urban school Scoil Aonghusa School located in Dublin, the national capital of Ireland. Another school in rural Ireland would have balanced the scale for a rural-urban Ghana, and rural-urban Ireland for equilibrium.

1.8.3 Restraints on Observation

In Ireland, the researcher learnt, from interaction with other people, that it was against the law for one to take photographs of children without permission from the appropriate authorities. In Scoil Aonghusa School, it was easier for the researcher to seek permission from the school authorities for the purpose. Out of the school, where

observation of respondent crossing behaviour took place, the Lollipop Woman located within the school's vicinity prevented the researcher from taking photographs of respondent-crossing-behaviour. Alternatively, the Lollipop Woman later supplied a publication, which in her opinion, contained similar photographs that could equally be suitable for the study. But other photographs and videos can in no way substitute for the real subjects in an observation study. However, in the absence of the photographs depicting the real situation, the researcher had to resort to the photograph from the publication supplied by the Lollipop Woman (Plate 4.6). Ideally, if the researcher had enough funds and time, the best would have been to arrange for, and seek permission from the South Dublin County Council to carry out the study. That way, all requirements for the study would have been met.

1.8.4 Inadequate time for Therapy Sessions

Throughout the period of the study in Ghana, the time that school authorities allotted to therapy sessions was not enough. Impressions gathered from the attitude of school authorities gave signals to the researcher that the therapy sessions were inconveniencing to the school. Consequently, the time needed especially for story-telling and interaction from each respondent was not met. In each session, between 5% and 10% respondents did not have the chance to participate in the story-telling sessions. They were given the chance in the subsequent sessions to tell their stories. Besides, respondents had to be rushed through the therapy process. Ironically, in Ireland, duration for therapy sessions was relatively better. The school first found out from the researcher, how much time was required for the therapy session. The school sorted things out administratively and fixed time for the therapy which was

convenient for the researcher, and at the same time, did not interfere much with the school's traditional activities.

1.8.5 Interference with Respondents' Drawings

During therapy sessions in Ghana, teachers present, influenced respondents' drawings. Teachers did not understand the essence of art therapy and thought that the nicer a drawing was, the better it was for therapy. The teachers attempted to correct respondents' drawings in what they thought were incorrect. For instance, in cases where respondents drew crash victims standing, teachers admonished respondents, explaining that if a vehicle knocked down a child, the victim would be lying down and not standing. These happened outside the researcher's attention even though the teachers had been cautioned about such practices. Contrarily, the attitude of teachers during therapy sessions in Ireland was different. The Irish teachers understood the connection between art and the child and therefore, allowed respondents to draw freely without interference.

1.8.6 Interference with Observation

Closely related to inference with respondents' drawings was inference with field observations in Ghana. In the first school selected for field observation, teachers informed respondents ahead of time to be of good traffic behaviour, because road safety personnel would come and study how the children behaved in traffic. Apparently, the teachers thought that if the school children were found to behave

well in traffic, it would mean that the teachers had been doing well in teaching the school children road safety lessons and that would give credit to the school.

The condition was not a fair setting for research, because the results would be biased. The school was dropped for the study and another one, St. Peter's School, selected. The change over affected the research budget and time table.

1.9 Organisation of the Rest of Text

The main text is set in 12/200 points Times Roman. Quotations are set in 11/180 Times Roman italics to contrast with the main text. The masculine gender "he" as used in the text connotes a generality of both the masculine and feminine gender. Restriction to "he" is only to avoid the "he / she" alliteration. Plan drawings of the study areas are the researcher's construct and are not to scale. The use of 'Ireland' refers always to the Republic of Ireland, which is different from Northern Ireland in the United Kingdom.

The text is arranged in six distinct chapters. Each chapter is independent of the other though, there are inter-chapter and intra-chapter cross-references to aid the reader's understanding. The location of an item referred to, is given by its paragraph index (e.g. 5.4.2). Sometimes, the paragraph index is preceded by a cross-reference indicator, 'q.v.'

1.9.1 Chapter One: Introduction

Chapter one is the leading chapter that acquaints the reader with a schematic data of the study. Detailed information is provided on the setting. The information contains some distinctive features which, in later chapters form the basis for understanding the study.

1.9.2 Chapter Two: Review of Related Literature

Literature from a variety of sources related to the study is reviewed. An extensive review of material on propositions and theories of child development form a larger volume of this chapter. Curriculum is also reviewed and contrasted with child traffic education in Chapter four of the study.

1.9.3 Chapter Three: Research Methodology

The methods used in the study are exclusively stated and explained in this chapter. Significantly, coded behaviour, used in a previous study by Zeedyk et al was adopted by the study and named the Zeedyk model.

1.9.4 Chapter Four: Road Traffic Education for Children

This is the body of the thesis, presenting the observational study on the road crossing behaviour of children in the study areas in Ghana. These were coded for behavioural change analyses in Chapter five. The Chapter further features art therapy sessions which determined behavioural change patterns in a before and after study. A large

number of photographs taken of respondents and other events in the study areas are used to enhance comprehension.

1.9.5 Chapter Five: Data Analyses and Interpretation

This chapter draws premises from preceding chapters for analyses. Predominantly, the coded behaviour of respondents in the study was computed and the rate of behavioural change established. Findings are extracted to draw the conclusions for the study.

1.9.6 Chapter Six: Summary, Conclusions and Recommendations

The concluding chapter is in three sections. One section contains brief, non-detail summary of all findings contained in the research. Section two states concluding remarks. Section three issues corresponding recommendations to findings and problems in traffic education.

1.10 Conceptual Framework / Operational Definitions

Some exclusive words and phrases have been used as concepts in the text. These have been selected and explained contextually. Hence the meaning of such words are operational only within the context of the thesis. The reader understands the discourse of the thesis better if he familiarises himself with the meanings of such concepts. They are arranged in alphabetical order in the section

- **Analytical survey:** a survey that attempts to describe and explain why certain conditions exist
- **An Garda Siochana:** Irish Police Service
- **ANOVA:** Analysis of Variance
- **Art therapy:** An outward, mostly unconscious, expression of an inner feeling, knowledge or experience by means of drawings. Such expressions are used as diagnostic calibrations of the child's cerebral depth of traffic experience, and emotional attachment to, or detachment from the realities of trauma. Interactions modify their perceptions which show in later drawings.
- **Audiencing:** the process by which the meaning of a visual image is traversed and accepted or rejected by a peculiar group of people (forming an audience) watching the image in specific circumstances.
- **Behavioural assessment:** Field observation in which respondents were observed in traffic and their behaviour cardinally coded
- **Child(ren):** Person(s) or respondent(s) in this study aged between five and ten years old
- **Cohort Studies / Analysis:** the study of a specific population, as all those born in a given period as they change over time
- **Control Group:** In St. Peter's School, Kumasi, pupils from the school's Road Safety Club was the source of membership for the Control Group. Respondents in the Control Group, by virtue of their membership of the Road Safety Club, had superior traffic knowledge over another group, the Test

Group. The Control Group therefore served as a relative yardstick of measurement for the latter.

- ***Degree of freedom:*** In calculating the standard deviation of n observations the sum of the deviations from the mean is zero. Hence, when $(n - 1)$ deviations have been written down, the n th deviation is determined and we say that for n observations there are $(n - 1)$ degrees of freedom (Loveday, 1971:188).
- ***Descriptive survey:*** A survey that attempts to picture or document current conditions or attitudes
- ***Green Cross Code:*** The Green Cross Code is a brand created by the UK National Road Safety Committee (now the Royal Society for the Prevention of Accidents, RoSPA) to raise awareness of pedestrian road safety in the UK. The multimedia Green Cross Code campaign began in 1970 and continues today. The Green Cross Code replaced the earlier Kerb Drill pedestrian safety campaign; the Kerb Drill's military style ("Halt! Quick march!") was deemed confusing to children by safety authorities. The Green Cross Code itself is a short step-by-step procedure designed to enable pedestrians to cross streets safely. While the Code has undergone several changes over the years, the basic tenets ("Stop, Look, Listen, Think" or "Stop Look Listen Live".) have remained more or less the same. The 2005 version of the Green Cross Code reads as follows:

- ***THINK!*** Find the safest place to cross, then stop.
- ***STOP!*** Stand on the pavement near the kerb.

- *USE YOUR EYES AND EARS!* Look all around for traffic, and listen.
 - *WAIT UNTIL IT'S SAFE TO CROSS!* If traffic is coming, let it pass.
 - *LOOK AND LISTEN!* When it's safe, walk straight across the road.
 - *ARRIVE ALIVE!* Keep looking and listening
- ***Hail:*** Frozen rain or grains of ice falling from the clouds
 - ***Heuristic learning:*** A knowledge-acquisition strategy that can suggest a solution to a problem but do not necessarily guarantee a solution at once. It is the process of engaging in exploratory schemes that have the potential of solving a problem. The person first constructs a representation of the problem, called the “problem space” and then works out a solution that involves a search through the problem space. The problem solver could break the problem into components, activate old information from memory, or seek new information. If an exploratory solution proves to be successful, the task ends. If it fails, the person backtracks, sidetracks, or redefines the problem or method used to solve it.
 - ***Institutionalised traffic education:*** when teaching and learning processes are Socratic and go on in an established recognized school with a set of teachers.
 - ***Kerb drill:*** The precautionary alertness required of a pedestrian just before crossing the road.
 - ***Makaranta:*** local name given to Islamic schools

- **Medium variables:** the aspects of content that form units of analysis in the subject under consideration
- **Paopaa:** a word in the Akan dialect (in Ghana) meaning porter.
- **Lollipop woman:** Traffic warden in Ireland, named so by school children
- **Northern sector:** the Northern, Upper East and Upper West Regions make up this sector. Additionally, a little stretch of land of the Brong Ahafo and Volta Regions sharing boundaries with the Northern Region up to latitude 90^0 belongs to the northern sector.
- **Road safety:** the immunity of road users from injury and death on the road arising out of deliberate and systematic precautions employed in the making, altering and use of the road and its devices.
- **Romantic Revival:** also referred to as romanticism, an artistic and intellectual movement originating in Europe in the late 18th century and characterized by a heightened interest in nature, emphasis on the individual's expression of emotion and imagination, departure from the attitudes and forms of classicism, and rebellion against established social rules and conventions.
(www.answers.com. March 2010)
- **Semiology:** (also called semiotics), is the analytical and philosophical intrusion into the meaning of an image and how it works in relation to the broader systems of meaning and to the artist.

- ***Sequitur***: An inference or conclusion that does not follow from the premises or evidence; or a statement that does not follow logically from what preceded it.
- ***Sign***: in the systematic development of how language works. Sign was thought of as the basic unit of language. The sign consists of two parts, the signified and signifiers.
- ***Signified***: the first part of the sign. It is a concept or an object.
- ***Signifiers***: the second part of the sign. A sound or an image that is attached to the signified
- ***Site***: the interpretation or meaning of visual images
- ***Southern sector***: the Ashanti, Brong Ahafo, Central, Eastern, Greater Accra, Volta, and Western Regions make up this sector. A little stretch of land of the Brong Ahafo and Volta Regions sharing boundaries with the Northern Region up to latitude 90^0 does not belong to the southern sector.
- ***Tabletop Model***: a system of child traffic education where the traffic environment is simulated on a tabletop for children to participate in the teaching and learning process (Fyhri 2004).
- ***Test Group***: In St. Peter's School, Kumasi, the respondent group formed by the study to comparatively match up the Control Group for purposes of measuring behavioural change, and changes in the traffic knowledge of respondents (children)

- ***Traffic communication signals and symbols:*** Road markings and road furniture such as traffic lights, road signs and vehicle signals.
- ***Traffic education:*** the transmission of knowledge, attitude, norms, skills and ethics of road culture to an educand with the aim of making him an asset to road safety.
- ***Traffic inconveniences:*** a road user's conscious or unconscious suspension of an act by means of vehicle, implement or human attitude/behaviour that elicits inappropriate reaction or inaction from another road user. Traffic inconveniences are of two types, extreme and habitual.
- ***Treasure Trail Model:*** a system of child traffic training in Dundee, Scotland where children are observed for various traffic behaviour as they move to and fro the street to letters of the words "Treasure Trail" (Zeedyke 2000:45)
 - ***Extreme Traffic Inconvenience:*** traffic inconvenience is extreme when it knowingly or unknowingly causes another road user to be involved in an accident.
 - ***Habitual traffic inconvenience:*** the conventional traffic inconveniences that causes delay in the movement of another road user.
- ***Traffic knowledge:*** awareness of, ideas and information on traffic issues acquired through learning and experience.
- ***Trend studies***

- ***Trotro***: a commercial passenger bus that commutes within a town. The term is a generic one that emanated from the boarding fare which was “tro”, Ghanaian word for three pence or two-and-a-half pesewas that was legal tender in the immediate post-independence era.
- ***Trend studies***: one of the three types of longitudinal study where different groups of people drawn at different times from the same population are sampled



1.11 Abbreviations

A list of abbreviated words and acronyms are explained in this Section. Some of the less familiar words are direct extracts from other publications.

- ***AD:*** Adjikpo Dokuyo
- ***ANOVA:*** Analysis of Variance
- ***Aug:*** August
- ***Bhvr:*** Behaviour
- ***CG:*** Control group
- ***Chldn:*** children
- ***Convsn:*** Conversion
- ***Dec:*** December
- ***DOG:*** Direction of gaze
- ***Exhbtg:*** Exhibiting
- ***Feb:*** February
- ***Freq:*** Frequency
- ***HGV:*** Heavy goods vehicle
- ***Jan:*** January
- ***Mar:*** March

- **MVC:** Motor vehicle crashes
- **NA:** Not applicable
- **Pertng:** Pertaining
- **Oct:** October
- **Nov:** November
- **p/pp.:** page / pages
- **q.v.:** (latin, quod vide) meaning look up this point or topic elsewhere in this book
- **Sept:** September
- **Sic:** thus. Used in a quotation containing a mistake or inaccuracy to show that, that is not the researcher's mistake.
- **TG:** Test group
- **sq. km:** square kilometres
- **m:** meters
- **Viz:** (latin, videlicet) meaning namely or that is to say.
- **ZPD:** Zone of proximal development

1.12 Acronyms

- **AD:** Adjikpo Dokuyo
- **BRRI:** Building and Road Research Institute
- **CRDD:** Curriculum, Research and Development Division
- **CSIR:** Council for Scientific and Industrial Research
- **DfT:** Department for Transport, London
- **DUR:** Department of Urban Roads
- **DVLA:** Driver and Vehicle Licensing Authority
- **GES:** Ghana Education Service
- **IBS:** International Bible Society
- **JHS:** Junior High School
- **JTTC:** Junior Traffic Training Centre
- **KNUST:** Kwame Nkrumah University of Science and Technology
- **MOEYS:** Ministry of Education, Youth and Sports
- **NRSC:** National Road Safety Commission
- **NSC:** National Safety Council, Republic of Ireland
- **ODA:** Overseas Development Administration
- **PCRER:** President's Committee on Review of Education Reforms

- **RRSC:** Regional Road Safety Commission
- **WHO:** World Health Organisation

KNUST



CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 The Child: History and Regard

Down history, children were regarded differently in different cultures by their adult supervisors, from viewpoints of socio-cultural norms, religion, research, and the law. In the early days, philosophers speculated largely about the nature of children and how they should be raised. Three philosophical data formed the basis by which children were raised. These were the original sin, tabula rasa, and innate goodness (Santrock, 1995:7). In the original sin view, especially advocated during the Middle Ages, children were perceived as basically bad, being born into the world as evil beings. The objective of child upbringing was to provide salvation, in order to remove sin from the child's life. Towards the end of the seventeenth century, the idea of original sin had given way to the tabula rasa idea which held the view that children were not innately bad but were like a "blank tablet," a tabula rasa, that is, the children had empty heads which contained no knowledge at all, having freshly entered the world. Case and Dalley (2005:1) reiterate that over the last two centuries the Christian doctrine of original sin had given way to a cult of original virtue in the Romantic Revival. The development of psychoanalytic theory challenged and changed the assumption of original innocence by scientific investigations of infants and child consciousness. Increased awareness of the child was popularised by the Freudian theory which attempted to give an appreciation of childhood consciousness Case and Dalley (2005:1). By this time, adult perception of children was gradually changing. This revolution of thought was exemplified by Jesus' teaching that children were to be loved and revered (IBS, 1984:1528), a departure from the ancient

attitude to children which was to be propagated in the Roman Empire during the next 400 years with the introduction of Christianity. With the strong influence of Christianity then, Jesus' symbolic likening of children (because of their "emptiness") to repentance as a prerequisite to entry into heaven also intensified adults' changed perception about children. It was therefore believed that childhood experiences were important in determining adult characteristics.

In medieval times, laws generally did not distinguish between child and adult offenses. After analyzing samples of art along with available publications, historians concluded that European societies did not accord any special status to children prior to 1600. In paintings, children were often dressed in smaller versions of adult-like clothing. It was thought that children were actually treated as miniature adults with no special status in medieval Europe, though the historians were criticised for some inaccuracies in their proposal. In medieval times, children worked, and their emotional bond with parents was not strong as it is for many children today. As of 2004, modern times, Papalia et al (2004:9) claimed that *"in some developing countries, children labour alongside their elders, doing the same kinds of work for equally long hours"* In the eighteenth century, the innate goodness idea emerged, propounding that children were inherently good. Because children were considered to be good, it was proposed that they should be allowed to grow naturally, with minimal parental monitoring or constraint.

In the contemporary era, perception about children has changed. Childhood has been identified as a formative period of life that lays a determinant foundation for later adult years. Childhood is now regarded as a special time of growth and change, into which investments are made. Children are protected from the excesses

of the adult work world through child labour laws. Children's crimes against society are taken care of by a special system of juvenile justice, and there are now state provisions for child assistance and family support systems.

2.2 Child vulnerability

Growth is a definite developmental process in the life of man. Development is characterised by two major growth periods, childhood and adulthood. Each period has its peculiar characteristics that differentiate it from the other. Adulthood is characterised by maturity which conducts adult life with sanity and decorum. Childhood, on the other hand, is plagued with inattentiveness and inadvertence. By their nature, children are inquisitive and explorative. These attributes make children prey to danger especially in the open environment where risk is more prevalent. The account by Hawes and Scotcher (1993:165) that *"Children above 4 years are particularly at risk outside the home as they begin to explore their environment"* lends credence to the vulnerability of children, dictating their unpredictability and exposition to danger. Vulnerability is a common feature of children irrespective of their socio-cultural inclinations, though the magnitude of vulnerability may differ among children.

2.2.1 Injuries Among Children

Consequent of their vulnerability, injury is prevalent among children all over the world. Most of these injuries are life-threatening. In Ghana, a hospital-based study carried out in Kumasi, the second largest city, one of the selected areas of this study,

showed an annual rate of hospitalisation of 230/1000,000 children aged less than 15 years with the highest injury rate occurring among the five - nine and 10 - 14 year age groups (Abantanga and Mock, 1998:517). Some of these injuries are sports-related activities and others including falling from trees, playing apparatus, high walls and other heights (Table 2.1).

Table 2.1: Annual rates of injury per 100 000 population (pop) of children hospitalised by mechanism and age (n = 677)

	All ages		<1year		1-4 years		5-9 years		10-14 years	
Mechanism	Pop 294424		18812		84470		99642		91500	
	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate
Pedestrian	219	74	2	NA	30	36	111	111	76	83
Falls	184	62	3	NA	41	49	92	92	48	52
Burns	119	40	11	58	66	78	28	28	14	15
MVC	40	14	1	NA	10	12	17	17	12	13
Lacerations	22	7	0	NA	1	NA	7	NA	14	15
Bicycling	12	4	0	NA	2	NA	5	NA	5	NA
Assaults	8	NA	0	NA	0	NA	3	NA	5	NA
others	73	25	0	NA	25	30	23	23	25	27
All cases	677	230	17	19	175	207	286	287	199	217
Sex										
Boys	405	136	9	NA	102	121	170	171	124	136
Girls	272	92	8	NA	73	86	116	116	75	82

(Source: Abantanga and Mock, 1998)

The situation is not different from Nigeria where Elechi et al (1990:234 - 8) found that injury-related deaths accounted for 68%. Data on America showed same child-intense vulnerability. The National Safe Kids Campaign (2003) indicates that 120,000 children are permanently disabled from injuries each year, making children the number one cause of medical spending for children aged between five and 14. According to Anderson (2002), accidents and adverse effects of injuries are the seventh leading cause of infant deaths in America. The United Nations Children's Fund (2004:20), indicates that *"nearly 11 million children die each year before their fifth birthday - about 30,000 children a day."* It is established that injury is mainly accountable for severe disability and death among children.

In domestic accidents, such as contact with fire, reflex action generated from response to stimuli has the potential of causing the child to withdraw from, or curtail the action which is imminent with fatal consequences. By contrast, road traffic crashes are too illusive, evasive and fast to allow the child any room for reflexive exoneration. In road crashes, the object of danger (vehicle) moves unnoticeably towards the victim (child), leaving little or no room for the child's reflexes to identify and connect with available stimuli for onward transmission to the child's brain. In the traffic environment, the child is restricted by some developmental limitations which increase his exposure rate to danger. These limitations include the child's inability to utilise peripheral vision to see vehicles coming from various directions; speed judgement and distance of approaching vehicles.

2.2.2 Road Traffic Crash Injuries Among Children

Injuries incurred by children include domestic injuries, and road traffic crashes. Of the two, the most serious, comparatively, is road traffic crashes. The dominance of road traffic injuries over other injuries is a global phenomenon. Will (2005:947) states that the most prevalent and costly injury sources are traffic crashes with 64% of children significantly getting injured in road traffic crashes.

Many studies have alluded to the age range four to ten as the highest among children involved in road traffic crashes. More and specific studies thin down to a narrower range or to even single specific ages. In their study, Fyhri et al (2004:197), found five to six year olds at a greater risk. Schagen and Rothengatter (1997:283) also state four to nine years as the age disproportionately involved in road traffic crashes. The World Health Organisation gives a wider range of 10 to 24 years old. Zeedyk et al (2002:43) studied five and six year olds to test children's behaviour in realistic traffic situations. In Ghana, Afukaar and Ackaah (2006:7) give the modal age range of children involved in road traffic crashes as seven to nine years. The incidence of child pedestrian crashes is described as alarming in Ghana, showing an average of 300 deaths between 2001 and 2003 (Mensah and Afukaar, 2008:7). In America, 2197 children in 2001 aged 0 - 14 died and 267,000 were injured in road traffic crashes (Will, 2005:947). The magnitude of road traffic crashes among children is exemplified in developing countries with the highest rates found in Africa and the Middle East (World Health Organisation).

2.3 Pedestrian Fatalities in Ghana

Road accident statistics and studies in Ghana indicate that the pedestrian, as a road user on foot is at risk within the road environment. For example, between 1998 and 1993, 2,397 pedestrians were killed and 12,140 were injured in road traffic crashes. Pedestrian crashes constitute a large proportion of crashes on the roads especially in the urban areas. In 1991, pedestrian accidents were found to be 4.9 times that of car fatalities and 3.6 times that of bus fatalities (Afukaar 2001:1).

2.3.1 Child Traffic Fatalities in Ghana

In Kumasi, Ghana, transportation-related injuries was the leading cause of hospitalisation and death among children. Child-pedestrian knockdowns constituted the highest fatalities with an annual injury rate of 74/100,000 children followed by motor-vehicle crashes with children as occupants (4/100,000). Pedestrian injuries formed the leading cause of trauma among five - nine and 10 - 14 age groups, with the corresponding rates of injury being 111/100,000 and 83/100,000 children respectively (Abantanga et al 1998:516).

Generally in Ghana, the annual child traffic fatalities constitute 310 deaths (Figure 2.1). Children constitute 20% of all classes of road traffic fatalities, representing 35% of all pedestrian fatalities with the age group 6 -10 years old presenting the modal age group for all groups of pedestrian fatalities (Figure 2.2). Walking as a means of transport by children had been found risky and even more serious when children managed to cross busy roads all by themselves. It is for this reason that, in Europe, children are not allowed to cross the road without adult

supervision (q.v. 4.2). By contrast, there is no legal restriction on children as independent road users in Ghana. The incidence of child-pedestrian fatality is exemplified by 76% of child-pedestrians killed in traffic while crossing the road (Figure 2.3). Afukaar and Ackaah (2006:11) reiterate the danger of crossing the road as *“a very difficult and dangerous task for children especially those below age 10 years. The right to walk seems fundamental yet, annually an average of 250 children died as pedestrians in Ghana between year 2001 and 2005”*.

The diminutive size of children and children's level of understanding of traffic systems have been major contributory factors predisposing children to the high risk of death in traffic. Studies (Lee, 1994:22 - 30; Tight, 1998:69 - 74; Afukaar, 2001:1 - 2), have established this. The diminutive size of children, for instance, makes it difficult for drivers to see them, especially if they are standing between parked cars or are among other objects by the road. Young children are often unable to judge safe crossing gaps in traffic and speeds of on-coming vehicles. Over 76% was killed whilst crossing the road (Figure 2.3).

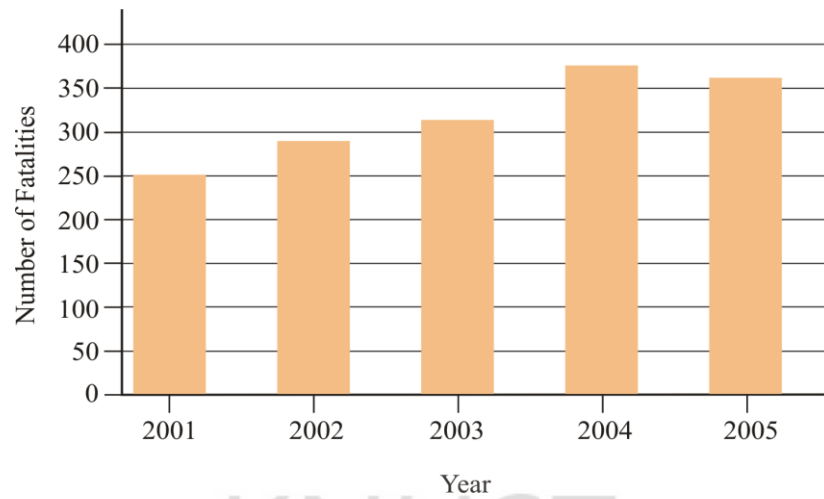


Figure 2.1: Annual Child Fatalities

(Source: Afukaar, 2006)

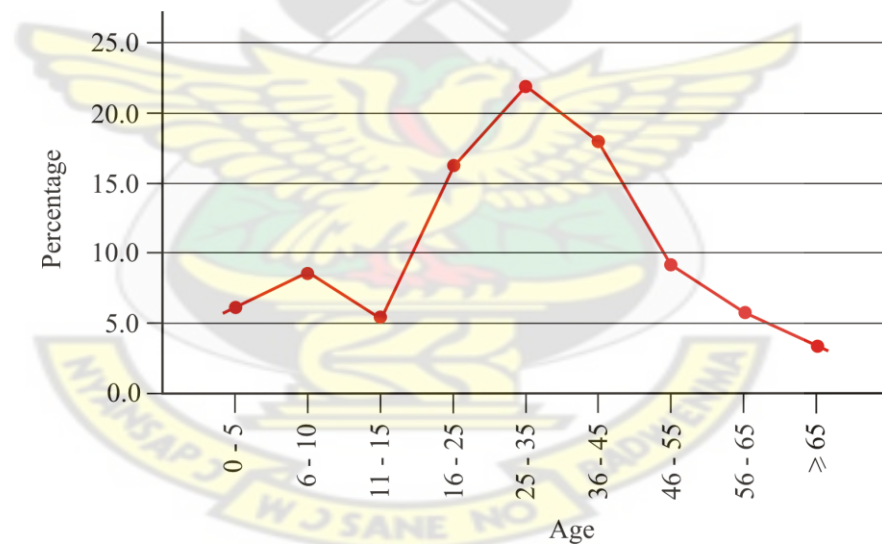


Figure 2.2: Age group of child fatalities compared with other age groups

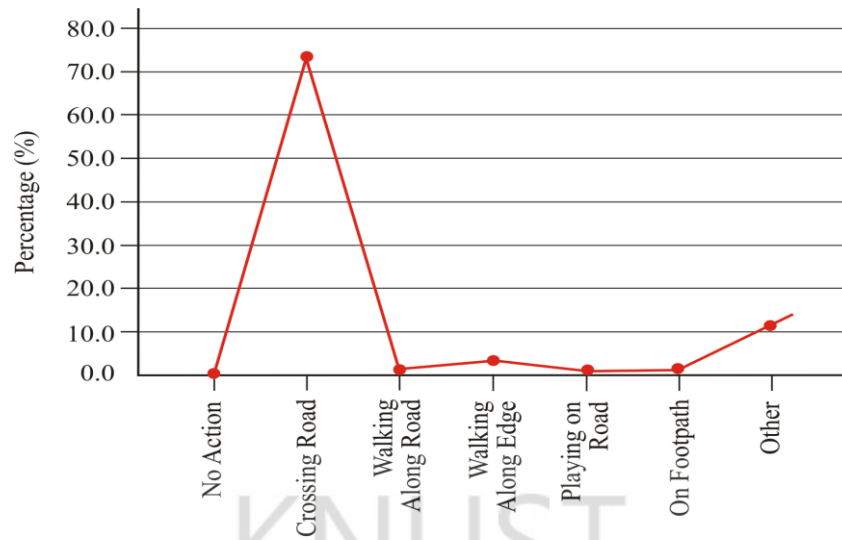


Figure 2.3: Action of Child Pedestrian Fatality

(Source: Afukaar, 2006)

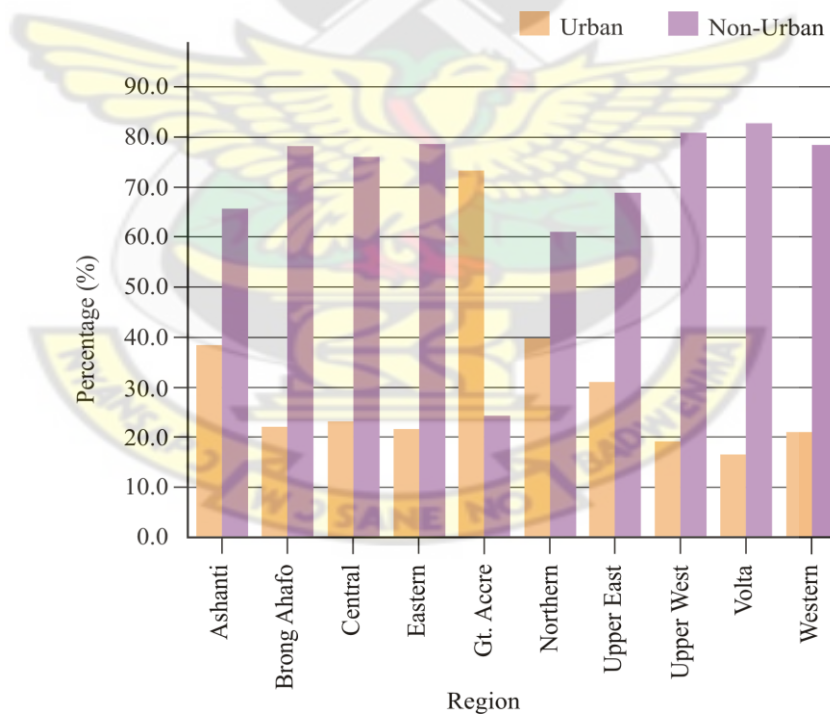


Figure 2.4: Distribution of Fatalities by Region and Road Environment

(Source: Afukaar, 2006)

Parents overestimate their children's ability to cross the street safely on their own and therefore leave their children unaccompanied. Many primary school-age children occurred in traffic as pedestrians unaccompanied by adults. Children are characterised by running or dashing across the road without observing the road safety Green Cross Code. The non-urban (rural and village) road environment was associated with 68% of child road traffic fatalities (Figure 2.4). Excessive prevailing

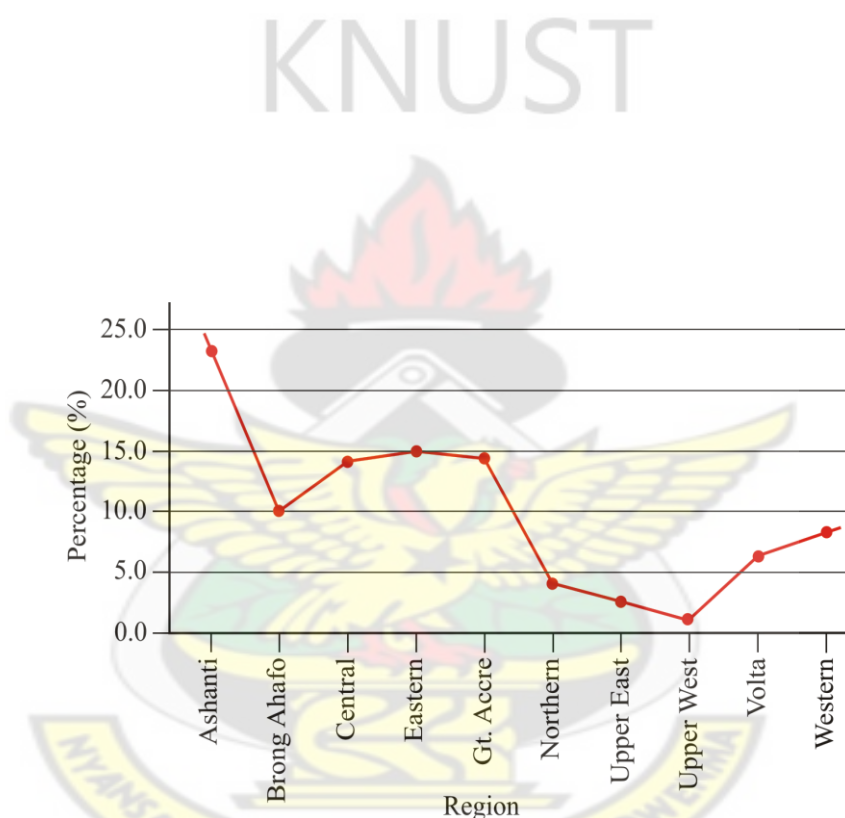


Figure 2.5: Distribution of Child Fatalities by Region

(Source: Afukaar, 2006)

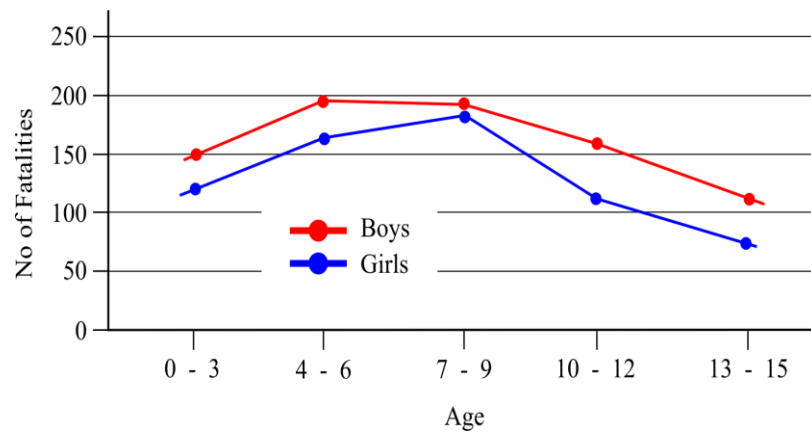


Figure 2.6: Distribution of Child Fatalities by Age Groupings and Sex

(Source: Afukaar, 2006)

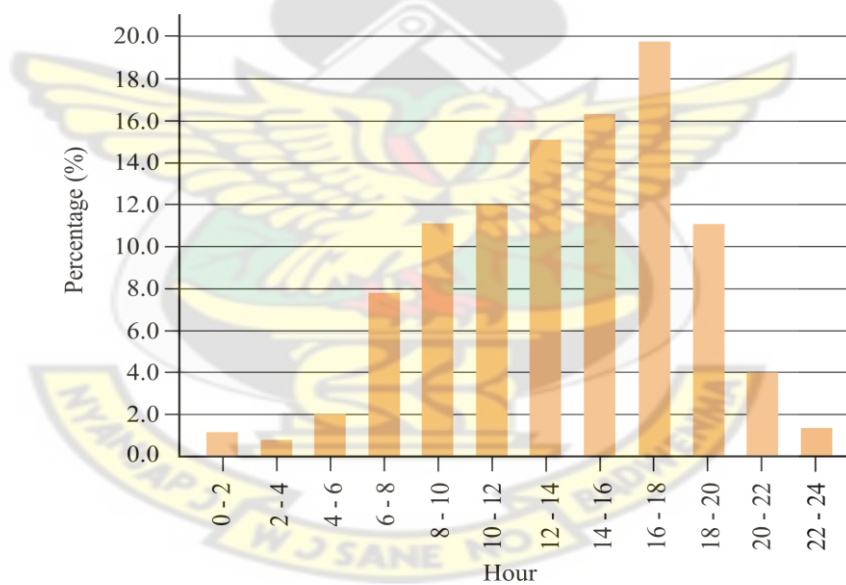


Figure 2.7: Distribution of Fatalities by Hour of Day

(Source: Afukaar, 2006)

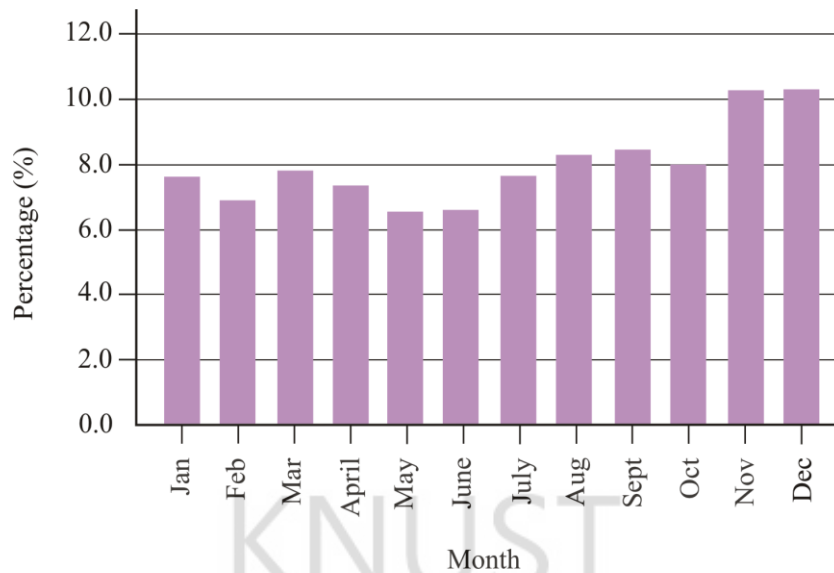


Figure 2.8: Distribution of Child Pedestrian Fatalities by Month

(Source: Afukaar, 2006)

vehicular speeds on highway sections passing through small settlement areas along the road network coupled with poor pre-hospital and emergency medical care services may have also contributed to the high proportion of fatalities (Quansah, 2001; Ross et al, 1991). The general lack of safe pedestrian walkways endangered the child-pedestrian, as walking was the predominant mode of transportation for children in most non-urban settlements. Comparatively, urban areas had the advantage of the provision of sidewalks and protected crosswalks to facilitate walking as a mode of transportation in the urban areas. Consequently, many children (over 80%) died as pedestrians in traffic in rural areas of the Volta Region in Ghana (Figure 2.4). In Ghana, child pedestrian fatalities are more prevalent in Ashanti Region (23%), Eastern Region (15%) and Central Region (14%) as shown in Figure 2.5. These three regions constitute 50% of all child traffic fatalities in Ghana. These regions are also characterised by high incidence of non-urban related child traffic

fatalities (Figure 2.4). Figure 2.6 shows the higher involvement of boys (55%) in fatal road accidents compared with girls (45%), reflecting stereotyping and intrinsic behavioural differences between the sexes (Evans, 2006; Afukaar, 2001; Tight, 1996). However, the vulnerability of boys and girls appears to be the same in the age group 7 - 9 years (Figure 2.6). Most children (80%) were involved in fatal road traffic accidents during broad daytime (Figure 2.7). The worst period during the day was from 1600 hours and 1800 hours (Figure 2.7) when most children were perhaps returning home from school or other social activities. It is worthy to note that the months of November and December prominently stood out as the worst months of the year (Figure 2.8).

2.4 Child Development

From the time when the perception of childhood changed for the better (q.v. 2.1), childhood has attracted much attention. In contemporary times, an exclusive devotion has been made to the scientific study of the processes the child undergoes from conception to adolescence. This is referred to as child development, which is part of a broader area of study, human development, which covers the entire lifespan from conception to death.

Human beings develop in ways like all others, but unlike others, each individual has some unique characteristics. Psychologists, therapists, and developmentalists are attracted to both unique and shared characteristics for studying human nature and development. Psychologists see development as *“the pattern of movement of change that begins at the conception and continue through the life cycle”* Santrock (1998:18).

2.5 Developmental Processes of the Child

2.5.1 Change

Two kinds of change, qualitative and quantitative are discernible in development studies. Qualitative change is characterised by the occurrence of a new phenomena which cannot be predicted on the strength of an earlier occurrence. Change occurs in the kind, structure and organisation of an occurrence exhibited by the child (Papalia et al, 2004:8). For instance, in this study, child respondents in the Control Group performed poorly in the second observation (Figures 5.2 - 5.4). If a better performance had been predicted on the basis of the previous performance, it would have been wrong. Quantitative change, on the other hand, is change in the amount or number of physical occurrences in the child. This could be changes in height, weight and frequency of communication.

2.5.2 Stability

Underlying these changes is the level of stability, or how constant a change occurs. A change may either be constantly noticeable in the child's stages of development or may last over a definite period of time. The time frame (period) within which change occurs is its stability (Papalia et al, 2004:8).

2.5.3 Domains of Development

Change and stability in the personality and behaviour of the child happen in three major domains, the physical development, cognitive development and psycho-social development. Though these are distinct dimensions, they interrelate in their operations to affect the gross development pattern of the child as diagrammatically presented by Santrock (1998:20) in Appendix 3 (a). Development is a unified process that sets the child more than a bundle of isolated parts (Papalia et al, 2004:8).

Physical development, according to Papalia et al (2004:8) involves the *“growth of the body and brain, sensory capabilities, motor skill and health.”* Santrock (1998:18) refers to this domain as biological processes, relating to them as changes in genes inherited from parents which account for the development of the brain, hormonal changes at puberty, height and weight gains, motor skills.

Cognitive development is related to change or stability in mental abilities such as learning, memory, thinking, creativity, language and moral reasoning. It is indicated that the process of memorising a piece of literature, imagining or drawing an object, constructing a sentence or solving a problem, are cerebral activities involving an active use of the brain.

Psycho-social development is the change or stability in the sum of the child's personality, emotional levels and social relationship with other people. Psycho-social development, referred to as socio-emotional processes by Santrock (1998:19), has the potential of influencing the cognitive and physical processes of the child's development. Socio-emotional processes are changes in a person's relationship with other people, changes in emotions and changes in personality. Social processes in human development account for actions which are consequent of the individual

relationship with some events in the environment with other people or the actions might be dictated by personal moods. For instance, a person's verbal responses to a friendly conversation may be characterized by abrasive reactions or may be sullen in countenance if he has previously been irritated by someone or an event. Santrock (1998:19) explains that *“an infant's smile in response to a mother's touch, a young boy's aggressive attack on a playmate, a girl's development of assertiveness ... all reflect the role of social processes in children's development”*. The three processes are intricately interwoven. Socio-emotional processes enhance cognitive processes. Socio-emotional processes may also influence biological processes to affect cognitive processes. All of these occur in a child with one body and mind. The three processes are commonly augmented by another process - art therapeutic processes. In the developmental process, art therapy plays the diagnostic role of bringing out the emotional deficiencies of children and subsequently maps out corresponding panacea. Art therapy facilitates the mental development of the needed for the functioning of the other senses. Council (2003:207) expatiates its essence in medical art therapy, indicating that *“it is extremely useful in assessing each young patient's ... cognitive development. Information gathered through artworks can be invaluable to the medical team as it seeks to treat the whole person, not just the disease or diagnosis”*. Art therapy permeates all three areas. For example, in Piaget's Cognitive Processes, the child's preoperational thought in the Symbolic Function Substage is made up of symbols and scribbles. In the biological processes, physical and intellectual developments shift preoperational thoughts to operational thoughts (Santrock, 1998:215,216). Accordingly, this study re-defines Santrock's diagrammatic presentation of the three processes. Centrally placed, art therapy is

shown in the re-definition commonly affecting and influencing the three processes (Appendix 3 b).

2.5.4 Periods of Development

The child develops along certain landmarks characterised by certain age-related tendencies which are identifiable in four areas of the child's development. Age divisions corresponding to the expected behavioural tendencies may differ from society to society, and also from individual to individual. Generally, however, the periods of development revolve around these, projected by Santrock (1998:19, 20): the prenatal period, infancy and toddlerhood, early childhood, middle childhood and adolescence.

The prenatal period is the time from conception to birth, lasting for approximately nine months. It is the time where tremendous growth occurs, starting from a single cell to a complete organism equipped with a brain and behavioural capabilities. Infancy and toddlerhood is the time that extends from the birth of the child to the period between 18 and 24 months. During this period, the child depends extremely on adults. Many psychological activities begin within this period of childhood. Some of these include language, symbolic thought, sensorimotor coordination, and social learning.

Early childhood is the period that runs from the end of infancy to about five to six years of age. Early childhood is the period when young children learn to become more self-sufficient and to care for themselves. The pre-school child develops reading-readiness skills characterised by identifying letters of the alphabet

and following instructions. They spend longer hours playing with their peers. This period is also known as the preschool years.

Middle childhood is described by Santrock (1998:19) as middle and late childhood stating the age range as six to eleven years of age, whiles Papalia and Olds (1985:239) describe the period as middle childhood and state the corresponding age range as six to twelve. They all recognise that during this period, children improve their fundamental skills in reading, writing and arithmetic and they apply their knowledge of numbers, words and concepts more effectively. The children become better at things they have already been engaged in. They are formally exposed to the larger world and its culture. Self-control increases and achievements become a more central theme of the child's concerns. The period is also called the elementary school years.

Adolescence is the period of transitional development childhood to early adulthood, commencing from between 10 to 12 years of age and ending between 18 and 22 years of age.

2.6 The Art of Children

Every child draws. All children, irrespective of their cultural backgrounds or environmental dispositions, draw. Drawing is therefore, instinctive and innate in children and breaks cultural barriers. Kindler (1997:25) traces drawing to toddlerhood where the writer relates drawing to the repetition of kinetic actions which constitute a form of kinetic self imitation of the child which imitates the understanding of resemblance, which is an analogy between action and these traces.

Psychologists and art therapists have categorised children's drawings into various stages of artistic development. One of them is Lowenfeld's stages of artistic development.

2.6.1 The Scribble Stage

The scribble stage is associated with children between two and four years old. In this period, children's scribbles are shapeless, purposeless doodles or lines of varied density. Children's strokes appear wavy, following the waves of the hand, the swinging movements of the arm either from the elbow or shoulder likened to the tangled movements of a pen swinging from a pendulum. The nature of the scribbling does not suggest much pressure from the scribbling medium (e.g. pencil) applied from the pivot of the muscle. Significantly, the scribbling stage is the primitively fundamental base from which all other graphic art grows. Four types of markings are identifiable with the scribble stage each of which is a cumulative progression on the other. These are the disordered, longitudinal, circular and naming stages.

The disordered scribbling are uncontrolled markings of diverse line intensity usually determined by the personality of the child. The child, at this stage, has little or no control over motor activity. The longitudinal markings are controlled repetitions which visually demonstrate an awareness and demonstration of kinaesthetic movements. This advances to the circular stage where there is inherent evidence of a deeper exploration of controlled motions indicating the potential ability to do more complex forms. During the naming stage, children begin to tell stories about their scribbles. Remarkable at this stage is the shift from thinking in terms of motion to imaginative thinking with regards to pictures. This stage marks the

development of the ability to visualise in pictures. It is a tremendous turning point in the life of man.

2.6.2 The Pre-schematic Stage

Between age four and six, the child is at the pre-schematic stage where drawing is announced by the appearance of circular images with lines which seem to suggest human or animal figures. During this stage the schema (the visual idea) is developed. Drawings show what the child perceives as most important about the subject. There is little understanding of space. Objects are placed in a haphazard way throughout the picture. Where colour is used, it is more emotionally than logically presented.

2.6.3 The Schematic Stage

At this stage, the child is between seven and nine years old. Drawing at this stage is recognisable by the dominant awareness of the use of space. A defined base and sky line is apparent. Objects in the drawing have a relationship to what is up and what is down. Elements in the drawing are all spatially relatively positioned. Colours are shown just as they appear in nature. Shapes and objects are easily definable. Figures are exaggerated. Human beings could be taller than a house, flowers bigger than humans, family members large and small. This is often used to express strong feelings about a subject. Sometimes the objects appear to be drawn upside down. Another Phenomenon is called 'x-ray'. In an x-ray picture the subject is depicted as being seen from the inside as well as the outside. Another technique sometimes used is called "folding over" this is demonstrated when objects are drawn perpendicular to

the base line. Read (1964:118) calls the latter part of this stage, age nine (and age ten, part of the next drawing stage) as visual realism when the child *“passes from the stage of drawing from memory and imagination to the stage of drawing from nature”*.

2.6.4 The Dawning Realism Stage

Between age nine and 11, the dawning realism stage also known as the gang age, realism begins to dawn on the child. Group friendships of the same sex are most common. This is a period of self awareness to the point of being extremely self critical. The point of realism is the child's point of view. Realism is not meant to be real in the photographic sense rather than an experience with a particular object. In this regard this stage is the first time that the child becomes aware of a lack of ability to show objects the way they appear in the surrounding environment. The human is shown as girl, boy, woman, man clearly defined with a feeling for details often resulting in a “stiffness” of representation. Perspective is another characteristic of this stage. There is an awareness of the space between the base line and sky line. Overlapping of objects, types of point perspective and use of small to large objects are evident in this stage. Objects no longer stand on a base line. Three dimensional effects are achieved along with shading and use of subtle colour combinations. Drawings often appear less spontaneous than in previous stages, because of an awareness of lack of ability.

2.6.5 The Pseudorealistic Stage

In this stage, age 11 to 13 years, the product becomes most important to the child, unlike in the previous stages where the process in making the visual art was of pre-eminence. This period is marked by two psychological differences, visual and non-visual experiences. In the first, called visual, the individual's art work has the appearance of looking at a stage presentation, the work is inspired by visual stimuli. Visual types feel as spectators looking at their work from the outside. The second is based on subjective experiences. This type of non-visual individual's art work is based on subjective interpretations emphasizing emotional relationships to the external world as it relates to them. Non-visually minded individuals feel involved in their work as it relates to them in a personal way. The visually minded child has a visual concept of how colour changes under different external conditions. The non-visually minded child sees colour as a tool to be used to reflect emotional reaction to the subject at hand.

2.7 Art Therapy and Child Traffic Education

Child traffic education has been extensively criticised, much so because child-pedestrian fatalities are incongruous with the amount of education given to children. Some experts have taken a devout pessimistic stance and argued that rates in child-pedestrian casualties are not conformable to expected yields because children, by nature of their biological and physiological limitations can never respond properly to the demands of traffic. DfT (nd:9) re-echoes the popular feeling that educational measures for children (and in general) have not been achieved as has been expected and emphasises that there may even be quite strict limits on what can be achieved

through education. Hillman et al (1990) think that the insignificant decreases in child-pedestrian casualties are attributable to reduction in child exposure to traffic as a result of parental anxiety towards their children's safety. DfT (nd:9) strengthens the point by adding that changing focus from education to engineering and urban planning measures aimed at building a safer environment in which the need for education might not be necessary may also account for reductions in fatalities. Piaget's theory on child development had been previously misconstrued to mean that the child would not be able to perform certain tasks until an appropriate level of development has been reached. Affected by this thought, Sandels (1975) asserts that it is impossible to fully adapt children below age 10 to the traffic environment because they are incapable of managing its demanding contents. Consequently, in some instances, groups of children are physically restrained from traffic by being bound together in chains to defuse their unpredictable and erratic tendencies (q.v. 2.2) which could 'spill' them onto the street (Plate 2.1).



Plate 2.1: A group of school children bound together by rope to prevent them from 'spilling' on to the street. Seattle, Washington, USA, 2008.

(Source: Damsere-Derry, 2010)

Opponents of the same view think that if the universal maxim that “*all things are possible*” is potent, then it is equally possible to train young children to adjust to traffic. DfT (nd:24) reveals that the long-established tradition in road safety asserting that child skills in road safety cannot be improved through education until a particular stage of development has been reached, is challenged, given its inconsistency with the advancement of contemporary research in psychology and developmental psychology. Justifying this claim are attempts made by researchers at improving children’s performance on a range of clearly defined pedestrian skills which have actually produced empirical evidence that such skills can be accelerated, provided the suitable training is given. They further counter-argue that child traffic education is not working because educational measures are knowledge-based and restricted to the classroom. Classroom techniques such as reliance on the Green Cross Code and the conventional “look left and right” before crossing the road, are not properly commendable for children below seven years due to the verbal skill they require for this task. However, when taught behaviourally, Rothengatter (1981) opines that these same techniques can lead to significant improvements in the roadside judgement of even young children four years of age. They advocate a shift to a more behaviour-affecting type of teaching founded on research findings.

Synonymous with this, is substantial literature in the field of road safety demonstrating the efficacy of training in diverse road safety skills. Proving this are recent studies which have demonstrated a comparative evidence of the advantage of roadside instruction over classroom instruction (Shagen and Rothengatter, 1997); the application of developmental psychology to child road safety (Demetre, 1997); roadside simulated study in the classroom (Fyhri et al., 2004); looking behaviour of

children (Zeedyk et al., 2000); finding safe places to cross (Ampofo et al., 1991); crossing safely at junctions (Rothengatter, 1981); plan safe routes (Thomson et al. 1992); crossing where cars are parked (Rothengatter, 1981); ability to make roadside timing judgements (Lee et al; 1984; Demetre et al; 1992).

Opponents of the impossible-child-traffic-training argue that lower yields in child traffic training is also because educational objectives are too broad and general, mostly pivoting around “reducing accidents” which has the tendency of influencing a sharp revolutionary approach of massively churning out children who only acquire much knowledge and can properly answer correctly to questions of what to do in traffic but actually cannot, when confronted with the same traffic situation. Child traffic educational programmes which assume that children will spontaneously transfer the understanding gained in the classroom to behaviour on the road are poorly supported by theory and empirical evidence. The implication is that, DfT (nd:6) *“it would be better to focus on promoting development from scratch in the context in which the learning will be used - i.e., at the roadside or something closely analogous - than in general discussions about what one might or might not do while sitting round a table”*.

Child traffic education, therefore, emphasises pragmatism. Many teaching and learning processes are so much to simulate reality. Some teaching sessions, such as the Treasure Trail in Dundee, Scotland, even use the real traffic environment (Zeedyk et al, 2000:45). But this proves expensive in terms of funding and personnel, and worse of all, presents a rather high risk for potential child casualty. To eliminate risk in practical training in the real traffic environment, some countries, (like South Africa), have adopted a separately built traffic environment called the Junior Traffic

Training Centres (JTTC), (Plates 2.2 – 2.4), (Fourie et al, 2005). But the JTTCs though eliminate some amount of the risk of child casualty in training, it does not present a hundred per cent spontaneity of the occurrences in the traffic environment. Fourie, Coetzee and Raven (2005) confirm that the JTTCs focused on “*teaching children driving rules and not so much road safety rules that apply to pedestrians*” and observe also that the temporary training facilities marked out on parking areas do not provide a realistic environment to function as a simulation of real life. Alternatively, less risky and less expensive processes equally simulating the traffic environment in the classroom, such as Fyhri’s (2004) Table-top Model (Plate 2.5), are in use. Whereas all these traffic environment-simulating options have the tendency of achieving the intended results, they are not without shortcomings.



Plate 2.2: Junior Traffic Training Centre, Kempton Park, South Africa
(Source: Fourie, Coetzee and Raven, 2005)



Plate 2.3: JTTC in Cavendish Primary School, South Africa
(Source: Fourie, Coetzee and Raven, 2005)

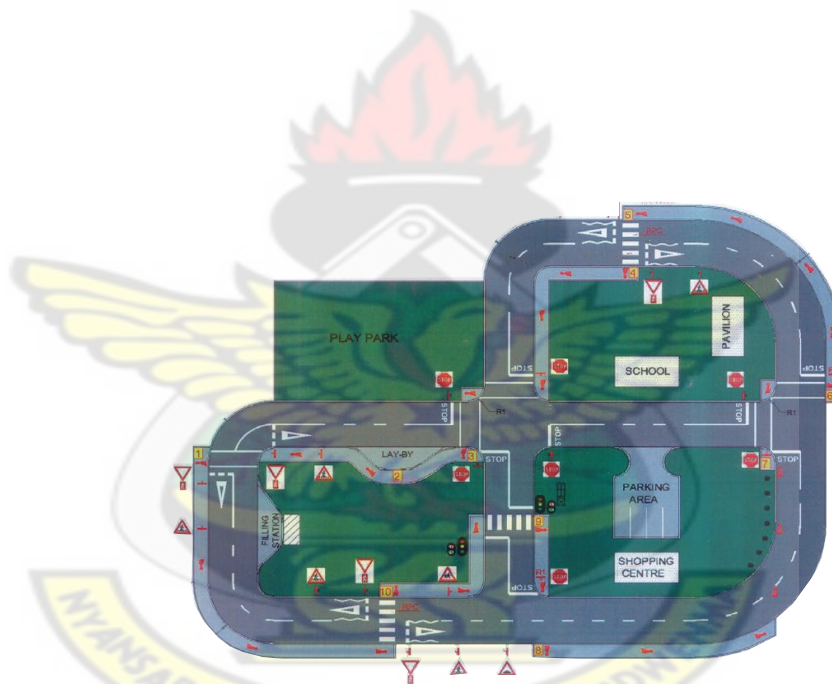


Plate 2.4: Layout of JTTC, Cavendish and Eldomaine Primary Schools, South Africa
(Source: Fourie, Coetzee and Raven, 2005)

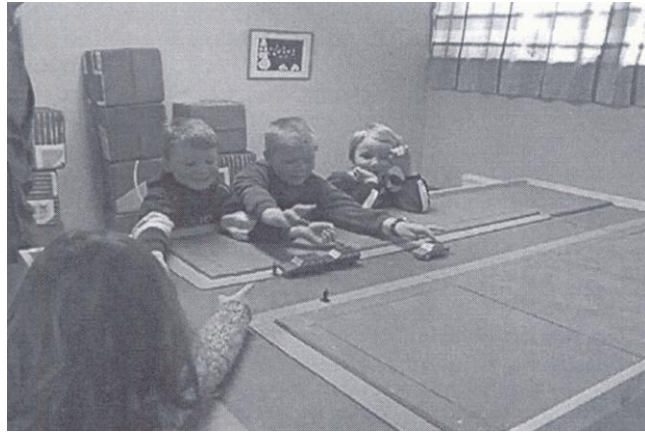


Plate 2.5: The tabletop model. Children explaining the danger of crossing the road behind a parked car

(Source: Fyhri, Bjørnskau, Ulleberg, 2004)

Another method, which does not initially simulate a plastic or physical reality of the traffic environment but extends a realistic representation of the child's thoughts and perceptions about the traffic environment and what goes on in there, are inherent in art therapy. It does not bear all the risks and much expenses associated with the other realistic simulating models but has the overly advantage of exploring the child's emotional involvement on the exercise. Emotional temperatures form a fundamental diagnostic feature which increase the child's propensity for appreciating and measuring the realities of pain and anguish associated with death, especially of a loved one. The interspersing rotation of the child's personal contact with the traffic environment and more therapy sessions, builds a cumulative experience on the child's previous perceptions. This cycle gradually fosters improved perceptions which translate into behavioural changes required of the child in traffic.

2.8 Theories of Child Development and Learning

Several theories of child development and learning have influenced discussions of school readiness. Three of these theories have had profound impact on kindergarten readiness practices. These three theories include the maturationist, environmentalist, and constructivist perspectives of development (Powell, 1991).

2.8.1 Maturationist Theory

The works of Arnold Gessell set the pace for the advancement of the maturationist theory. Maturationists assert that development is a “biological process” that occurs automatically in predictable, sequential stages over time (Hunt, 1969). This position is one basis of the debate as to whether nature (the genetic traits and characteristics inherited from a biological parent), or nurture (environmental influences in the natural setting, including influences from family, society and culture) is the determinant of a child’s development (Papalia et al, 2004:21). The maturationist theory leads many educators and families to assume that young children, if healthy, will acquire knowledge naturally and automatically as they grow physically and become older.

In the maturationist context of education, the child is ready for school when he can perform such tasks as reciting the alphabet and counting - basic tasks required for learning more complex tasks such as reading and arithmetic. Prior to attending school, parents are expected to have introduced their children to these practices. When the child underperforms, it is interpreted as the child needing more time to acquire the knowledge and skills needed to perform at the level of his or her peers.

DeCos (1997) states that, corrective measures for the underperforming child in the maturationist system of education include referrals to transitional schools, retention or holding children out of school for an additional year.

2.8.2 Environmentalist Theory

Proponents of the environmentalist theory are John Watson, B.F. Skinner, and Albert Bandura. The environmentalist theory is founded on the basis that the environment moulds the child's learning and behaviour. In other words, human behaviour, development and learning are consequent of the influences of the environment.

In school, success depends extensively on the child taking instructions from the teacher. According to environmentalists, the child is ready for school at the age when he can properly respond to the environment of the school and the classroom. This means that the child must be able to associate with the school rules and regulations, curriculum activities, positive behaviour in group settings and directives and instructions from teachers and other adults in the school.

Educators relying on the environmentalist theory believe that children learn best by rote-learning activities. These include such things as copying letters, tracing numbers, reciting the alphabets repeatedly. In such classrooms, layout is strictly traditional (Figure 4.1a), unlike that of the constructivist type where layout is in segments (q.v. 2.6.3, Plates 4.8, 4.23) allowing for free movements and interaction.

In the home setting, parents stuff the place with workbooks containing colouring and tracing activities. These activities require very little parent-child interaction. The child gets involved in a one-way independent activity. In the

environmentalist approach, when the child is found to be incapable of performing certain tasks, he is labelled as having a learning disability and is restricted to some classroom measures designed to control his behaviour and responses.

2.8.3 Constructivist Theory

The constructivist theory of learning was propounded by Jean Piaget, Maria Montessori, and Lev Vygotsky. Although there are variations in their projections, they all articulate a common context of learning and development. Constructivists believe that learning and development occur when young children interact with the environment and people around them (Hunt, 1969:30). They are consistent in the view that young children should be active participants in the learning process. Santrock (2004:226) emphasises Piaget's position that children learn better when they are made an active part of the learning process where they seek solutions for themselves. Constructivists require young children to initiate most of the activities for learning and development.

In schools where the constructivist theory is used, attention is given to the physical environment and classroom arrangement. Classrooms are divided to take smaller number of children and the rooms equipped with developmentally suitable material that children can play with and manipulate. Classroom arrangement is such that children can move freely and actively about.

Teachers make meaningful use of children's daily activities by incorporating them into the curriculum to foster easy understanding. Constructivists expect parents to engage their young children in reading and storytelling activities in order to

encourage children's participation in daily household activities in a way that introduces to them such concepts as counting and language use. Significant in the constructivist theory is that when a young child encounters difficulties in the learning process, he should not be labelled as incapable but should rather be given individualized attention and customized to help the child address his difficulties.

2.9 The Child and Story-Telling

Story-telling is an integral part of human life, both childhood and adulthood. In each stage of life however, story-telling has its characteristic relevance. In childhood, the importance of story-telling is based on its transience of development from the oral ability to speak. From birth to one year of age, babies experiment with sound. They coo and babble until at about 6 months of age when they begin to make two-letter-word sounds and progress gradually. Sound builds the child's skill for language development needed for story-telling. The story-telling ability of children may differ from one another because of the level of expanse of the word bank forming the child's language base or strength. Between age one and two years children are able to put two words together and by age three their word bank would have increased to 1,000 and they are able to string words together to describe at least one object. Averagely, between age four and five children are able to use most elements of the complex sentence structure (eg. pronouns, adverbs, adjectives, possessive and plurals). At this age, the child has observably increased their word bank to about 3,000. From age 5 to 6 (Glazer 1989) children would have "*acquired language skills similar to adults, with most rules of grammar already in place*". Language development is essentially relevant in childhood; in that it develops simultaneously

with the child's artistic skill, with one complementing the other in growth. Simpson, et al (1998:180) gives a corresponding blend of artistic and language development:

This entire sequence of oral development is very similar to the sequence of artistic development, but the steps are not necessarily accomplished at the same ages. The babbling stage is similar to the mark-making stage, when children experiment with making marks. The stage of putting two words together is similar to when children begin to combine their marks to make radials, suns or their first tadpoles. The stage of stringing more words together is similar to the early symbol-making stage of development, when children are expanding their visual vocabularies but do not yet place images into a realistic frame of reference. The phase of fully developed grammatical construction is similar to the symbol-making stage of visual development, when children are able to compose the entire picture plane. Children will continue to develop by adding to both their visual and verbal vocabularies and to the complexity of each expressive language.

Verbal story-telling ability requires another level of language skill which begins with what Applebee (1978) names the "spectator role" of language. The use of language occurs in two ways. First, using language for "looking on" and secondly using language for "participating in" (Simpson, 180). The latter is traced to early infancy when babies are alone in the crib and produce pre-sleep monologues; i.e. the child may designate an object in the crib as his audience and talk to it without the benefit of any social interactive feedback. The child functions happily in an imaginary world.

The other characteristic of the "spectator role" is the ability to order experience. Beyond two years children are sensitive to the rhythmic structure of language and are able to repeat rondo-like patterns of a sequence of experiences.

This commences the skill of story-telling. Applebee (1978:37) traces its further development:

as early as two-and-a-half years old, many children are able to respond appropriately when asked to “Tell me a story.” They begin with a formal opening or a title, they end with a formal closing, and they consistently use the past tense during the telling of the story. At two-and-a-half, children already recognize that to tell a story is different from other uses of language. Great differences in story structure occur between two-and-a-half and five years of age. When the child is two-and-a-half, stories are generally expressive reports on events closely bound to the child’s world of experience. For example, “The daddy works in the bank. And Mommy cooks breakfast. Then we get up and get dressed”. By the age of five, a clearly distinguished story with attention to the sound of language develops – for example, “Once upon a time there were four cowboys. One was named Wilson, one was named Ashton, one was called Cheney. They all shot holdups and killed rattlesnakes and they ate them”

This habit of talking to oneself or to inanimate objects or repeating experiences, occur in different forms and grows with the child. Piaget and Vygotsky (Junn, 2001:55) studied the various language dynamics of children and categorised them (Table 2.2). Junn, et al (2001:55) reiterate Vygotsky’s finding that the most significant era in the course of the child’s intellectual development “... *occurs when speech and activity, two previously completely independent lines of development, converge*”

Table 2.2: Types of private speech as advanced by Piaget and Vygotsky

Varieties of Private Speech		
Egocentric Communication	Remarks directed to another that make no sense from the listener's perspective	David says to Mark who is sitting next to him on the rug. "It broke", without explaining what or when
Fantasy Play	A child role-plays and talks to objects or creates sound effects for them	Jay snaps, "out of my way!" To a chair after he bumps into it
Emotional Release	Comments not directed to a listener that express feeling, or that seem to be attempts to review feelings about past events or thoughts	Rachel is sitting at her desk with an anxious look on her face, repeating to herself, "my mom's sick, my mom's sick"
Self-Direction	A child describes the task at hand and gives himself or herself directions out loud	Carla, while doing a page in her math book, says out loud, "six". Then counting on her fingers, she continues, "seven, eight, nine, 10. It's 10. The answer is 10
Reading Aloud	A child reads written material aloud or sounds out words	"Sher-lock Holm-lock, Sherlock Holme," Tommy reads, leaving off the final "s" in his second, more successful attempt.
Inaudible Muttering	Utterances so quiet that an observer cannot understand them	Angela mumbles inaudibly to herself as she works on a math problem

(Source: Junn et al, 2001)

2.10 Child Road Traffic Education in Ghana

Child road traffic education gained formal introduction in the school education curriculum in 2001, as part of the 2001 - 2005 Road Safety Strategy with the objective of reducing fatalities in Ghana. Prior to that road traffic education had been concentrated on adult population. In the event of introducing child road traffic education in the school education system, the word 'curriculum' had been extensively used to indicate the seriousness of the introduction. An exposition on the school curriculum is made to see its reception of child traffic education.

2.11 Curriculum

What curriculum is has not been a straightforward subject-matter. The boundaries of curriculum are indistinct, making it too intricate to remain in the strict confinement of a single definition. Curriculum is therefore widely diffused though it tapers towards related points of view. Educationists and curricularists have expressed different views on curriculum which have affected the meaning of curriculum by way of additive and subtractive differences in concepts (Nsiah-Achampong, 2004:130). Accordingly, it is worth looking at what curriculum is for the purpose of this study.

Blishen (1970: 181) borrows the definition of curriculum from a Spense Report of 1938 as *“a statement or programme of courses of teaching and instruction”*. Tyler (1956:79) states curriculum as *“all the learning of students which is planned by and directed by the school to attain its educational goals”*. Blishen, however, refers to a wider definition of curriculum as *“all the experience which a*

pupil has under the guidance of the school". Blishen's broad definition of curriculum is no different from that of Nacino-Brown, Oke and Brown (1982:25): *"all the experiences a child has under the guidance of a school."*

Blishen's first definition and Tyler's, on the one hand; and Blishen's broader definition and Nacino-Brown, Oke and Brown's, on the other hand, brings two features expressed by curricularists and educationists. The former focuses on 'subjects' while the latter focuses on 'experience'. Another central idea is found in Wheeler's definition which is unusual but strategic. Wheeler teases the brain on how society and school-education affect behaviour. Behaviour being the focus of Wheeler's later definition of curriculum, Wheeler (1967:11) explains behaviour as *"broadly anything that an organism does, including overt physical action, internal physiological and emotional processes and implicit activity ... Behaviour is anything that a human being thinks or feels or does"*. Wheeler again brings to mind, how society and school education are capable of changing human behaviour. But to achieve *"approved behaviour patterns (knowledge, skills, habits, sensitiveness, attitudes and values), and to inhibit disapproved ones"* (Wheeler, 1967:11), claims the means of achievement must be deliberate and systematic. Having introduced behaviour and its agents of change as society and school education, Wheeler (1967:11) then defines curriculum: *"It is with these deliberate, systematic, planned attempts to change behaviour that curriculum is concerned. By curriculum, we mean the planned experiences offered to the learner under the guidance of a school"*

Wheeler's definition introduces another feature, behaviour. The idea of curriculum being a set of subjects to be taught, as advanced by Blishen and Tyler supra, has been challenged as being narrow. A deeper idea, knowledge and

experience are revealed in Tanner and Tanner's (1980:43) definition: *"That reconstruction of knowledge and experience systematically developed under the auspices of the school ... to enable the learner to increase his or her control of knowledge and experience"*.

2.11.1 The Use of the Term Curriculum

Nsiah-Achampong (2004:132) purports that the definition of curriculum is a problem so intense that some of the meaning offered for curriculum rather describes 'syllabus', as in *"all the courses or subjects which the school offers"* and *"the systematic arrangement of subject-matter and activities within a course offered by a school"* (integrated science or social studies, for example), Nacino-Brown, Oke and Brown (1982:25). The result is that curriculum and syllabus are used interchangeably i.e. one as a substitute for the other. Tanner and Tanner (1980:6) make known this temptation:

During the early years of the twentieth century, most educators held to the traditional concept of Curriculum as the body of subjects or subject matters set out by teachers for students to cover...Adding to the confusion, such terms as course of study and syllabus were being used synonymously with curriculum.

This temptation, compounded by the problem of definition, has given grounds to the belief by educationists that (Tanner and Tanner, 1980:43) *"unless a fixed, universally agreed-upon definition of curriculum is developed, there can be little progress in the field"*. But Tanner and Tanner (1980:43) conversely decry this assertion by making analogous reference to a similar definition problem existing in the field of science:

the fact that scientists have not agreed on a fixed definition of science has not impeded scientific progress. Of course, different scientists have come up with different working definitions of science, and such definitions can be helpful in their work. But the idea of fixity is inimical to the very spirit of science.

Since curriculum determines the study of science, the latter part of Tanner and Tanner's (1980:43) case may not be logically plausible with the moral cogency of what curriculum stands for. The fluidity of science, for instance, is what has led to the overflow of nuclear armament which is detrimental to society. The first part of Tanner and Tanner's (1980:43) argument vouches for the learner's control over knowledge and experience. That means if the learner is unable to manage his knowledge and rather uses it to the detriment of society, curriculum loses its purpose. It must be noted that child traffic education itself is not a curriculum but a subject introduced into an existing curriculum, the school curriculum. Child traffic education will not be well-tailored if the school curriculum itself is not properly defined or managed. It is therefore not clear what the National Road Safety Commission refers to as a "*new curriculum for road safety education in schools by 2008*" (NRSC, 2006:27).

Theorists' dilatation on curriculum and corresponding expositions on it show far more than syllabus as a substitute for curriculum. Farrant (1998:173) makes a deeper relational exposition on curriculum and syllabus as follows:

Teaching is the final step in the process of converting educational aims into practical realities. It is useful, therefore, to examine how it is affected by each step in the process as the curriculum, with its formulated educational aims, is changed first into a syllabus, then a scheme of work, and finally into the lessons that are taught in the classroom ... The

curriculum is normally represented in terms of a number of subjects, but each of these has to be presented in precise terms if it is to be followed in a satisfactory manner by different teachers. Such an interpretation of a curriculum is called a syllabus.

Farrant's exposition reveals two things:

- (a) an implicit distinction between curriculum and syllabus, starting from teaching, and building up a sequence.
- (b) a symbiotic connection between curriculum and syllabus

The latter forms a more acceptable base for the easy reception of the syllabus-substitute-for-curriculum temptation. Farrant's definition of curriculum further complements the syllabus-substitute-for-curriculum problem. Farrant (1998:173) states curriculum as what it is, and what it is not:

curriculum is the way in which society tries to meet its educational goals and consists not only of the subjects which appear on the school's time-table but also of those other things from which the child learns subconsciously, such as the school's accepted standards of behaviour and the values that are prized.

Though seemingly stating subjects as curriculum, the 1966 Education Review Committee in Ghana was particular about teaching subjects "to reflect the changing scientific, technological and cultural needs of Ghana" (NLC:21). It further emphasised that content of syllabuses and the method of teaching should be reviewed constantly to ensure that what was taught was related to the environment of the pupils and firmly based on experiment (NLC:25). The MOEYS' statement on "the

curriculum and the subject syllabuses for textbooks ...” *clearly gives a vivid distinction between curriculum and syllabus (MOEYS, 2003:8).*

2.11.2 Curriculum Redefined

Having studied various discussions and expositions on curriculum Nsiah-Achampong, (2004:135), using the three central ideas viz behaviour, experience and knowledge, re-defines curriculum as *“a consciously prepared design, usually monitored by a body such as a school, for the provision of knowledge through experience and cognition to affect behaviour”* for the benefit of society.

The introduction of child traffic education into the school curriculum was appropriate. A further look at the structure of curriculum will lend an insight into how child traffic education fared.

2.11.3 The Structure of Curriculum

Curriculum is made up of two structures. These are the Platform and Deliberations.

2.11.3.1 The Platform

The Platform is the base or foundation upon which curriculum stands generally. It contains all the philosophies, theories and concepts needed to form the action part of the curriculum - Deliberations. The Platform is actually the part of the curriculum that determines the character or nature of a curriculum just as certain policies may describe the economy of a country as socialist or capitalist. Amenuke (1976:19)

states the Platform of curriculum as the conceptions, theories and aims upon which a plan for instruction stands. Amenuke likens the platform to a foundation upon which something stands. He explains Platform further along the lines of Walker (1974: 137):

in a curriculum process, choices must be made and justified. Once a choice is justified and accepted as being true, it becomes a conception. People hold certain beliefs about what is true and worthy. These are theories. Then, there are beliefs about what is educationally desirable ... Conceptions, theories and aims become the base upon which a plan for instruction stands

2.11.3.2 Features of Curriculum Platform

A curriculum platform is made up of the following features:

(a) Needs

The platform ascertains the needs of the society (e.g. Ghana) in which the learner lives, and the specific needs of the learner identified as child traffic education, lack of which caused traffic fatalities among children. When the needs have been identified, the Deliberative process complements the needs with what is to be learned. If the Platform does not first identify the needs of the society and learner, there is the temptation that what would be drawn up for learning may be irrelevant.

(b) Values

The peculiar norms of every society remain sacrosanct and unscathed with time. The dynamism of education, however, sometimes conflicts with these societal norms mostly in cases where the type of education in operation is not indigenous. This is

evident in many African societies where European school type of education found its way into the society by colonial administration. It is pertinent to note that the ideals of education determine the norms of the society in relation to the objectives of education. It is imperative that education does not operate independent of the norms of a society. Bruner (1969:69) observes that *“education ... confined only to the schools and not to the society at large is doomed to eventual triviality.”* Nsiah-Achampong (2004:137) illustrates this by reference to the Ghanaian situation where there is conflict between European contemporary medicine and orthodox herbal medicine. The general Ghanaian perception of herbal medicine is one of mediocrity. This could be because the Ghanaian or medical personnel are educated in European values. As education developed in Ghana, herbal medicine, the indigenous equivalent of pharmacognosy was introduced as a course of study in the KNUST in 2001. It had long been recommended for integration in the university by the 1966 Education Review Committee (NLC, 1966:41). The 1987 Educational Reforms in Ghana, for instance, sought to substitute European names in text books with Ghanaian names to reflect Ghanaian societal values. It was also to check the European-name-bearing Ghanaian personality crisis.

Another example is illustrated in relation to traffic non-verbal communication. The Ghanaian society trivialises the left hand because it is used to perform odd functions. It is therefore seen as a sign of disrespect when one uses the left hand to perform ethical functions such as greeting, collecting or giving out something. In driving, when the right hand is engaged by the gears, the driver is faced with an inevitable choice of using the left hand to signal in greeting or in response to greeting. Due to its cultural implications, some drivers force the use of

the right hand even when it is engaged in the driving process. The practice is inimical to road safety within that short period of interruption. In designing a curriculum for traffic education, this is an example of a problem of value conflict to be considered.

To avoid this value conflict, for instance, the Ministry of Education, Youth and Sports recommended that at least 70% of textbook authorship should be Ghanaians (MOEYS, 2003:10). ‘Safe Ways, A Road Safety Education Resource for Teachers of P5s’ (q.v. 4.1.5) was authored by a British, Gill Murray. But the British effort was supported by a Ghanaian team made up of Mr. Clocuh, Director of Education; Mrs Patience Anson-Yevu, Assistant Director of the District Office; and Justice Amegashie, National Road Safety Commission. Hence, the textbook, though British authorship, funded by the British Overseas Development Administration (ODA), and based on research by the Transport Research Laboratory (TRL) in the UK, is wholly Ghanaian content-based seeking to educate the child on road safety in Ghanaian values (Murray, 1996).

(c) Objectives

The objectives of a curriculum are what the curriculum intends to achieve over a period of time. The subjects for study are drawn taking into consideration the values and needs of the curriculum in the spirit of the philosophy spelt-out in the Platform. The objective of child traffic education was to inculcate road safety alertness into children to fit into the general objective of reducing fatalities by 5%.

(d) Theories

Theories on education and learning have been established by philosophers to facilitate learning. Theories form the character of a curriculum. Curricularists select theories which facilitate the achievement of set objectives. Just as national economies tailor along certain lines such as capitalist economy, socialist economy and so on, so do curricula tailor along certain learning theories deemed to be most suitable for the goals in question. Three theories, the Maturationist, Environmentalist and Constructivist were studied (q.v. 2.8). Child traffic education could not be identified with one theory. It was generally pragmatist in nature (as in the use of the demonstrative method, q.v. 4.1.3). Though it relied on traditional classroom arrangement (q.v. 4.1; Plate 4.1; Appendix 1) associated with the Environmentalist theory, the Constructivist theory of incorporating children's daily activities in the learning process was used.

2.11.4 The Curriculum Deliberations

Deliberations form the active part of the curriculum concerned with how the curriculum is implemented. When the theories and principles forming the Platform of the curriculum have been established, the Deliberative process converts them into practicable concepts for use. The working processes of the Deliberation are made up of five features. These are: the curriculum content, methodology, curriculum implementers and syllabus

The Curriculum Content is a list of what is to be learnt. Armah (2001:1) indicated crossing of roads, road signs and identification of pedestrian crossings as

some of the topics to be learnt. Methodology contains general information on how each subject is to be taught. It includes extra-curricular activities and literature to be used e.g. textbooks. Curriculum implementers are a set of persons bearing corresponding qualifications required for teaching subjects. In child traffic education, there was a case of synaptic reversals between personnel from the NRSC and the GES. By the inception of child traffic education, many teachers had not been trained for the purpose (Table 4.1), so NRSC personnel helped in the teaching process (Plates 4.2, 4.3). The synaptic reversal here is that while the NRSC personnel who knew the subject of road safety did not bear the professional “corresponding qualifications” required for teaching, professional teachers were not well-versed in the subject of road safety to teach it. As a remedy, a new training-of-trainers course was developed by 2008 and traffic education made mandatory for all teachers by 2010 (NRSC, 2006:27). Syllabus is a detailed arrangement of subjects to be taught, with their corresponding teaching methods and appropriate teaching aids. Teachers are expected to prepare their Scheme of Work (Farrant, 1988:274) and Lesson Plan Notes (Farrant, 1988:177) from the syllabus.

2.11.5 Evaluation

The curriculum contains a statement on how the educand should be tested. It specifies the types of test to be used and at what time the entire curriculum will be evaluated. The curriculum goes through two stages of evaluation - formative and summative. Formative evaluation is aimed at evaluating the on-going curriculum for weaknesses and or improvements to effect changes for a better operation of the curriculum. Summative evaluation is assessment of the entire curriculum at the end of certain terminal periods.



CHAPTER THREE

METHODOLOGY

3.1 Longitudinal Experiment

The study is predominantly an observational one that used the longitudinal approach to study a cohort of lower primary pupils between the ages of five and ten, for a period of one academic year, September 2006 to July 2007. The age range of five to ten has been identified as the most prevalent age group of children that is most vulnerable to road traffic crashes in Ghana (q.v. 2.2.1) and all over the world (q.v. 2.1.3). The traffic behaviour of 70 - 71 pupils from schools in Ghana and Europe (Table 4.1) was observed in a before and after study, noting differences in behavioural change. The nature of this research dictated an inclination towards the Trend Studies and Cohort Analysis types of Longitudinal Research. Regarding Trend Studies, different sets of respondents were studied using the same methods. Regarding Cohort Studies, these sets of respondents bore the same age demographics whose developmental pattern was analysed for changes over a period of time to determine a cohort effect.

3.2 The Survey Method

The survey method advocated by Wimmer and Dominick (1987:102 - 134) was used. Two types of survey, the descriptive and analytical surveys were used in the study. Descriptive survey was used to give an objective reported account of the observations made. Analytical survey was subsequently used to critically examine cases in the descriptive survey and draw explanatory inferences from them.

3.2.1 The Descriptive Survey

Descriptive survey relied enormously on field observation and primary and secondary sources of data. Some secondary sources led to primary sources of information and vice versa.

3.2.1.1 Field Studies / Observation

Field studies were conducted by random, clinical, concealed and participant observations on child pedestrian behaviour.

3.2.1.2 Random Observation

A motorized reconnaissance was used to survey child pedestrian behaviour generally at random in Kumasi and Adjikpo, Ghana; and Dublin, Republic of Ireland. This served as a preliminary observation to acquaint the researcher with the characteristics of the traffic environment of the selected areas and associated peculiarities of respondents in the respective areas. For instance, one marked differential observation was made between child pedestrians in Ghana and the Republic of Ireland. In the Republic of Ireland, besides child pedestrians who strayed into 'jay walking', child pedestrians mostly had adult supervision. Also, in every school, a Lollipop Woman took position at access roads to the school, in the morning and afternoon during the time of going to, and coming from school when school children crossed the street frequently. The Lollipop Woman calmed traffic for children to cross the street.

In Ghana, by contrast, child pedestrians were found to be traffic-independent and competed with adults on the streets. In the two selected schools in Ghana, St. Peter's School and Adjikpo Dokuyo School, by observatory speculation, approximately 90% and 99% of school children respectively went to and returned from school unaccompanied by adults. There were also no street wardens to control traffic for the school children (child pedestrians).

The study was undertaken for one academic year (2006 / 2007 academic year) in Ghana. By the following year (2007 / 2008 academic year), respondents had advanced to another class, primary five. The researcher carried a random interactive observation on a selected few which, however, fell outside the scope of the study.

3.2.1.3 Clinical Observation

In selected schools, survey was carried out at irregular frequencies. A pre-study survey was done twice every other quarter of the first term and once every other interspersing quarter in Adjikpo Dokuyo School and Scoil Aonghusa School. The first quarter was missed in Scoil Aonghusa School (Tables 3.2, 3.3). In St. Peter's School, the pre-survey was increased by one tally due to the researcher's proximity advantage in the study area (Table 3.1). Therapy sessions were carried out once every quarter. Except in Scoil Aonghusa School where one therapy session was missed, all four sessions were carried out in St. Peters and Scoil Aonghusa School and Adjikpo School (Tables 3.1, 3.2). Post-survey was carried out three times in Scoil Aonghusa School (Table 3.3).

Table 3.1: Observation data, St. Peter's School, Ghana

Period of study	Freq of Obsvatn. (Pre-Study Survey)	Freq of Therapy Sessions	Freq of Obsvatn. (Post-Study Survey)
1st Quarter	3	1	4
2nd Quarter	2	1	2
3rd Quarter	3	1	2
4th Quarter	2	1	1
Total	10	4	9

Table 3.2: Observation data, Adjikpo Dokuyo School, Ghana

Period of study	Freq of Obsvatn. (Pre-Study Survey)	Freq of Therapy Sessions	Freq of Obsvatn. (Post-Study Survey)
1st Quarter	2	1	2
2nd Quarter	1	1	1
3rd Quarter	2	1	1
4th Quarter	1	1	1
Total	6	4	5

Table 3.3: Observation data, Scoil Aonghusa School, Ireland

Period of Study	Freq of Obsvatn. (Pre-Study Survey)	Freq of Therapy Sessions	Freq of Obsvatn. (Post-Study Survey)
Week One	-	-	-
Week Two	1	1	-
Week Three	2	1	2
Week Four	1	1	1
Total	4	3	3

In St. Peter's School more survey sessions were carried in a diminishing order (Table 3.1). In selected schools in Ghana, all pre-study survey was carried out in the first term, therapy sessions in the second term and post-study survey in the third term. In Scoil Aonghusa School the study was contracted into one month (q.v. 1.8.1) in which all three events, pre-study survey, art therapy experiential sessions and post-study survey were carried out quarterly.

The survey was done in two different time periods of each day: morning, 0700 – 08:30 hours; afternoon, 1330 – 1430 hours. The two sessions took advantage of children going to school in the morning and coming from school in the afternoon. In both instances, the respondents exhibited all the activities involved in road crossing. Some children whose behavioural change was slow, static or who exhibited remarkable learning difficulties were sorted out by their drawings and traffic behaviour. These children were put under constant surveillance to check their

relatively (compared to the generality of class) irregular behavioural change and intensify teaching and therapy sessions for them.

3.2.1.4 Concealed Observation

There were instances where the researcher did not disclose his identity as a researcher. This was necessitated by an event in the first school selected by the researcher (which was abandoned later) where teachers informed pupils to be of good behaviour because an officer had come to observe and take pictures of them crossing the street (q.v. 1.8.6). Apparently, the teachers had a different thought. They thought that if the pupils behaved well in traffic, the school would gain credit. Consequently, before the researcher contacted the school authorities in another school for permission to engage the pupils in a study, the researcher carried out at least, some field observation on the pedestrian behaviour of the school children.

In cases where identity was inevitably required, the Partial Concealment approach was used. Identity was disclosed but the point of interest or objective was not declared. The advantage gained was that, human subjects (respondents) under study behaved somewhat naturally.

3.2.1.5 Participant Observation

In some situations, the researcher entered the social setting and participated in events while observing. The researcher, like other adults, participated in street-crossing simultaneously with child pedestrians and observed their behaviour.

3.2.2 Analytical Survey

Analytical survey made use of statistical and content-based analyses.

3.2.2.1 Ordinal Scale of Measurement (OSM)

The OSM ((Leedy and Ormrod, 2005:26) was used to rate performance of the Test Group over the Control Group (q.v. 3.7.5) in the two survey sessions. Mean scores of final action minus mean scores of initial action indicated simple differences. Generally, negative values showed poor performances while positive values showed improved performances. Performance change in the groups showed in the increasing values as in $\alpha = 18, \alpha = 26, \alpha = 33, \alpha = 37$ (q.v. 5.4.1.4) and decreasing or fluctuating values as in $\alpha = 13, \alpha = 14, \alpha = 19, \alpha = 15$ (q.v. 5.4.1.4) in the survey sequence of (1), (2), (3), (4), (q.v. 5.4.1.3).

In St. Peter's School, the two categories of respondents were assessed in four instances as follows:

- (a) Performance of Control Group over Test Group in the pre-survey study

$$X(\text{cgB}) - X(\text{tgB})$$

- (b) Performance of Control Group over Test Group in the post-survey study

$$X(\text{cgA}) - X(\text{tgA})$$

- (c) Performance of Control Group in the pre-survey and post-survey studies

$$X(\text{cgA}) - X(\text{cgB})$$

(d) Performance of Test Group in the pre-survey and post-survey studies

$$X(\text{tgA}) - X(\text{tgB})$$

In Adjikpo Dokuyo School, only one group of respondents was involved in both the pre-survey and post-survey studies. The group was assessed on one instance:

(a) Relative difference in respondent performance in the pre-survey and post-survey studies

$$X(\text{gA}) - X(\text{gB})$$

3.2.2.2 ANOVA

The study was mainly to find out if changes occurred in the subjects under study. Data was used to build logical and sequential analyses of the behavioural pattern of respondents in a before and after study. Applying ANOVA design, group performance differences were tested for statistical significance. Using the Control Group as the yardstick of measurement, change in behavior of the Test Group was estimated relative to change in the Control Group. This implies that the effect is equal to change in the Control Group minus change in the Test Group divided by the average standard deviation of the groups.

3.2.2.3 Content Analysis

Content analysis was used as an instrument to study the drawings of respondents to reveal the messages inherent in the drawings and their corresponding connection to the respective respondents. The medium variable used to assess drawings was site. The three types of site advocated by Rose (2005:16) were concurrently applied to the drawings. These are:

- (a) The site of the production of drawings
- (b) The site of the drawing itself
- (c) The site where the drawing was seen by various audiences.

This, in the study, was incorporated into the interactive sessions, where respondents spoke about their drawings, and their colleagues, in the interactive processes. The respondents also gave their opinions and views about the drawings

3.3 Primary Sources

Basic sources of information were individuals in authority who provided direct information through interviews.

3.4 Secondary Sources

The national television station was relied on as an indispensable secondary source given its regular position in the dissemination of traffic information on education.

Some pieces of information broadcast on the television yielded a double effect of leading to primary sources of information besides being a secondary source itself

3.5 Research Tools

The tools were used to explore, extract and sort out information for the study. The tools, mainly interviews, the library and measuring techniques (Leedy and Ormrod, 2005:12 – 27) suited the study. Interviews were structured and interactive, and occurred with authorities on road safety. Besides, other facilities which served as tangible sources of information were consulted.

3.5.1 Interviews / Sources of Information

- Mr. Oware Boateng, RRSC, Kumasi
- Dr. K. Annan, Head of Department, Herbal Medicine, KNUST, Kumasi
- Ghana Television
- TV 3 (private television station)
- The radio
- Newspapers (the Daily Graphic, The Ghanaian Times)

3.5.2 Libraries Used for the Study

3.5.2.1 Research Institutions

- (i) Building and Road Research Institute (BRRI), of the Council for Scientific and Industrial Research (CSIR), Kumasi.
- (ii) Institute of Science and Technological Information (INSTI), of the Council for Scientific and Industrial Research (CSIR), Accra
- (iii) Science & Technology Policy Research Institute (STEPRI), of the Council for Scientific and Industrial Research (CSIR), Accra
- (iv) Curriculum Research and Development Division (CRDD), of the Ghana Education Service (GES), Kumasi.

3.5.2.2 Academic and other institutions

- (i) Kwame Nkrumah University of Science of Technology, (KNUST), Kumasi.
- (ii) Faculty of Art, KNUST, Kumasi
- (iii) Faculty of Social Sciences, KNUST, Kumasi
- (iv) Department of Art Education, KNUST, Kumasi
- (v) National Road Safety Commission (NRSC), Accra and Kumasi

3.5.2.3 Public libraries

- (i) The Ashanti library, Kumasi, Ghana
- (ii) The Square, Dublin, Republic of Ireland
- (iii) County library, Dublin, Republic of Ireland

3.5.2.4 Private libraries

- (i) Research Scientists and academicians in Ghana and South Africa

3.6 Measurement Techniques

3.6.1 Pre-test Survey

A multi-task intervention study using a pre-test survey was used to examine respondent's existing knowledge (skills) on child pedestrian road crossing skills. One of the selected schools, St. Peters school had benefited from the RRSC education campaign. Pupils from the school were expected to be well-versed in road crossing skills. In the course of the observation, child road user behaviour was recorded by photography using the still camera. Field assistants were placed at concealed locations to record data on child pedestrian skills using the conventional kerb drill by Zeedyk et al (2000):

1. Looked left and/or right before reaching kerb
 - First look
 - Second look

- Third look
2. Stopped at kerb
 3. Looked left and/or right while stopped at kerb
- First look
- Second look
- Third look
- Stopped at kerb
4. Looked at moving car
 5. Waited for car to move off before crossing
 6. Looked right and/or left while crossing
- First look
- Second look
- Third look
7. Style of crossing
- Walking
- Running

It was found that the kerb drill was most suitably appropriate for the study and any other study of this kind. It was consequently adopted by this study and called the Zeedyk Model.

3.6.2 Post-test Survey

After art therapy sessions, respondents were tested again using the same Zeedyke Model. The essence of the post-test survey was to measure the extent of behavioural change in respondents' road crossing skills.

3.7 Research Approach

3.7.1 Ethics

The major population of the study is children. The juvenile pliability of children is protected by legal and social structures supporting their dependence on parents and guardians. Wimmer and Dominick (1987:432) show the need to respect and protect the rights of persons used in research. In all study areas, permission was sought from school authorities for the involvement of children in the study. In Ireland, taking photographs of individual children is not permitted by law. Also, taking photographs of children in public is not permitted. For the purpose of the study, permission from the Dublin County Council would have been required.

3.7.2 Art Therapy Sessions

Art therapy was used as the major medium of training for the children. The researcher formed a story on a case of road traffic crashes in which a child had been crashed by a vehicle and died. Since respondents were used to their teacher, the teacher was made to tell the story to the class. The respondents subsequently made drawings out of the stories. Each respondent stood in front of the class and told a story from his drawing. The class interacted with the storyteller. The essence of the art therapy sessions was to:

- (a) Let the children create their own virtual traffic environment
- (b) Study children's perceptions about road safety
- (c) Study children's emotional reactions to death and danger on the road

Forming a scheme from their expressions and, using the fear-appeal method and Pavlov's conditioning theory, children's perception on road safety from their own drawings were reinforced. The researcher played the clinician and used the Piagetian and Vygotskian interactive approach to enhance respondents' perceptual development of traffic environment. These were evident in the application of the Zone of Proximal Development (q.v. 4.4.1.1.1) and the monitoring of respondents' private speech during the therapy sessions (Plates 4.59 - 4.62).

3.7.3 St. Peter's School

In St. Peter's School, respondents were studied in two groups, the Control Group, and the Test Group. Among the three selected schools, St. Peter's School had a unique feature which the study took advantage of. This group categorisation approach was influenced by the unique feature of existing group structures in the School. These group structures were Clubs such as Road Safety Club, Cultural Society, Bible Society, and Red Cross Society. The study adopted the Road Safety Club as the Control Group. The demographic characteristics of the Control Group were diversely wide as compared to the Test Group. Age range in the Control Group, for instance, was from five to 13. This means that maturity level of the Control Group was relatively higher. The Control Group also had the advantage of a frequent study of road safety activities.

The Test Group, by contrast, was the constitution of one class, primary four whose age demographics satisfied the age range (five to ten years) for the research. Primary four pupils, who were members of the Road Safety Club forming the Control Group, were excluded from the Test Group. This was to prevent the expected

advanced knowledge of road safety activities of respondents in the Control Group from influencing the Test Group.

3.7.4 Adjikpo Dokuyo School, Ghana; and Scoil Aonghusa School, Ireland

In these schools, the same group of respondents selected from one class constituting the required age group, five to ten, was used for the study. Adjikpo Dokuyo School had not been a beneficiary of the Regional Road Safety Commission educational campaign since its inception. Knowledge of road safety was of the same level among pupils in the school.

In the Scoil Aonghusa School, road traffic education was an active part of the school curriculum. Besides, physical measures had been put in place to protect child pedestrians. Pupils in Scoil Aonghusa School were expected to have good knowledge of road safety.

3.7.5 The Test Group and Control Group

The purpose of the Test Group / Control Group comparative study was to test the relative child pedestrian skills of respondents in both groups, using the Control Group as a yardstick of measurement because of the extra-knowledge advantage of the Control Group.

3.8 Sampling and Sampling Frame

Purposive Sampling was used to select two schools in Ghana and one school in the Republic of Ireland. These are St. Peters Primary School, Kumasi District, Kumasi, Ashanti Region, Ghana; Adjikpo Dokuyo L/A Primary School, Yilo Krobo District, Somanya, Eastern Region, Ghana; and Scoil Aonghusa Junior School, South Dublin County Council, Tallaght, Republic of Ireland.

The schools (in Ghana) were purposively selected to meet the needs of the study for which a random-based sampling method has a deficient potential of achieving. The location of St Peters school was representative of a busy urban setting area with high traffic density. The location of Adjikpo Dokuyo School, on the other hand, represented a less busy rural setting with a relatively low traffic activity. Both locations, the busy urban and less busy rural settings, were chosen to compare children's perceptual adaptability to the varied traffic environment in which they live. The highest child pedestrian fatality areas in Ghana are the Ashanti, Eastern and Central Regions. Ashanti and Eastern Regions were selected on grounds of proximity to save cost.

Europe, compared to Ghana, bore a less record of child pedestrian crashes. The study selected one European country, the Republic of Ireland, to conduct a study and compare with the study in Ghana. The Republic of Ireland was selected due to the researcher's family-resident advantage there. Besides the place formed a good specimen of the traffic environment in Europe generally.

CHAPTER FOUR

CHILD ROAD TRAFFIC EDUCATION

4.1 Child Traffic Education in Ghana

Child road traffic education was institutionalised in Ghana in 2002 when road safety was introduced as a subject of study in the school education curriculum as part of the 2001 - 2005 Road Safety Strategy (Nsiah-Achampong, 2004:254). The programme commenced as educational campaigns organised by the National Road Safety Commission (NRSC) to educate children in schools. The NRSC delegated authority to its regional bodies, the Regional Road Safety Commission (RRSC) to carry out the educational campaigns in their respective jurisdictional areas.

The RRSC travelled from school to school to teach school children. The educational campaign was structured into two, the indoors audio-visual displays and the outdoors demonstration exercise. Each lesson lasted for a period of between two-and-a-half hours and three hours. The size of each class was the total number of pupils from Primary One (P1) to Junior High School Three (JHS 3). The class size varied from school to school but an estimated 500 pupils could be close to accuracy. All pupils in the school were put together to form one entire class for the lessons. The least age in Primary One (P1) was five years old and the modal age in the Junior High School Three (JHS 3) was 13 years old. This means that the class was made up of children between five and 13 years old. The audio-visual session was made up of film-shows on the subject of road traffic crashes usually shown on national television and other private television stations in Ghana. The demonstration exercise involved dramatising the tasks involved in road crossing. In the audio-visual session,

classroom arrangement was the traditional type where pupils sat in rows and faced the direction of instruction (Appendix 4(a); Plate 4.1). In the demonstration session, classroom arrangement was the horseshoe formation type where pupils formed the horseshoe and the demonstration team performed in the middle (Plate 4.3). Unlike the formation in Appendix 4 (d) where the teacher's position is at the open end of the horseshoe, in the RRSC education campaign, the teacher (together with the passive team, was positioned at the closed end of the horseshoe. A lecture was given concurrently with the demonstration exercise. Questions were asked after the lesson and children who provided correct answers were awarded toffees and biscuits, as incentives.



Plate 4.1: Photographic complement of Appendix4. Traditional classroom arrangement (backview and frontview) of audio-visual lessons

In 2002, the government of Ghana introduced road traffic education into the curriculum of basic schools as a subject of study. Seven years after its introduction, the government decided to make it (road traffic education) a compulsory subject of study in basic schools (Ghanaian Times, 2009:15). The study looks at the state of child road traffic education in basic schools. Having studied what a curriculum is (q.v. 2.11), it is used as a scheme to study the child road traffic education in Ghana, and contrasted with the case in the Republic of Ireland.

4.1.1 Curriculum Implementers

Personnel involved in the teaching exercise were the demonstration team, teachers from the school, parents and personnel from the National and Regional Road Safety Commission. Altogether, these were of two different categories, the active and passive teams. The active team comprised the demonstration team and the RRSC personnel. This category was the active one that carried out the teaching process, while the passive category was made up of teachers from the school and parents whose children were in the school. The passive group looked on in a bid to learn from the active group. The teachers were expected to continue the teaching process in the schools while parents were to influence their children's behaviour on road crossing. The demonstration team comprised volunteers from other organisations. They were not paid by the government. At the helm of teaching was a retired educationist. Occasionally, personnel from the NRSC, the parent body, also taught traffic education in schools (Plate 4.2).

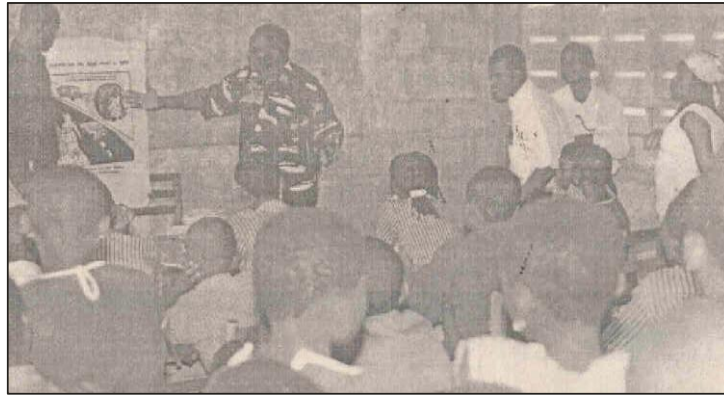


Plate 4.2: Teaching activity by the NRSC in a school in Accra
(Source: Ghanaian Times, 2007)

4.1.2 Curriculum Content

The subjects studied under child road traffic education in the schools included Crossing of Roads, Road Signs, and Identification of Pedestrian Crossings (Armah 2001:1). A study Nsiah-Achampong (2004:255-6) replicated by this study indicated that Road Crossing was studied in the primary school; The Police and the Country, Road Accidents, and Road Signs were all studied as integrated subjects in the Social Studies course in the Junior High Schools. The Senior High School studied Environmental Pollution caused by vehicular Transport, and Traffic Signs (Table 4.1)

Table 4.1: Traffic Education in the School Education System

	<i>Primary</i>	<i>JSS</i>	<i>SSS</i>
<i>Topics</i>	<ul style="list-style-type: none"> ● Road crossing 	<ul style="list-style-type: none"> ● The police and the country ● road accidents ● road signs 	<ul style="list-style-type: none"> ● Environmental pollution caused by vehicular transport ● traffic lights
<i>Teaching Methods</i>	<ul style="list-style-type: none"> ● Demonstration ● poetry ● reading 	<ul style="list-style-type: none"> ● Lecture method ● role play 	<ul style="list-style-type: none"> ● Discussion method ● demonstration
<i>Teaching Materials</i>	<ul style="list-style-type: none"> ● Sketches ● pictures ● real objects ● real situations 	<ul style="list-style-type: none"> ● Charts 	<ul style="list-style-type: none"> ● Card boards ● pencils
<i>No of Teachers Trained in Traffic Education</i>	—	<ul style="list-style-type: none"> ● One teacher (trained by the Regional Road Safety Commission in year 2003) 	—
<i>Extra Curricular Activities</i>	<ul style="list-style-type: none"> ● Street crossing drama ● counting of cars ● poetry ● drawing ● identifying police 	<ul style="list-style-type: none"> ● Street crossing drama 	<ul style="list-style-type: none"> ● Street crossing
<i>Difficulties in Teaching</i>	<ul style="list-style-type: none"> ● No zebra crossing and traffic lights in Tapa for demonstration ● no teaching aids from GES. ● Apart from looking left and right when crossing the road, I (teacher) do not have any idea on road safety 	<ul style="list-style-type: none"> ● I didnt know about proper road crossing ethics, so invited policeman to teach the topic ● there are no information in textbooks; I use my own ideas 	<ul style="list-style-type: none"> ● There are no reading materials on traffic for teaching

(Source: Nsiah-Achampong, 2004)

4.1.3 Teaching Methodology

The teaching was by demonstration. A demonstration team dramatised the processes involved in road crossing (Plate 4.3). Some of the pupils were made to participate in the demonstration exercise by acting as pedestrians (Plate 4.4). While teaching (demonstration) was going on, another team bearing teaching aids moved along the horseshoe formation to display pictures (visuals) to the learners (Plate 4.5).



Plate 4.3: Demonstration method by personnel from the RRSC. St. Peter's School



Plate 4.4: Participation of school children in the demonstration exercise. St. Peter's School



Plate 4.5: Administration of visual instructional media. St. Peter's School

KNUST

4.1.4 Instructional Media

In the teaching and learning process, instructional media have been found to be an indispensable, reliable and flexible mode of facilitating the passage and absorption of information by the teacher and learner respectively. The schools were found to be using audio-visuals (video), visuals (posters, simulated Zebra Crossing) and prints (books). Instructional media used included posters (paper and fabric posters), books and a fabric model of Pedestrian (Zebra) Crossing. The Pedestrian Crossing teaching aid was used to simulate reality in the traffic environment. The posters were paraded around in the course of teaching. After the teaching exercise in the school, the teaching aids were donated to the school for the teachers to continue the teaching process (Ghanaian Times 2007:14).

4.1.5 Books

Two textbooks were found to be used by pupils and teachers. These were:

- (a) *Traffic Safety Lesson for schools, compiled by National Road Safety Commission, safe ways. A Road Safety Education Resource for Teachers of P5 by Gill Murray*
- (b) *Traffic Safety Lesson for schools*, was used by pupils. A Road Safety Education Resource for Teachers of P5, was teachers' resource book.
- (c) *Safe Ways*. A road safety education resource for teachers of P5s. By Gill Murray.

4.2 Child Traffic Education in Ireland

In the Republic of Ireland, child road traffic education was an original part of the school curriculum. Various topics on road safety were integrated into the subjects studied. Consequently, there was no need for the National Safety Council (NSC) of Ireland to embark on educational campaigns and teach road safety in basic schools as happened in Ghana. Occasionally, a trained person from An Garda Síochána gave a talk to the students on the 'Green Cross Code'. Europeans agree to the view that, irrespective of their level of traffic education, children must still receive some form of protection, supervision or restriction in the traffic environment. In extreme cases, children are even directly physically restrained from a probable 'spill' into the streets (Plate 2.1). Zeedyk et al (2002:49) presents the idea of child protection on the street as the view of some members of the road safety community who feel strongly that children should not be allowed to cross the road on their own. This is evident in the

provision of Lollipop Women on streets around schools (Plate 4.6). To complement this and to supplement the ‘Green Cross Code’, school children are taught to obey instructions from the Lollipop Woman.



Plate 4.6: Lollipop Woman directing school children to cross the street. Ireland.
(Source: Comhairle Contae Átha Cliath Theas, 2008)

4.2.1 Instructional Media

Scoil Aonghusa, comparatively made extensive use of instructional media to facilitate teaching and learning. A step further in the school’s effort was the use of electronic instructional media (internet) in the teaching process. Some publications used by the teachers and pupils were as follows:

- (a) *Be Safe*. Published by the National Safety Council, Republic of Ireland
- (b) *Resource Materials for Relationships and Sexuality Education*. Published by the Department of Education Science, Republic of Ireland.
- (c) *First Steps*. Published by the Western Health Board

(d) *Walk Tall*. Published by the Department of Education and Science, Republic of Ireland.

(e) *Scoilnet*. A portal for Irish Education (lárshuíomh oideachais na hÉireann)

Resource Materials for Relationships and Sexuality Education was used by the Junior and Senior Infant grades. Pages 124-127 contained information on road safety. First Steps was teachers' resource book and *Walk Tall*, was used by the Senior Infant grade. Scoilnet was an internet programme which could only be accessed on the schools' broadband network.

4.2.2 Curriculum Implementers

Curriculum implementers in Scoil Aonghusa were the same teachers in the school who taught the children road traffic education

4.3 Assessment of Child Traffic Education in Ghana

The introduction of road traffic education into the school curriculum was an effort which, at least, heightened children's knowledge and concerns on road safety. The existence of Road Safety Clubs in basic schools, teaching activities, parents' supervision of their children were all activities which implied, at least, a marginal improvement of child road safety education even without measurement. Boateng (2008:47) indicates that the collective efforts of the National Road Safety Commission (NRSC), Department of Urban Roads (DUR), Ghana Highway

Authority (GHA), Council for Scientific and Industrial Research (CSIR), had yielded some results in the reduction of fatalities, stating inter alia, that there had been a reduction in the number of fatalities by 1.6% with the number of reported cases of injuries also reducing by 12% and the vehicles involved in accidents also reducing by 5.2%.

However, the process was found to contain some weaknesses which threatened its efficiency and efficacy. These were class size, whole-group instruction, duration of teaching, ad-hoc teaching and learning programmes and imbalances in the campaign delivery.

4.3.1 Class Size

Though class size does not matter much in terms of student achievement (Ornstein and Lasley, 1995: 303, 304), the case of a crowd forming a class could hardly be conformable to this assertion. In the RRSC educational campaigns, children were gathered in a large crowd in the school compound to be taught. The characteristics of crowd behaviour manifested in the school children and thereby affected their comprehension. In one instance, in St. Peter's school during a teaching session some school children left the class scene and dangerously run after a heavy goods vehicle which drove in to deliver chairs in the school compound to supplement seating capacity (Plate 4.7). This was an instant empirical test of the efficacy of the teaching process; the school children, in the process of being taught what not to do, exhibited a contrary behaviour. In St. Peters school, respondents' rate of information retention was evaluated three times between 10 and 60 minutes after the teaching session in an

interval of 20 and 30 minutes, using a sample size of 10 respondents from two different age groups selected at random (Table 4.2). The results showed that respondents' retention rate waned with time. Comparatively, the retention rate of age-group six and seven, dropped faster. The heterogeneity of a large class runs the probable risk of grouping students with different developmental levels where beginners who require minimal amount of information could be overloaded (Wuest and Lombardo, 1994:171).



Plate 4.7: School children, spontaneously run after HGV in the school compound



Plate 4.8: Small Group instruction type.
(Source: Ornstein and Lasley, 1995)

Table 4.2: Evaluation of children's information retention rate after a traffic education session

	Age of Respondents	No of Respondents	Evaluation		
			10 mins	30 mins	60 mins
Respondents	6 - 7	10	5	3	1
Respondents	8 - 9	10	8	5	3

4.3.2 Whole-group Instruction

Closely related to class size, is whole-group instruction. Teaching a large group of children with varied demographics and characteristics has been found to be a disadvantage. Ornstein and Lasely (1995:303,304), cite critics' position on the case:

The critics of whole-group instruction contend that it fails to meet the needs and interests of individual students, teachers who use the method tend to look upon students as a homogenous group with common abilities, interest, styles of learning and motivation. Instruction is general to a hypothetical average student a concept that fits only a few students in the class and all students are expected to learn and perform within narrow limits. Students are evaluated, instructional methods and materials are selected and learning is paced on the basis of the group average.

The concerns raised by critics were realised in the whole-group class administration by the RRSC. Hyperactive or extroverted children are usually incensed into action by the energy of a crowd. Observably, in the RRSC educational campaigns, extroverted children monopolized the scene by forcefully surging forward to answer questions

even when they were not nominated by the teacher, having put up their hands. Conversely, passive or introverted children were swallowed by the force of the crowd. As the crowd surged forward and backward, it was those who were forceful enough to catch the attention of the teacher who were called to answer questions. This affronts learning.

By contrast, Scoil Aonghusa, practised the Small-Group instruction type of teaching (Plates 4.23, 4.8). Ornstein and Lasely (1995:311, 312) state the importance of Small-Group instruction:

Dividing students into small groups seem to provide an opportunity for students to become more actively engaged in learning and for teachers to monitor students' progress better...Small groupings can enhance student cooperation and social skill. Small group instruction can provide interesting challenges, permit students' progress at their own pace, provide a psychologically safe situation to master the material and encourage students to contribute to class activities ... Teachers who engage in small-group instruction seem to attend to five strategies of teaching: (1) Compensation, favouring the shy, quiet, or low-achieving student; (2) Strategic leniency, ignoring some inappropriate behaviours of students; (3) Proper sharing, enlisting some students to aid in sharing homework or tutoring responsibility; (4) Progressive Sharing, suppressing emotions, limiting students' emotions or feelings because teachers feel they are inappropriate or might lead to management problems.

4.3.3 Duration of Teaching

The NRSC educational campaigns lasted about three hours in each session. This was too much for the modal age of 13 years old and worse for the least age of five years old. In Europe, the teaching period for children was strictly adhered to. In a study involving six to seven-year-olds, Schagen and Rothengatter (1997:286), used 30

minutes for classroom instruction and approximately 10 minutes for video show. In another study, Fyhri et al (2004:200) also assigned 30 minutes to teach children in the age group of four - six years. It is estimated that children get exhausted and saturated after a long time of study and absorption ceases to take place.

4.3.4 Methodology

In road traffic education, authorities are sometimes alarmed at the intensity of education that turns out to be inversely proportional to the expected rate of reduction or rise in road traffic crashes (Nsiah-Achampong, 2004:3). Will (2005:947) wondered “*why what we are doing is not working*” about child road traffic education for children. Will’s teaser is worth thinking about. It implies that there is something not right with the conventional road traffic education being carried out. Will (2005:947) goes on to say that “*simply educating the public does not translate into increased knowledge or behaviour change*”. Teaching children road safety skills has been a conventional attitude aimed at educating children to cope with traffic situation. But as to whether learning takes place when teaching is done is a matter of concern. Zeedyk (2002:49) cites a child-experienced researcher Johansson who, working with schools in Sweden reported a controversy that “*... the likelihood of a child being involved in an accident increases with training, an outcome that obviously violates educational expectations*”. This appears to be a converse of the norm. It is only when one critically examines the teaching methods, designs and models of child educational programmes with its expected corresponding consequent behavioural change in children that one may find substance in that statement. Zeedyk et al (2002:49,50) deepen the controversy and suggests an alternative:

The assumptions that guide the development of educational programmes and research designs are not necessarily logical or accurate but instead reflect cultural values and expectations. It is arguable that objectives of road safety training programmes should more often emerge from research rather than guiding them. Observational studies are valuable in this regard, for it is to identify what children really do on the road that will help us adults to decide what and how we should be teaching them.

4.3.5 Administration of Instructional Media

4.3.5.1 The Pedestrian Crossing

The availability or mere use of instructional media does not necessarily facilitate teaching and learning. To foster teaching and learning efficiently, instructional media must be effectively administered. Instructional media are known to destabilise the teaching and learning process if not well administered. One instructional medium, the Zebra Crossing that was used by the RRSC in educational campaigns was not properly administered. The instructional medium was administered such that, pedestrians walking along the road did not face on-coming vehicles. The idea of letting the adult pedestrian (bigger yellow arrow) be sandwiched between the child pedestrian and the vehicle is not properly communicated (Plate 4.9). The action is illustrated in Figure 4.2 (a). Comparatively, Figure 4.2 (b) presents the appropriate directional flow of both vehicles and pedestrians as pertains in reality. The lines marked (w) in Figure 4.2 (a) are not as appears on the ground as presented in Figure 4.2 (b). In Plate 4.4, the direction of flow is same for vehicles and pedestrians (Figure 4.3 (a) in the teaching and learning process, which should have been as shown in

Figure 4.3 (b). Discrepancy in the administration of instructional media in the RRSC educational campaigns was significantly sharp enough to affect learning.



Plate 4.9: Simulated vehicular - pedestrian use of the street

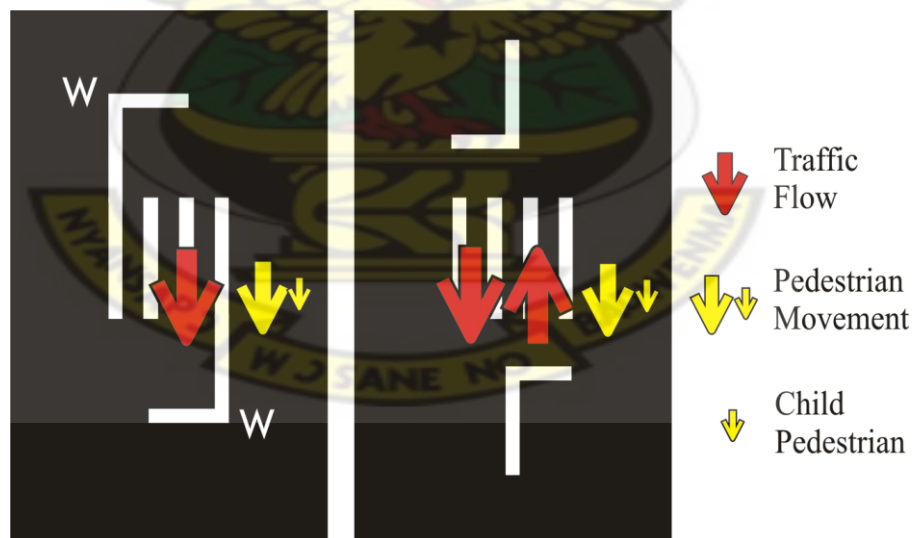


Figure 4.2 (a): Left, graphic complement of Plate 4.9. The Pedestrian Crossing instructional media indicating pedestrian and traffic flow

Figure 4.2 (b): Right, the Pedestrian Crossing as occurs on the ground, indicating agreeable discordance of flow of pedestrians and vehicles

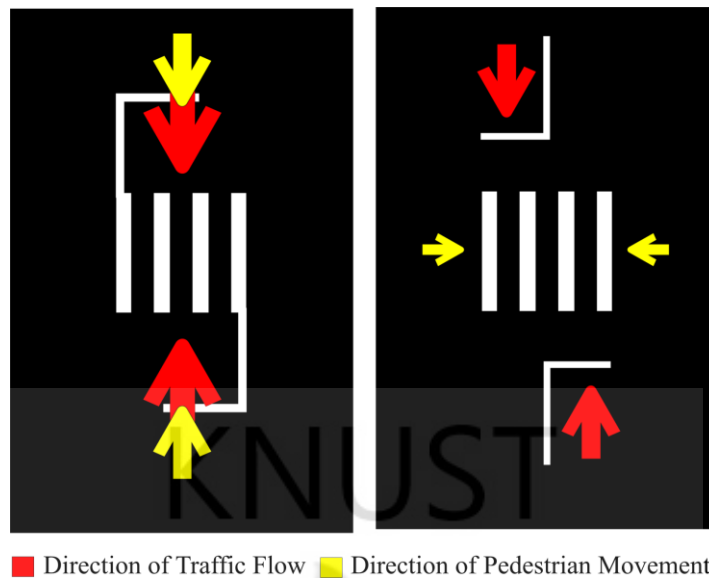


Figure 4.3 (a): Left, graphic complement of Plate 4.4. The Pedestrian Crossing instructional media indicating pedestrian and traffic flow

Figure 4.3 (b): Right, the Pedestrian Crossing as occurs on the ground, indicating agreeable discordance of flow of pedestrians and vehicles

4.3.5.2 Posters

The use of posters concurrently with on-going teaching defied the tenets and logic of communication. It was observed that children could hardly concentrate on both the posters and teaching at the same time. Children in the region of the poster display had their attention disrupted. This was mainly because the teaching was independent of the instructional media. Hence educands could hardly link teaching to instructional media.

4.3.6 Urban-Concentrated Educational Campaigns

The educational campaigns carried out by the RRSC was urban-bias. Educational activities were concentrated more on schools in the urban and peri-urban areas, and less in the rural areas. Generally, traffic scenery and conditions are more enhanced in the urban areas than in rural areas. Consequently, children in urban areas are more traffic-enlightened and respond better to traffic tasks than children in rural areas. A study by Fyhri et al (2004:204) in Europe showed that children in urban schools performed better in traffic tasks than their counterparts in rural areas. In all therapy sessions carried out by this study, it was deduced from their drawings that children in rural set-ups (Adjikpo Dokuyo School), had a low cognitive perceptual depth of the traffic environment.

This means that priority is misplaced. Rural areas which should rather receive more traffic education is inadequately catered for. In Adjikpo Dokuyo School, activities of the RRSC had not reached the school since its commencement in 2002. Also, the school did not have the textbooks distributed by the NRSC. None of the teachers had received training on road safety. A study by Nsiah-Achampong (2004:253) showed that even in the peak period of traffic training for teachers, only one teacher from an urban area had been trained in 2003 (Table 4.1). Seven years after its inception (2002 - 2009), the situation had not changed.

4.3.7 Ad-hoc Educational Programmes

The character of education inherent in the 2001 - 2005 Road Safety Strategy was in programmes instead of established systems. The programmes were disjointed, short-

lived and ad-hoc in nature. The plan to use the educational campaigns to set the foundation for teachers to continue the process did not work. Teachers did not continue with the teaching of road safety in the schools. This was because road safety was not entrenched in the school curriculum, as was the case for other subjects. It was therefore, not mandatory for teachers to teach the subject.

4.3.8 Clinical Studies

The study carried out an experiment to investigate, whether children who received traffic education by art therapy, performed better in real traffic situations than children who did not receive such training. The ultimate purpose of the training was to instil a permanent traffic culture in the children. The same experiment was carried out in St. Peter's School, Kumasi, Ghana; Adjikpo Dokuyo, Adjikpo, Ghana.

The experiment was made up of the application of art therapy to the traffic training of children to determine the associated child traffic behavioural patterns in a before and after study. The study was conducted in the vicinity of each school where children going to, and coming from school were studied for their crossing behaviour. In Ghana, it was noted that *“walking was the preferred modal choice by the majority of pupils in the public schools (71%) while private car and taxi (60%) were the modal choice of pupils in the private schools (71%) travelled to school more frequently by walking than those in the private schools (26%)”* (Afukaar and Agyeman 2006:5). In all cases of observation in this study, it was noted that school children in St. Peters school and Adjikpo Dokuyo walked to school. In Scoil Aonghusa, an estimated 60% of school children were brought to school by motorized transport and the remaining 40% by guardian-escort on foot.

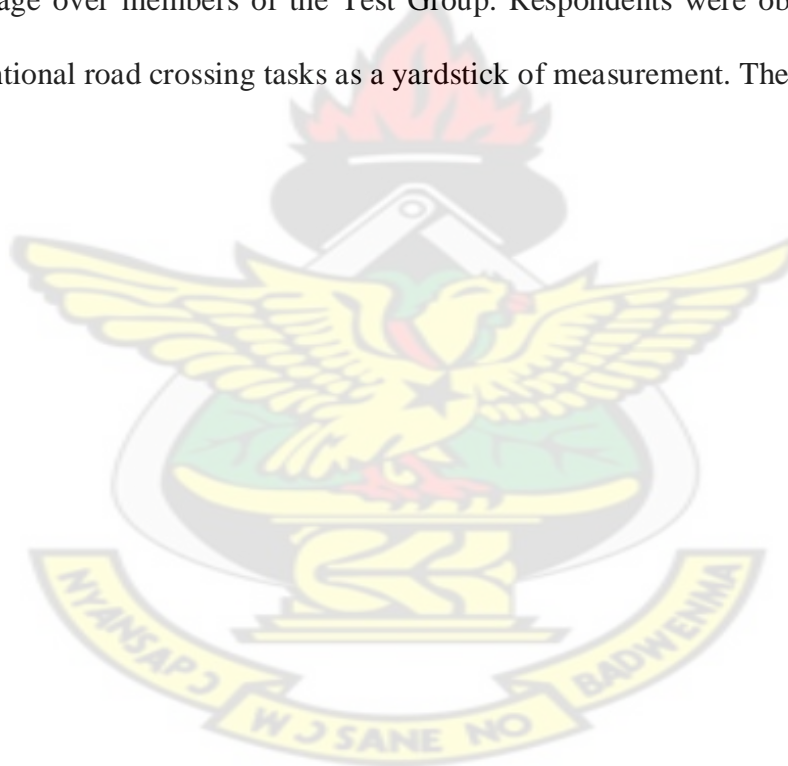
In the road crossing observation, the conventional road crossing skills of respondents were assessed using the Zeedyk kerb drill model (q.v. 3.4.1). In the St. Peters and Adjikpo Dokuyo schools, six and two Field Assistants were respectively positioned outside the sight of respondents to record behavioural patterns of respondents. Because respondents were not aware of the operations of the Field Assistants, their behaviour allowed for a realistic traffic setting needed for the study. During crossing, Field Assistants recorded whether or not children (1) looked for traffic on the main road before reaching the kerb; (2) stopped at the kerb; (3) looked for traffic while stopped at kerb; (4) looked at the moving car to their left; (5) waited for the car to move off before crossing; (6) continued to look for traffic while crossing; and (7) the style in which respondents crossed (i.e. walking or running). Each correct behaviour attracted one mark. In Scoil Aonghusa, there was only one Field Assistant who only observed but did not record behaviour.

4.3.8.1 St. Peter's School

The area around the school chosen for the study was a typical example of a busy traffic environment. Vehicular traffic flow on the street in the morning study period, 0700 hours to 0830 hours was averagely 13 vehicles per minute. Other facilities and amenities in the area that influenced traffic density in the area included a lorry station, market and a church - the St. Peter's Cathedral Basilica, Diocese of Kumasi (Figure 4.4). Of significance on the road was the location of a porridge seller (Figure 4.4; Plate 4.10) where some respondents stopped to buy breakfast. Mostly, respondents who stopped to buy porridge had their movements influenced. Distracted by the activity, they failed to conform to the kerb drill and moved into the street. The

street contained a kerb, pedestrian crossing and a junction. The pedestrian crossing was not very visible. Appearing partially faint, its faintness was consequent of an overflow of a muddy puss spilling over the pedestrian crossing (Plate 4.11). Crossing the Pedestrian Crossing was therefore not considered behavioural assessment of respondents.

Respondents were of two groups, the Control Group and Test Group. The Control Group was made up of respondents from the Road Safety Club in the school, who by virtue of the club's activities initially had a superior traffic knowledge advantage over members of the Test Group. Respondents were observed using the conventional road crossing tasks as a yardstick of measurement. The two groups



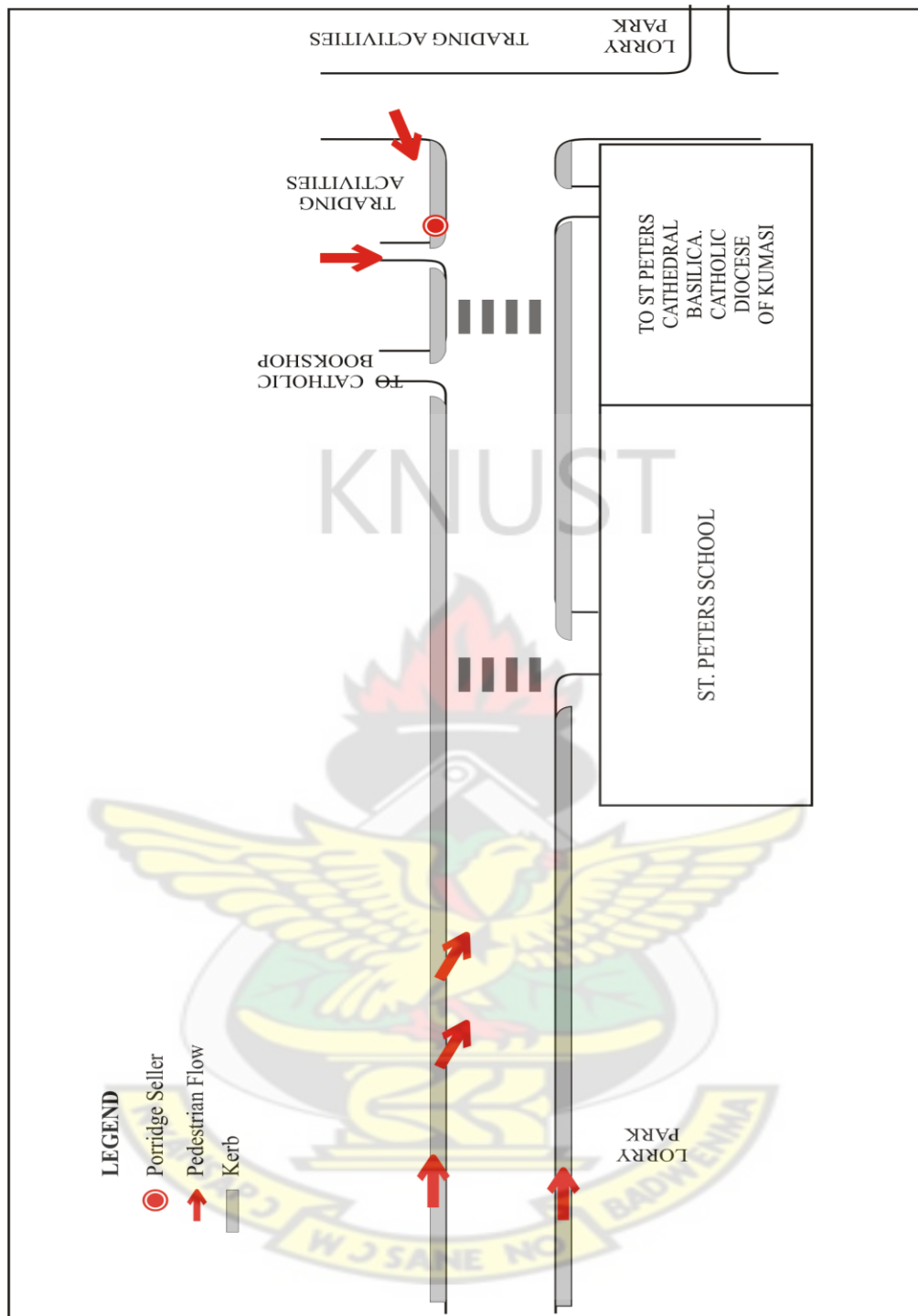


Figure 4.4: Schematic depiction of the road layout of the study area of St. Peter's School, Kumasi, Ghana. Layout: Author's Construct. Not to scale



Plate 4.10: Porridge seller located in the study area, St. Peter's School, where respondents stopped over to buy porridge before crossing the road



Plate 4.11: Visibility of Pedestrian Crossing disturbed by muddy puss from a nearby pothole



Plate 4.12 (a): Serial road crossing movement of respondent (post-survey)



Plate 4.12 (b): Serial road crossing movement of respondent (post-survey)



Plate 4.13: Respondents stop at the kerb to observe the ‘look left and right’ drill (post-survey)

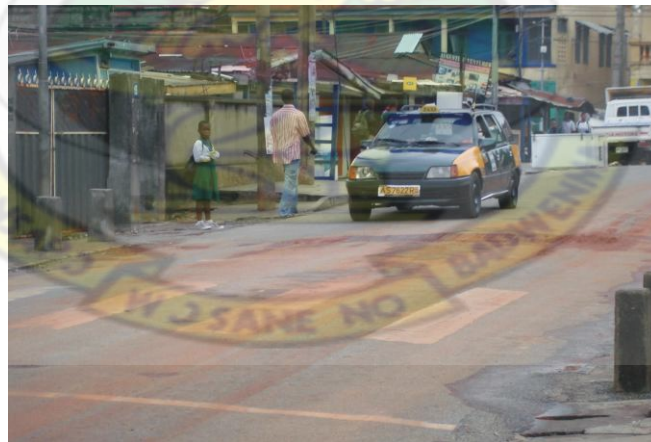


Plate 4.14 (a): Serial observation: respondent waiting at the kerb to cross the road (pre-survey)



Plate 4.14 (b): Serial observation. Respondent runs to cross street after looking left and right (pre-survey)



Plate 4.15: Noticing Field Assistants, respondents' spontaneous behaviour is influenced

Table 4.3: First assessment of road crossing behaviour of respondents, St. Peter's School, Ghana

Coded Behaviours (tasks)	Before						After					
	Control Group			Test Group			Control Group			Test Group		
	No of chldn exhibg bhvr	DOG (for items pertaining to looking)	Convsn to % of sample (N=40)	No of chldn exhibg bhvr	DOG (for items pertaining to looking)	Convsn to % of sample (N=40)	No of chldn exhibg bhvr	DOG (for items pertaining to looking)	Convsn to % of sample (N=40)	No of chldn exhibg bhvr	DOG (for items pertaining to looking)	Convsn to % of sample (N=40)
	R	L		R	L		R	L		R	L	
1 Looked left and/or right before reaching kerb	6		15%	4		10%	7		17.5%	11		27.5%
First look	2	4		0	4			6	1		6	5
Second look	0	2		1	1			1	1		3	0
Third look	0	0		0	1			0	1		0	0
2 Stopped at kerb	27		67.5%	20		50%	21		52.5%	30		75.5%
3 Looked left and/or right while stopped at kerb	7		17.5%	6		15%	7		17.5%	10		25%
First look	5	2		3	0			4	3		2	8
Second look	1	0		0	2			2	1		1	0
Third look	0	1		1	1			0	1		3	1
4 Looked at moving car	12		30%	13		32.5%	11		27.5%	15		37.5%
5 Waited for car to move off before crossing	8		20.5%	6		15%	8		20.5%	10		25%
6 Looked right and/or left while crossing	9		22.5%	7		17.5%	10		25%	16		40%
First look	4	5		2	5			3	7		9	7
Second look	0	2		3	1			0	2		0	2
Third look	1	0		0	0			2	0		1	0
7 Style of crossing												
Walking	30		75%	19		47.5%	29		72.5%	35		87.5%
Running	10		25%	21		52.5%	11		27.5%	5		12.5%
Mean			2.48			1.88			2.33			3.18

Table 4.4: Second assessment of road crossing behaviour of respondents, St. Peter's School, Ghana

Coded Behaviours (tasks)	Before						After					
	Control Group			Test Group			Control Group			Test Group		
	No of chldn exhibg bhvr	DOG (for items pertaining to looking)		No of chldn exhibg bhvr	DOG (for items pertaining to looking)		No of chldn exhibg bhvr	DOG (for items pertaining to looking)		No of chldn exhibg bhvr	DOG (for items pertaining to looking)	
		R	L		R	L		R	L		R	L
1 Looked left and/or right before reaching kerb	7			13			10			20		
First look		3	4		6	7		8	2		11	9
Second look		2	0		2	1		3	1		0	0
Third look		0	0		0	1		0	2		2	1
2 Stopped at kerb	28			32			27			34		
3 Looked left and/or right while stopped at kerb	6			12			9			25		
First look		4	2		6	6		2	7		12	13
Second look		1	0		3	1		0	1		5	0
Third look		0	1		0	2		0	0		2	1
4 Looked at moving car	11			18			9			28		
5 Waited for car to move off before crossing	10			15			12			30		
6 Looked right and/or left while crossing	8			19			10			27		
First look		4	4		8	11		6	4		17	10
Second look		0	1		0	0		1	1		12	15
Third look		3	0		1	1		4	0		8	19
7 Style of crossing												
Walking	25			37			21			52.5%	38	
Running	15			3			19			47.5%	2	
				2.38			2.65			2.45		
												5.05

Table 4.5: Third assessment of road crossing behaviour of respondents, St. Peter's School, Ghana

Coded Behaviours (tasks)	Before						After					
	Control Group			Test Group			Control Group			Test Group		
	No of chldn exhibg bhvr	DOG (for items perting to looking)	Convsn to % of sample (N=40)	No of chldn exhibg bhvr	DOG (for items perting to looking)	Convsn to % of sample (N=40)	No of chldn exhibg bhvr	DOG (for items perting to looking)	Convsn to % of sample (N=40)	No of chldn exhibg bhvr	DOG (for items perting to looking)	Convsn to % of sample (N=40)
1 Looked left and/or right before reaching kerb	11		27.5%	25		62.5%	15		37.5%	31		77.5%
First look	6	5		15	10		9	6		16	15	
Second look	3	1		6	9		0	8		10	3	
Third look	0	2		5	12		7	1		14	2	
2 Stopped at kerb	25		62.5%	30		75%	27		67.5%	32		80%
3 Looked left and/or right while stopped at kerb	10		25%	23		57.5%	15		37.5%	34		85%
First look	4	6		11	12		7	8		13	21	
Second look	3	2		4	10		0	2		3	11	
Third look	1	1		6	7		4	1		6	9	
4 Looked at moving car	15		37.5%	20		50%	10		25%	28		70%
5 Waited for car to move off before crossing	18		45%	28		70%	23		57.5%	35		87.5%
6 Looked right and/or left while crossing	7		17.5%	21		52.5%	14		35%	34		85%
First look	6	1		10	11		10	4		10	24	
Second look	0	0		8	7		0	3		6	5	
Third look	2	1		2	9		1	0		9	14	
7 Style of crossing												
Walking	28		70%	31		77.5%	30		75%	37		92.5%
Running	12		30%	9		22.5%	10		25%	3		7.5%
			2.85			4.45			3.35			5.78

Coded Behaviours (tasks)	Before						After					
	Control Group			Test Group			Control Group			Test Group		
	No of chldn exhibitg bhvr	DOG (for items pertaing to looking)	Convsn to % of sample (N=40)	No of chldn exhibitg bhvr	DOG (for items pertaing to looking)	Convsn to % of sample (N=40)	No of chldn exhibitg bhvr	DOG (for items pertaing to looking)	Convsn to % of sample (N=40)	No of chldn exhibitg bhvr	DOG (for items pertaing to looking)	Convsn to % of sample (N=40)
1 Looked left and/or right before reaching kerb	13		32.5%	30		75%	15		37.5%	35		87.5%
First look		7 6			14 16			13 2		15 20		
Second look		3 0			11 15			1 5		10 15		
Third look		0 2			8 10			0 2		23 12		
2 Stopped at kerb	26		65%	36		90%	30		75%	38		95%
3 Looked left and/or right while stopped at kerb	14		35%	31		77.5%	10		25%	36		90%
First look		7 7			10 21			7 3		20 16		
Second look		6 0			4 9			2 0		11 13		
Third look		2 1			11 6			1 1		8 10		
4 Looked at moving car	7		17.5%	32		80%	6		15%	34		85%
5 Waited for car to move off before crossing	10		25%	33		82.5%	10		25%	37		92.5%
6 Looked right and/or left while crossing	15		37.5%	35		87.5%	11		27.5%	38		95%
First look		4 11			15 20			2 9		15 23		
Second look		0 2			7 10			0 1		10 13		
Third look		1 1			11 9			3 2		7 9		
7 Style of crossing												
Walking	19		47.5%	37		92.5%	22		55%	39		97.5%
Running	21		52.5%	3		7.5%	18		45%	1		2.5%
			2.60			5.85			2.35			6.43

were observed concurrently before and after art therapy sessions. The observation periods were 0700 hours to 0830 hours for the morning period; and 1330 hours to 1430 hours for the afternoon period when school children were returning from school. The superior traffic knowledge advantage of the Control Group manifested in the first pre-survey observation where respondents in the Control Group performed relatively better than respondents in the Test Group (Table 4.3). In the first post-survey observation, the Test Group out-performed the Control Group and improved upon it cumulatively. Respondents in the Test Group were exclusively engaged in art therapy sessions and were observed to ascertain the significance of art therapy sessions on the traffic behaviour of children. In all subsequent observations (Table 4.4 to Table 4.6), respondents in the Test Group performed better than respondents in the Control Group. Performance of respondents in the Control Group fluctuated in both the pre-survey and post-survey studies, none of which, besides the first, proved better.

Assessed individually, however, there were few instances where performance of respondents in the Test Group in waiting for car to move off before crossing, dropped after a therapy session less than before the session (Table 4.4). The impact of the therapy sessions generally produced conscious conforming attitudes in the respondents (Plates 4.12, 4.13, 4.14), which contrasted sharply against the erratic and sporadic movement of respondents on the streets (Plate 4.14).

Three Field Assistants were positioned such that they would not be noticed by respondents so that their behaviour would not interfere with the spontaneity required of them. In instances where respondents seemed to have noticed the

presence of Field Assistants and respondent behaviour influenced, the behavioural assessment of such respondents was nullified.

Ninety-five per cent of the decisions made by Field Assistants were commonly convergent. Of the remaining 5% cases where there was disparity in coding, final decisions were made in consultation with the researcher.

4.3.8.2 Adjikpo Dokuyo School

The traffic environment selected for the traffic observation of respondents was about 200 meters away from the school, unlike St. Peter's school where the street for observation was close to the school, forming a boundary between the school and the opposite infrastructure. The location of Adjikpo Dokuyo School made it traffic-naked; there was no traffic activity in the immediate vicinity of the school. The road connecting the school and the street for the study, had been rendered unmotorable by erosion, hence there was seldom any vehicular activity in the perimeter of the school. The school environment was serene. The street used for the study had no Pedestrian Crossing, kerb or any other traffic feature which could influence traffic density. In the behavioural assessment, the shoulder of the road was considered as the kerb. The school was located on a low land with highlands overlooking the south-western part of the location. At the foot of the highland was a settlement where over 50% of the school children resided (Figure 4.5).

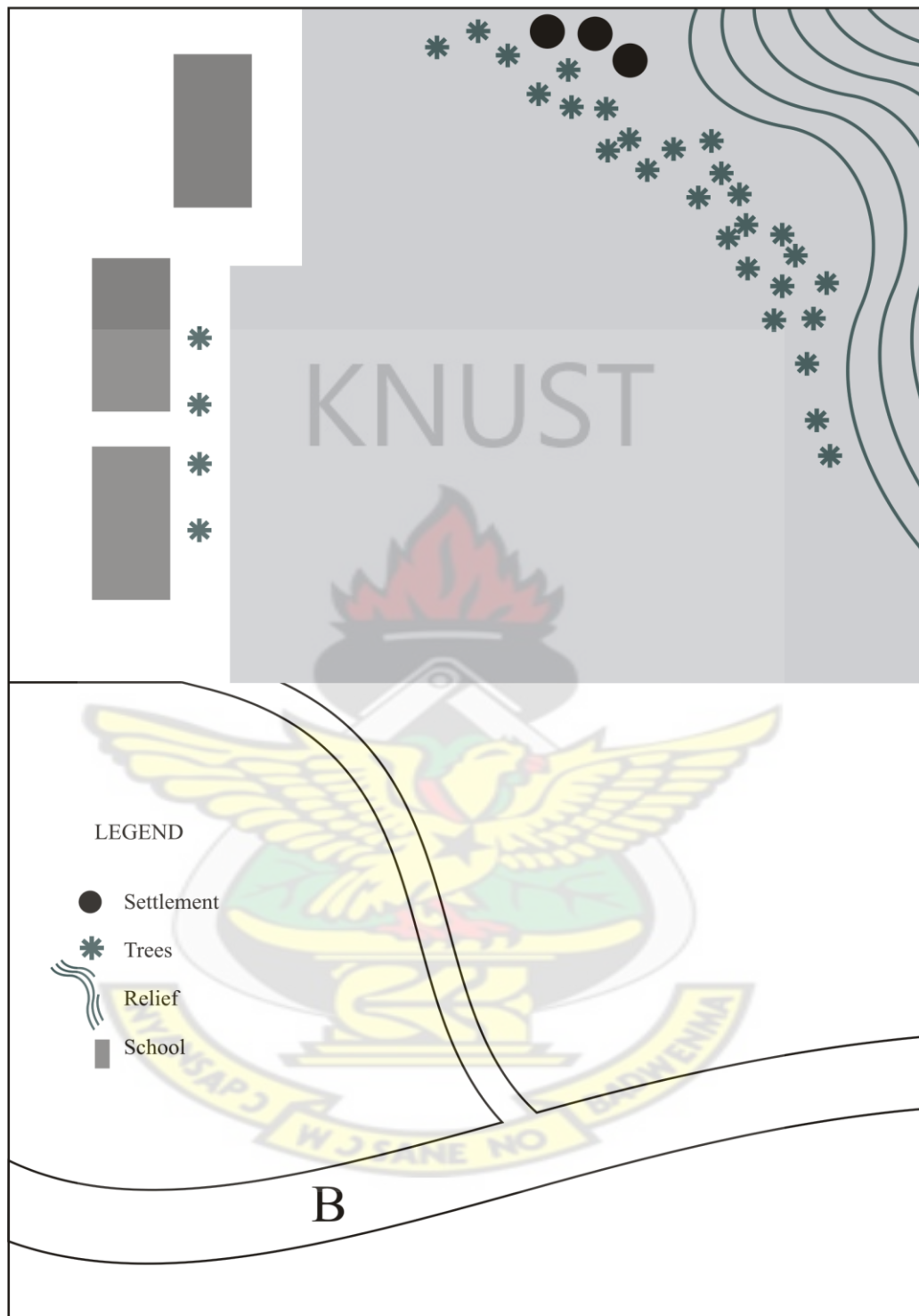


Figure 4.5: Schematic depiction of road layout of Adjikpo Dokuyo School area



Plate 4.16: Geographical setting of Adjikpo Dokuyo School



Plate 4.17 (a): Part of stretch of road used for the study. Absence of road markings and other traffic features were synonymous with the traffic environment of Adjikpo



Plate 4.17 (b): Part of stretch of road used for the study. Absence of road markings and other traffic features were synonymous with the traffic environment of Adjikpo



Plate 4.18: Traffic behaviour of respondents (pre-survey)



Plate 4.19: Traffic behaviour of respondents (post-survey)

The settlement, Adjikpo, was a typical rural one with little traffic activity. The settlement, together with the district capital, Somanya, had not much traffic features. There was, for instance, only one set of traffic lights in Somanya town which operated only on market days. In the therapy sessions carried out, only 10% of the drawings indicated a Pedestrian Crossing. Through interviews, it was noticed that the children who produced those drawings had frequent contact with at least, one urban city. This implied that, the traffic culture of respondents in rural Adjikpo was relatively low. This conforms to Zeedyk's et al (2002:204) study in Norway where children in Ila, an urban area, performed better than children in Jessheim, a rural area.

One class, made up of 11 pupils was selected for the traffic behavioural assessment and art therapy. Assessment took place on the street labelled B, between

the morning reporting time 0700 hours to 08300 hours, and the afternoon school closing period 1300 hours and 1430 hours. Traffic behaviour of respondents in Adikpo showed a relatively low performance (Tables 4.7 - 4.10) as compared to assessment of respondents in St. Peter's School, Kumasi (Plates 4.3 - 4.6). However, respondents improved exponentially. Unlike, St. Peter's School, the study in Adjikpo Dokuyo did not constitute two groups, Control Group and Test Group. The same group was studied for behavioural changes in a before and after survey. This is because the knowledge level of respondents on road safety was the same. The educational campaign and activities of the National Road Safety Commission had not reached the school.



Table 4.7: First assessment of road crossing behaviour of respondents, Adjikpo
Dokuyo School

Coded Behaviours (tasks)	Before			After		
	No of chldn exhbtg bhvr	DOG (for items pertng to looking)	Convsn to % of sample (N=11)	No of chldn exhbtg bhvr	DOG (for items pertng to looking)	Convsn to % of sample (N=11)
		R	L		R	L
1 Looked left and/or right before reaching kerb	0			2		18.2%
First look		0	0		1	1
Second look		0	0		0	1
Third look		0	0		1	2
2 Stopped at kerb	1			3		27.3%
3 Looked left and/or right while stopped at kerb	0			3		27.3%
First look		0	0		1	2
Second look		0	0		0	0
Third look		0	0		0	1
4 Looked at moving car	2			4		36.4%
5 Waited for car to move off before crossing	1			2		18.2%
6 Looked right and/or left while crossing	1			3		27.3%
First look		0	1		2	1
Second look		0	0		0	1
Third look		0	0		1	0
7 Style of crossing						
Walking	4			6		54.5%
Running	7			5		45.5%
Mean			0.082			2.10

Table 4.8: Second assessment of road crossing behaviour of respondents, Adjikpo
Dokuyo School

Coded Behaviours (tasks)	Before			After		
	No of chldn exhbtg bhvr	DOG (for items pertng to looking)	Convsn to % of sample (N=11)	No of chldn exhbtg bhvr	DOG (for items pertng to looking)	Convsn to % of sample (N=11)
	R	L		R	L	
1 Looked left and/or right before reaching kerb	2		18.2%	4		36.4%
First look	2	0		2	2	
Second look	0	0		2	1	
Third look	1	1		0	1	
2 Stopped at kerb	4		36.4%	6		54.5%
3 Looked left and/or right while stopped at kerb	3		27.3%	4		36.4%
First look	2	1		1	3	
Second look	0	0		0	1	
Third look	0	1		2	1	
4 Looked at moving car	5		45.4%	5		45.5%
5 Waited for car to move off before crossing	3		27.3%	4		36.4%
6 Looked right and/or left while crossing	4		36.4%	4		36.4%
First look	2	2		1	3	
Second look	0	0		1	0	
Third look	0	0		2	1	
7 Style of crossing						
Walking	7		63.6%	8		72.7%
Running	4		36.4%	3		27.3%
Mean			2.35			3.19

Table 4.9: Third assessment of road crossing behaviour of respondents, Adjikpo
Dokuyo School

Coded Behaviours (tasks)	Before			After		
	No of chldn exhbtg bhvr	DOG (for items pertng to looking)	Convsn to % of sample (N=11)	No of chldn exhbtg bhvr	DOG (for items pertng to looking)	Convsn to % of sample (N=11)
		R	L		R	L
1 Looked left and/or right before reaching kerb	5			6		
First look		4	1		2	4
Second look		2	1		1	3
Third look		1	0		0	0
2 Stopped at kerb	6			7		
3 Looked left and/or right while stopped at kerb	5			6		
First look		3	2		3	3
Second look		1	1		1	1
Third look		1	0		0	1
4 Looked at moving car	6			7		
5 Waited for car to move off before crossing	4			6		
6 Looked right and/or left while crossing	4			5		
First look		3	1		2	3
Second look		1	0		1	1
Third look		0	1		0	1
7 Style of crossing						
Walking	8			9		
Running	3			2		
Mean						

Table 4.10: Fourth assessment of road crossing behaviour of respondents, Adjikpo
Dokuyo School

Coded Behaviours (tasks)	Before			After		
	No of chldn exhbtg bhvr	DOG (for items pertng to looking)	Convsn to % of sample (N=11)	No of chldn exhbtg bhvr	DOG (for items pertng to looking)	Convsn to % of sample (N=11)
		R	L		R	L
1 Looked left and/or right before reaching kerb	6			7		
First look		4	2		5	2
Second look		0	0		1	2
Third look		1	0		3	1
2 Stopped at kerb	6			8		
3 Looked left and/or right while stopped at kerb	7			8		
First look		4	3		4	4
Second look		0	1		2	1
Third look		1	2		0	0
4 Looked at moving car	8			9		
5 Waited for car to move off before crossing	7			8		
6 Looked right and/or left while crossing	6			7		
First look		3	3		4	3
Second look		0	1		2	1
Third look		2	2		0	0
7 Style of crossing						
Walking	9			9		
Running	2			2		
Mean			4.19			5.09

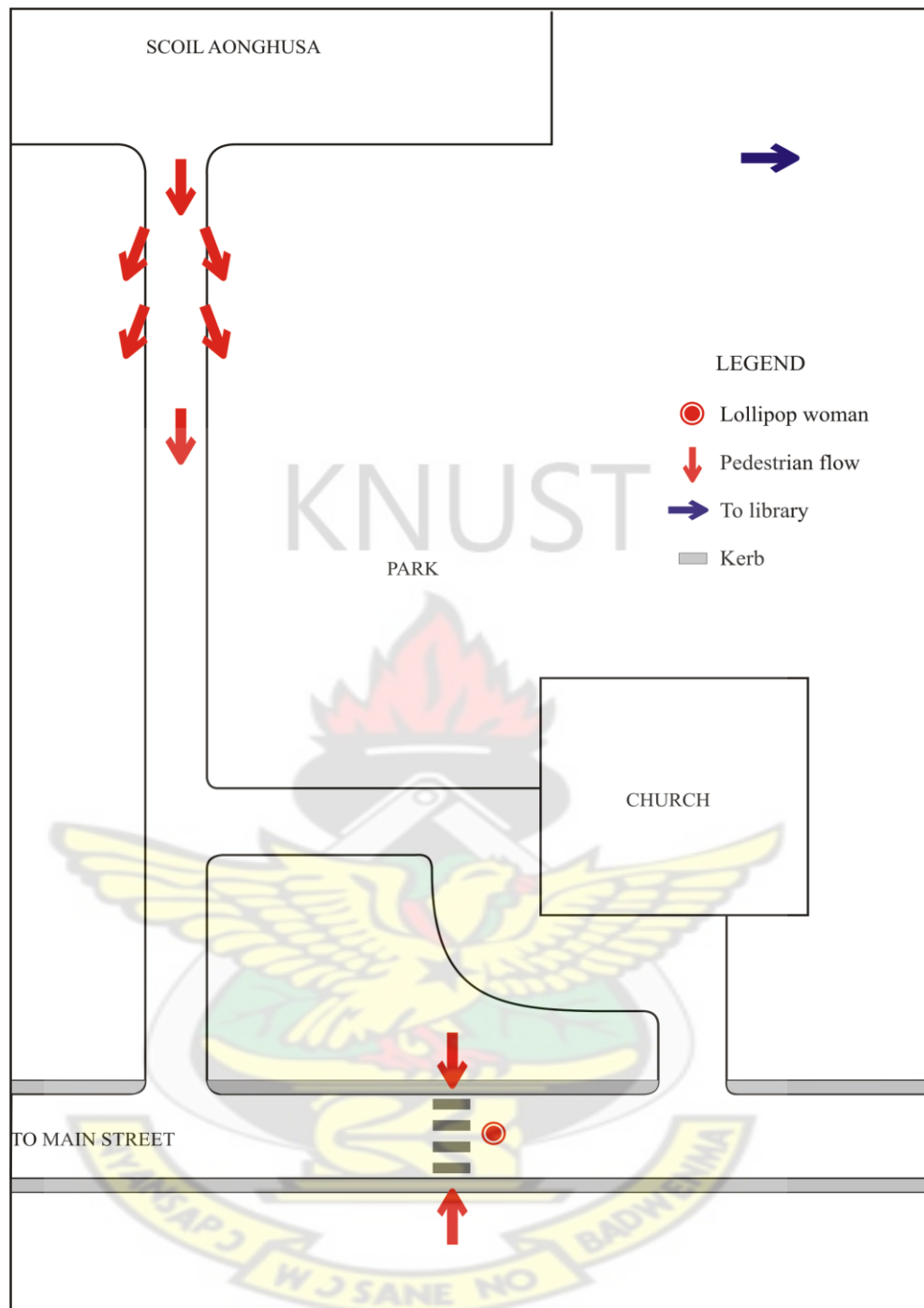


Figure 4.6: Schematic depiction of the road layout of Scoil Aonghusa area

4.3.8.3 Scoil Aonghusa

Scoil Aonghusa was located in an averagely traffic-busy area. The area exhibited all features of a typical traffic environment showing traffic lights, kerb, pedestrian crossing, average vehicular and human traffic density. But unlike the St. Peters area, the traffic environment in the area was properly managed and settlement layout well-planned to allow free-flow of traffic. Facilities and amenities in the area included a library, supermarket, residential settlements, church, and school car park. In Scoil Aonghusa, 10 pupils were involved in the study in 4 instances. Because school children were directed to cross the road by lollipop women, behavioural assessment of respondents in Scoil Aonghusa could not be carried out.

4.4 Art Therapy and Experiential Sessions

Therapy sessions formed the main model of education for children in this study. The essence of the therapeutic process was to provide the children a means to pour out their feelings or express themselves, that is, express themselves in their self-created worlds of the traffic environment. This was subsequently to build a basis for the diagnostic exploration of respondents' perception of road safety. The usual road traffic education initiatives aimed at teaching children skills for dealing with the traffic environment were integrated into the therapy sessions. This time, instead of children learning the rule-based theories of the conventional 'look left and then right before crossing the road', these same rules (rule-based study) were integrated into the art process as activities which are ruled over by children in their own traffic world.

In dealing with the generality of the traffic world by the child, these rules were unconsciously built into the psychic and developmental process of the child which manifested consciously when the child was confronted with the real traffic environment. The essence of art therapy is that children work to symbolize and communicate these experiences through imagery and art work. Children who are able to communicate in this symbolic way are able to convey their own inner worlds which otherwise might not be reached (Case and Dalley, 2003:174). Hammer (1998:511) dilates extensively on the essence of art therapy relating to its evolutionary, clinical and expressive contents applied to childhood and adulthood in behaviour disorders, diagnosis and treatment:

Analytically oriented art therapy deals with the release of the unconscious by means of projected spontaneous images into graphic and plastic expression. Art therapy can be explored either as a primary or an auxiliary form of psychotherapy. It is effective with behavior disorders as well as neurotic and psychotic patients; it is unstable with adults, adolescents or children. Art therapy which was originally applied to the treatment of individual patient, is now, also, beginning to be used as a supplementary technique in analytic group therapy. The process of art therapy is based on the recognition that man's most fundamental thoughts and feelings, deprived from the unconscious, reach expression in images rather than in words. By means of pictorial projection art therapy encourages a method of symbolic communication between patient and therapist. The techniques of art therapy are based on the knowledge that every individual, whether trained or untrained in art, has a talent capacity to project his inner conflicts into visual form.

The primary goal of the therapy sessions in this study was to let the children remember the tenets of road safety required of them. Getting children to remember

activities requires more than the conventional teaching of using the demonstration and lecture method. Many psychologists have proposed psychomotor and sensorimotor involvement of, or drills for educands. In teaching children basic health care practices, for instance, Hawes and Scotchmer (1993:120) used the story and drawing approach. They direct that children must be involved in the story right from the beginning and be helped to contribute to it. They suggest that:

- (a) children can name the characters and the story itself
- (b) Give them something to look for in the story
- (c) Allow them to predict the action
- (d) Invite their suggestions
- (e) When the story is over, ask them to consider alternatives.

Most importantly, regarding the story, Hawes and Scotchmer (1993:120) emphasise the need to ensure that the children have understood the message. To help them remember the messages in the story, they prescribe these:

- (a) Help the children to draw the story in a series of pictures which they can mix up and put back in the right order
- (b) Help them to make their own story book complete with pictures and cover
- (c) Ask a group of children to tell the story, each contributing a point, or tell the story from different characters' point of view.

Using the story formula, respondents in this study were told stories on road traffic crashes out of which they produced drawings. In turns, respondents stood in front of the class and told the story about their drawings to the class. The class then interacted with respondents by asking questions and making contributions.

4.4.1 Art Therapy Sessions in Selected Schools

A total number of 11 therapy sessions were organized in all three selected schools out of which 262 drawings were produced by respondents (Table 4.11). Ten drawings were randomly selected from each school for semiological analysis.

Table 4.11: Number of therapy sessions in selected schools

Therapy sessions	No of respondents in each session			
	St. Peter's	Adikpo	Scoil	Total
1st Session	40	11	-	51
2nd Session	40	11	20	71
3rd Session	40	11	19	70
4th Session	40	11	20	71
Total no of sessions	4	4	3	11
Total no of drawings	160	44	59	262

4.4.1.1 Methods

The story method was used. Respondents were told a story from which they composed their drawings (Plates 4.20 - 4.23). Each respondent stood in front of the class and narrated his story to the class. The class then interacted with the respondent (story-teller), by asking questions, and in some cases, making suggestions (Plates 4.24 to 4.26). In all three selected schools, the theme of the story was common: *a child who, at the point of crossing the road, did not pay attention, by skipping the conventional kerb drill and was knocked down by a vehicle*. The same story was varied at different times.

Though same-themed, respondents produced content-different drawings and told different stories about the drawings which evolved around the same theme. In some cases, respondents gave some semiological anecdotes. Characters in the story were, for instance, given names and some objects were assigned signifiers. Respondents were excited about their drawings and displayed them after many therapy sessions (Plate 4.27, 4.28). Excitement is emotional; emotion is diverse and psychic. After therapy sessions, the psychic distance between respondents and the traffic environment became shorter. Respondents became more reflective and sober. Even hyperactive children were sobered and acted with caution. In the St. Peter's school observation, some respondents were seen preventing others from crossing the street in what they thought was not the right time to cross. In Adjikpo Dokuyo School, one respondent fought with his friend after the two of them had crossed the street. When interviewed, it was found that an argument had ensued between them when one accused the other of not crossing the road properly. They were good

friends who did not want to lose the other in death from a preventable road traffic crash.



Plate 4.20: Respondents in a therapy session, supervised by teacher. St. Peter's School, Ghana



Plate 4.21: Art therapy session in Adjikpo Dokuyo School, Ghana



Plate 4.22: Art therapy session for Senior Infant class, Scoil Aonghusa, Ireland



Plate 4.23: Art therapy session for Junior Infant class, Scoil Aonghusa, Ireland



Plate 4.24: Respondents interact with classmate during story-telling. St. Peter's School, Ghana



Plate 4.25: Respondent telling her story to the class. Adjikpo Dokuyo School, Ghana



Plate 4.26: Respondent telling her story to the class. Notice drawing held high up in the air. Scoil Aonghusa, Ireland



Plate 4.27: Respondents of the Senior Infant class display drawings after therapy session, Scoil Aonghusa, Ireland



Plate 4.28: Respondents in Adjikpo Dokuyo School display their works

4.4.1.1.1 **Zone of Proximal Development (ZPD)**

As respondents interacted with their colleagues in sharing the stories on their drawings, the class teacher and researcher monitored their stories and looked out for error areas relating to their perception of road safety. The researcher assisted them (respondents) to correct these errors. The respondents cumulatively built upon their knowledge until they were able to present a better understanding of road safety with little or no supervision or assistance. This was established on Vygotsky's Zone of Proximal Development (ZPD). The ZPD is Vygotsky's theory for a set of activities too difficult for children to master independently until assisted by an adult or a more skilled child. The ZPD has two levels, the "lower limit" which is the stage of problem-solving reached by the child working independently; and the 'upper limit' which is the level of additional tasks the child can accomplish with the assistance of an able instructor. The ZPD was found to be a suitable tool for aiding the children's

knowledge on road safety, because it captured respondents' cognitive skills which were in the process of maturing and fashioned them. Vygotsky referred to these as the 'buds' or 'flowers' of development, to distinguish them from the "fruit" of development, which the child already can accomplish independently (Santrock, 4004:230).

4.4.1.1.2 Scaffolding

Scaffolding was used vis-a-vis the Zone of Proximal Development which are closely related. Scaffolding means changing the level of support. The level of support for respondents was administered such that support faded out gradually. Dialogue is an essential element of Scaffolding (Santrock, 4004:230). As respondents engaged in story-telling, there was much dialogue and interaction. Consequently, respondents' rich but unsystematic, disorganized, and spontaneous concepts, met with the researcher's systematic, logical, and rational discoveries.

4.4.1.2 St Peter's School

In St. Peter's School, the classroom arrangement was the traditional type (Appendix 4 (a); Plate 4.20). The study conformed to the same classroom arrangement. Therapy was organised for the Test Group in each quarter of the academic year. Out of 160 drawings (Table 4.11) grossly produced by the respondents, 10 were randomly selected for analysis.

4.4.1.3 Adjikpo Dokuyo School

In Adjikpo Dokuyo, classroom arrangement was the traditional type, though single row, where therapy sessions were organised. Forty-four drawings were produced out of which 10 were selected for analysis (Table 4.11).

4.4.1.4 Scoil Aonghusa

Two classes, the Junior and Senior Infant classes made up the therapy session group. Fifty-nine drawings were produced by the respondents and 10 drawings were selected for analysis. Classroom arrangement was the traditional type (Table 4.1 (a); Plate 4.22 for the senior infant grade, and the small-group instruction type (Plate 4.23) for the Junior Infant grade.

4.5 Drawings by Respondents

All drawings (Plates 4.29 to 4.58) portrayed the theme of the story, road traffic crash involving a child. The settings of the road traffic crash were depicted according to the perceptions of respondents in the different areas of the study. Respondents' drawings in each area of the study bore peculiar characteristics, each of which was different from the other. Drawings by respondents from Adjikpo Dokuyo (Plate 4.39 to Plate 4.48) carried fewer features of the traffic communication signals and symbols. Only one of the drawings (Plate 4.44) by nine-year-old Dede Hannah, forming 10% of the drawings portrayed a traffic communication symbol. Interaction with Dede indicated that the respondent travelled occasionally to the regional capital, Koforidua, to visit her uncle. This implies that respondents in Adjikpo Dokuyo were

not exposed to the details of the traffic environment. And this is because traffic itself was not detailed enough in Adjikpo. The low perceptual capabilities of respondents in Adjikpo Dokuyo were worsened by the lack of traffic education in the school as other schools had benefited from the National Road Safety Commission. The drawings produced by respondents were pictorial evidence of the type of traffic environment in Adjikpo. Streets in Adjikpo had no road markings (Plate 4.17 to Plate 4.19) or traffic lights. The nearest town, the district capital, Somanya, had only one set of traffic lights in the town, which operated only on market days.

By contrast, drawings by respondents in St. Peter's School showed a relatively better enhancement of the traffic environment which they (respondents) were accustomed to. The St. Peter's area of the study possessed more traffic communication signals and symbols than the Adjikpo Dokuyo area of the study. St. Peter's School respondents' drawings consequently portrayed a greater percentage of traffic details. Plates 4.29, 4.31, 4.33, 4.35, 4.36, 4.37, 4.38, forming 70% of the drawings carried traffic communication signals and symbols. These are traffic lights, 10% (Plate 4.33), pedestrian crossing, 60% (Plates 4.29, 4.31, 4.33, 4.36, 4.37, 4.38), road markings 30% (Plates 4.29, 4.32, 4.35).

Traffic environment in the Republic of Ireland area stood in sharp contrast with that of Ghana. Besides, the cultural differences portrayed in the drawings between Ireland and Ghana, Ireland seen through the drawings of respondents in Scoil Aonghusa, shows an even better traffic situation in Scoil Aonghusa (Republic of Ireland), than the St. Peter's area (Ghana). In the Scoil Aonghusa area of the study, all drawings (Plates 4.49 - 4.58) contained 100% traffic communication



Plate 4.29: Drawing by Rita Adansi, 8 years old, St. Peter's School,, Ghana.



Plate 4.30: Drawing by Samuel Quacoe, 9 years old, St. Peter's School, Ghana

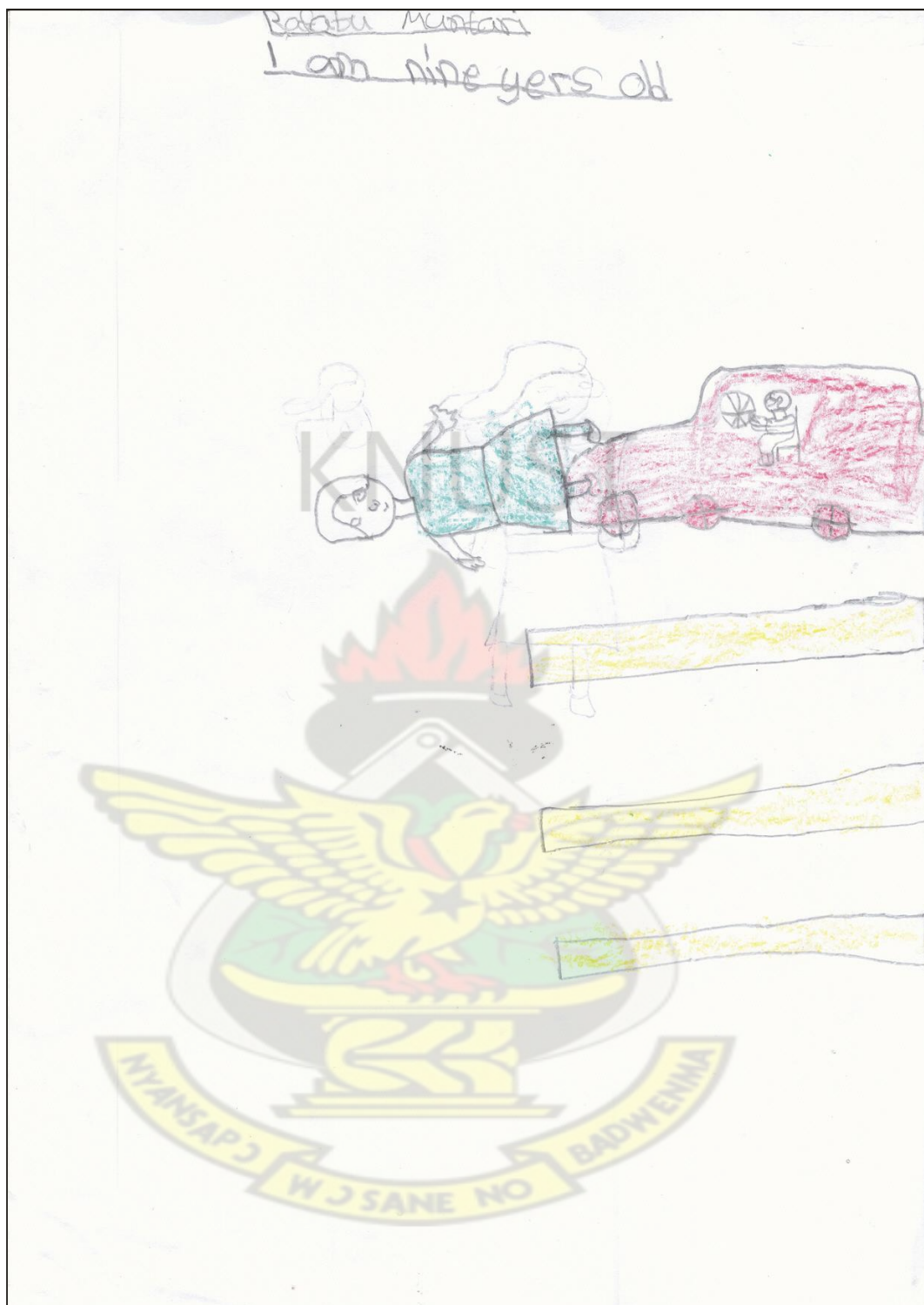


Plate 4.31: Drawing by Bafatu Muntari, 9 years old, St. Peter's School, Ghana.



Plate 4.32: Drawing by Precious Mante, 7 years old, St. Peter's School, Ghana.



Plate 4.33: Drawing by Bernice Agyei, 8 years old, St. Peter's School, Ghana.



Plate 4.34: Drawing by Peter Cephas Sieman, 7 years old, St. Peter's School, Ghana.



Plate 4.35: Drawing by Dorothy Sarpong, 7 years old, St. Peter's School, Ghana.



Plate 4.36: Drawing by Ama Prempeh Duah, 8 years old, St. Peter's School, Ghana



Plate 4.37: Drawing by Otis Achampung, 9 years old, St. Peter's School, Ghana



Plate 4.38: Drawing by Emmanuel, 8 years old, St. Peter's School, Ghana



Plate 4.39: Drawing by Doe Nanor Madel, 7 years old, Adjikpo Dokuyo School, Ghana.

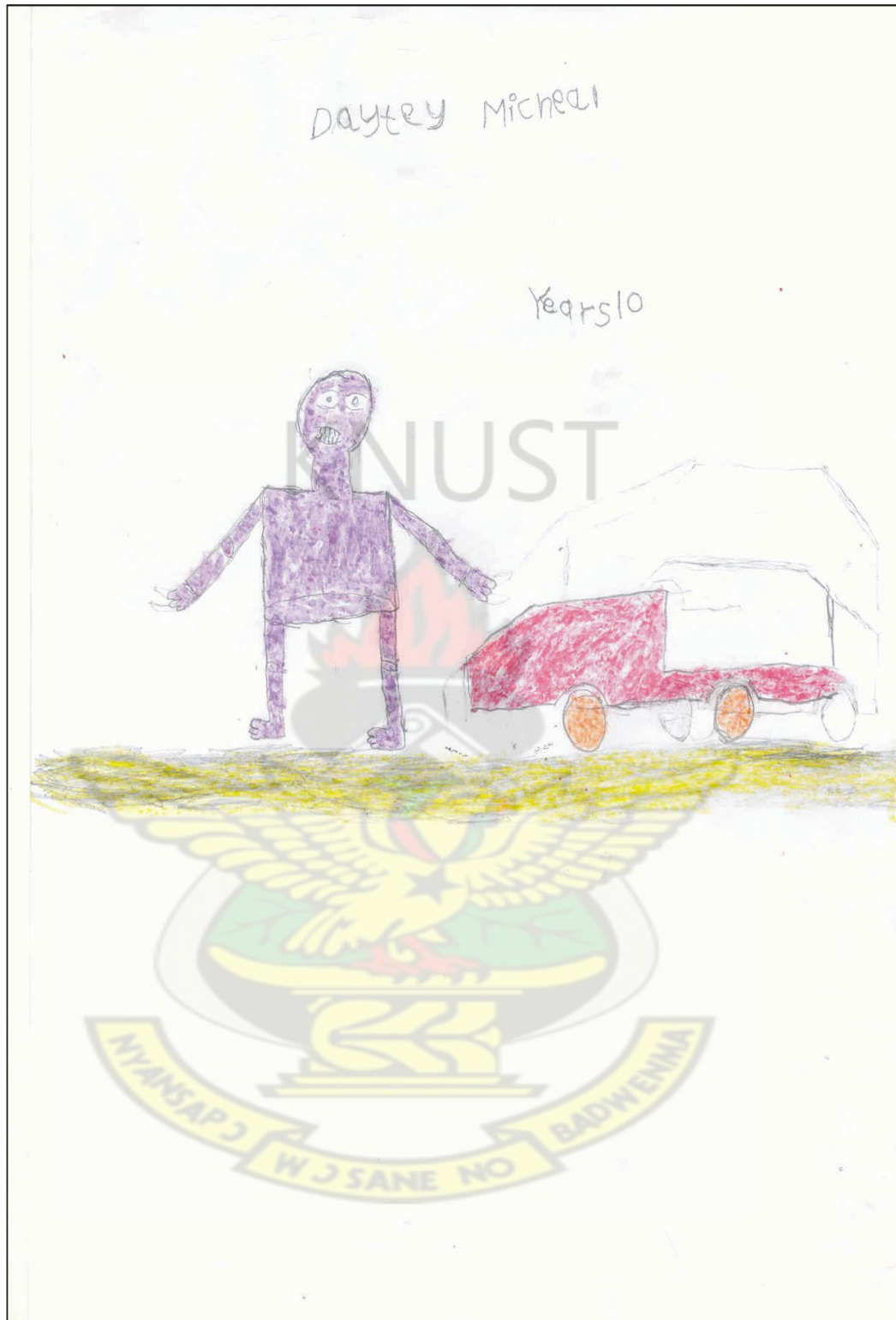


Plate 4.40: Drawing by Daytey Michael, 10 years old, Adjikpo Dokuyo School, Ghana.



Plate 4.41: Drawing by Aggwey Ogwerety, 7 years old, Adjikpo Dokuyo School, Ghana.



Plate 4.42: Drawing by Abaya Mary, 8 years old, Adjikpo Dokuyo School, Ghana.



Plate 4.43: Drawing by Tetley Emmanuel, 10 years old, Adjikpo Dokuyo School, Ghana.

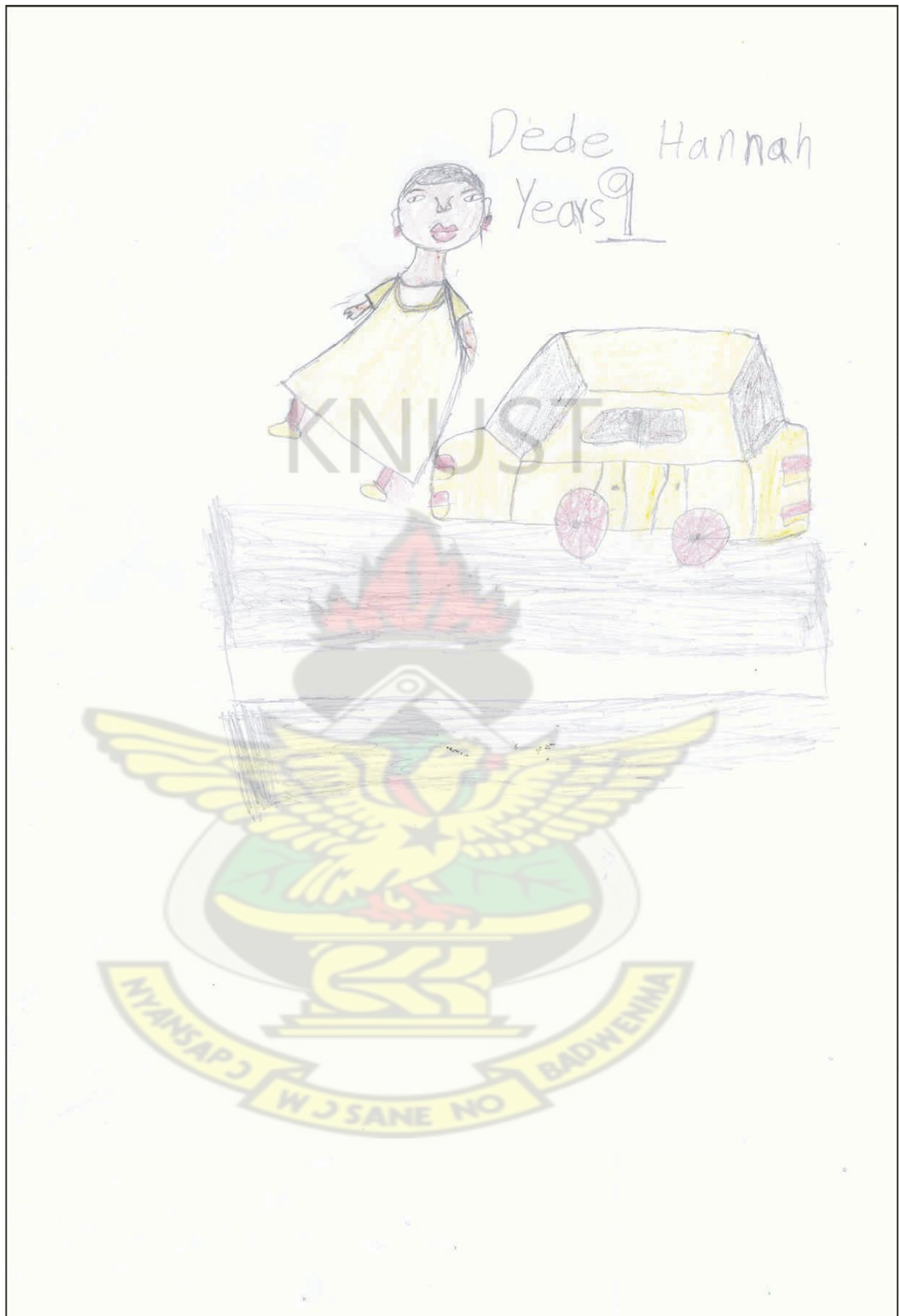


Plate 4.44: Drawing by Dede Hannah, 9 years old, Adjikpo Dokuyo School, Ghana

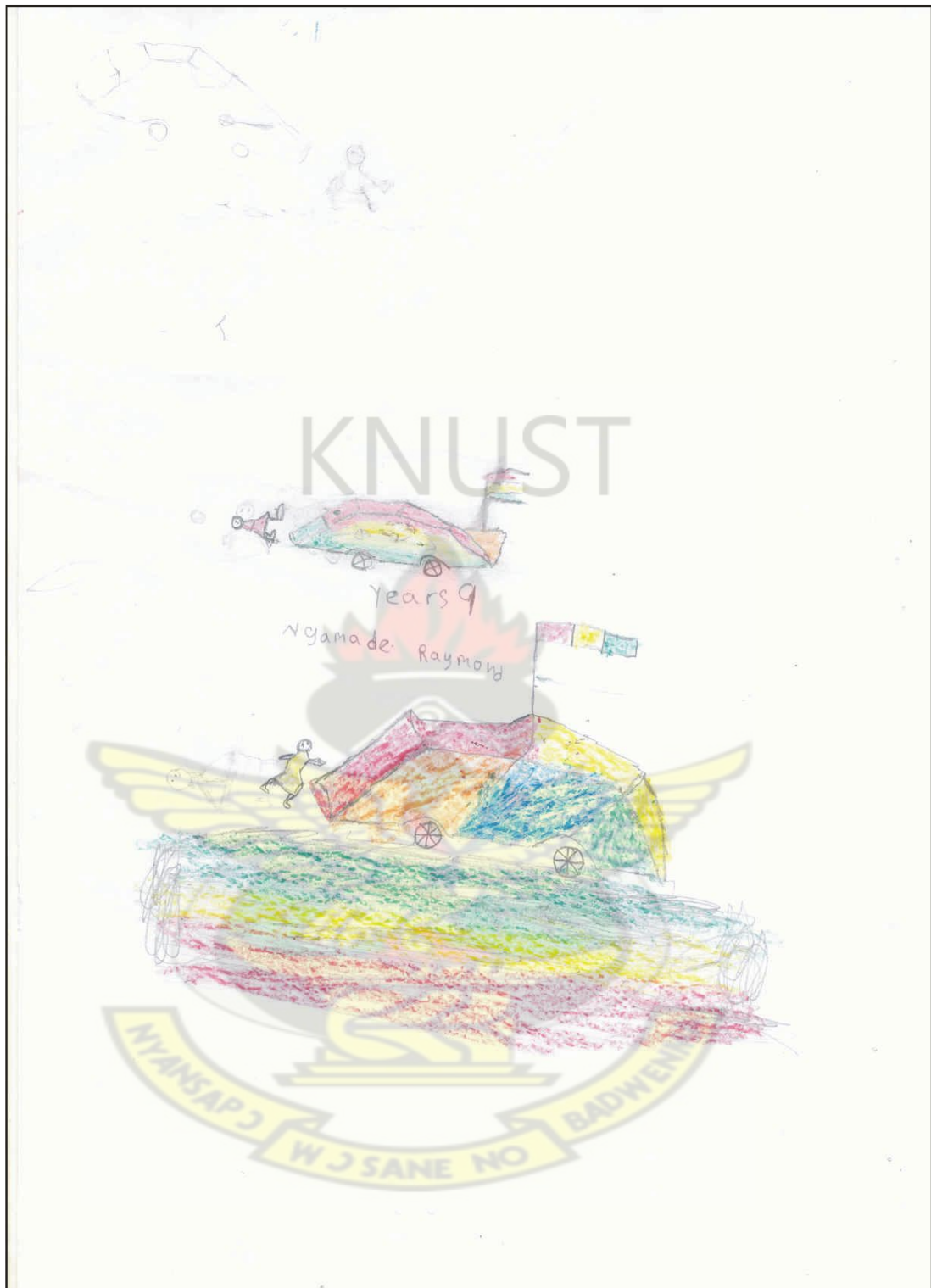


Plate 4.45: Drawing by Ngamade Raymond, 9 years old, Adjikpo Dokuyo School, Ghana.



Plate 4.46: Drawing by Abaya Michael, 9 years old, Adjikpo Dokuyo School, Ghana.



Plate 4.47: Drawing by Aziz Abduni, 7 years old Adjikpo Dokuyo School, Ghana.

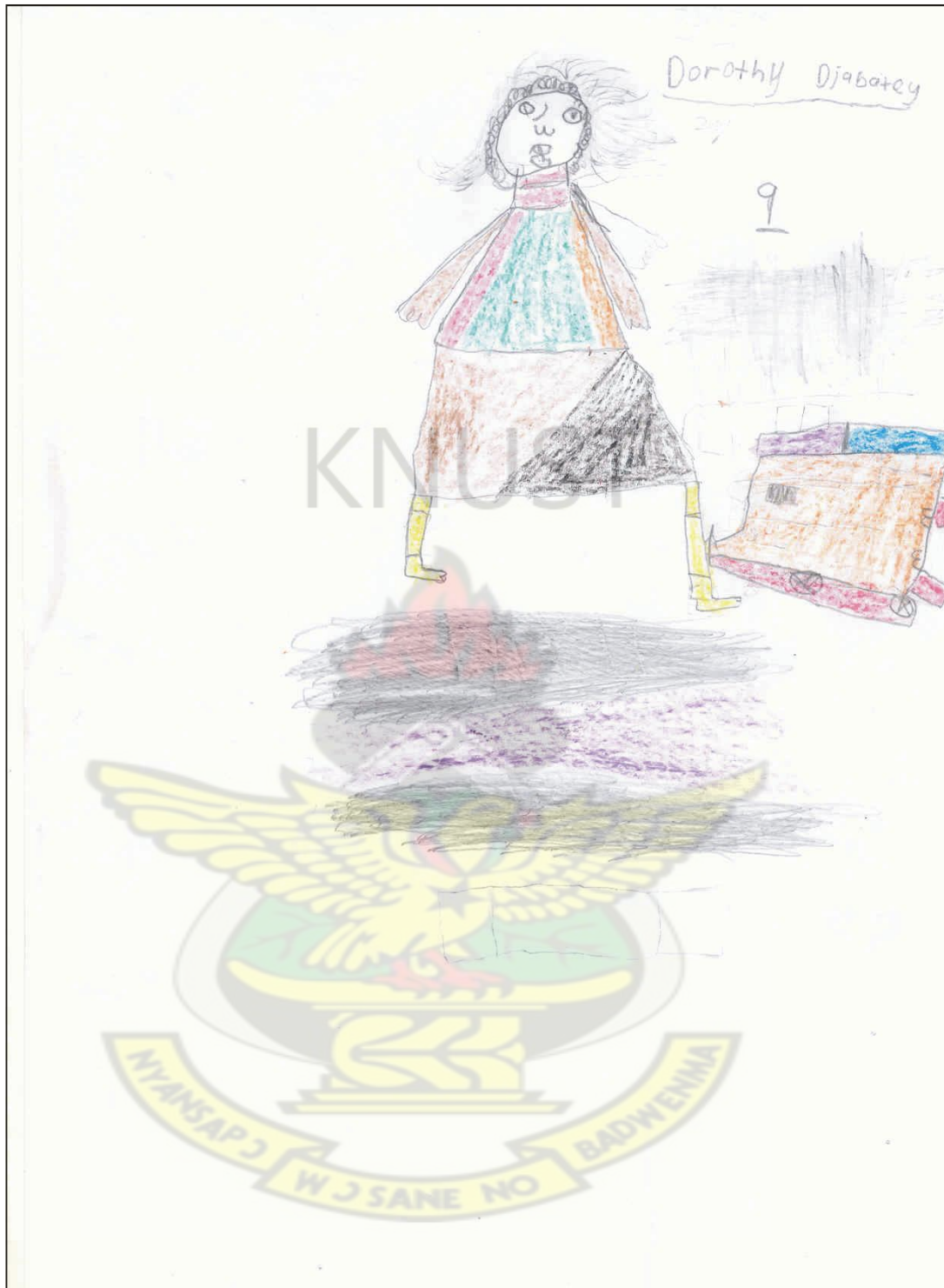


Plate 4.48: Drawing by Dorothy Djabatey, 9 years old, Adjikpo Dokuyo School, Ghana.



Plate 4.49: Drawing by Emma, 5 years old, Scoil Aonghusa, Ireland



Plate 4.50: Drawing by Michael Quinn, 8 years old, Scoil Aonghusa, Ireland

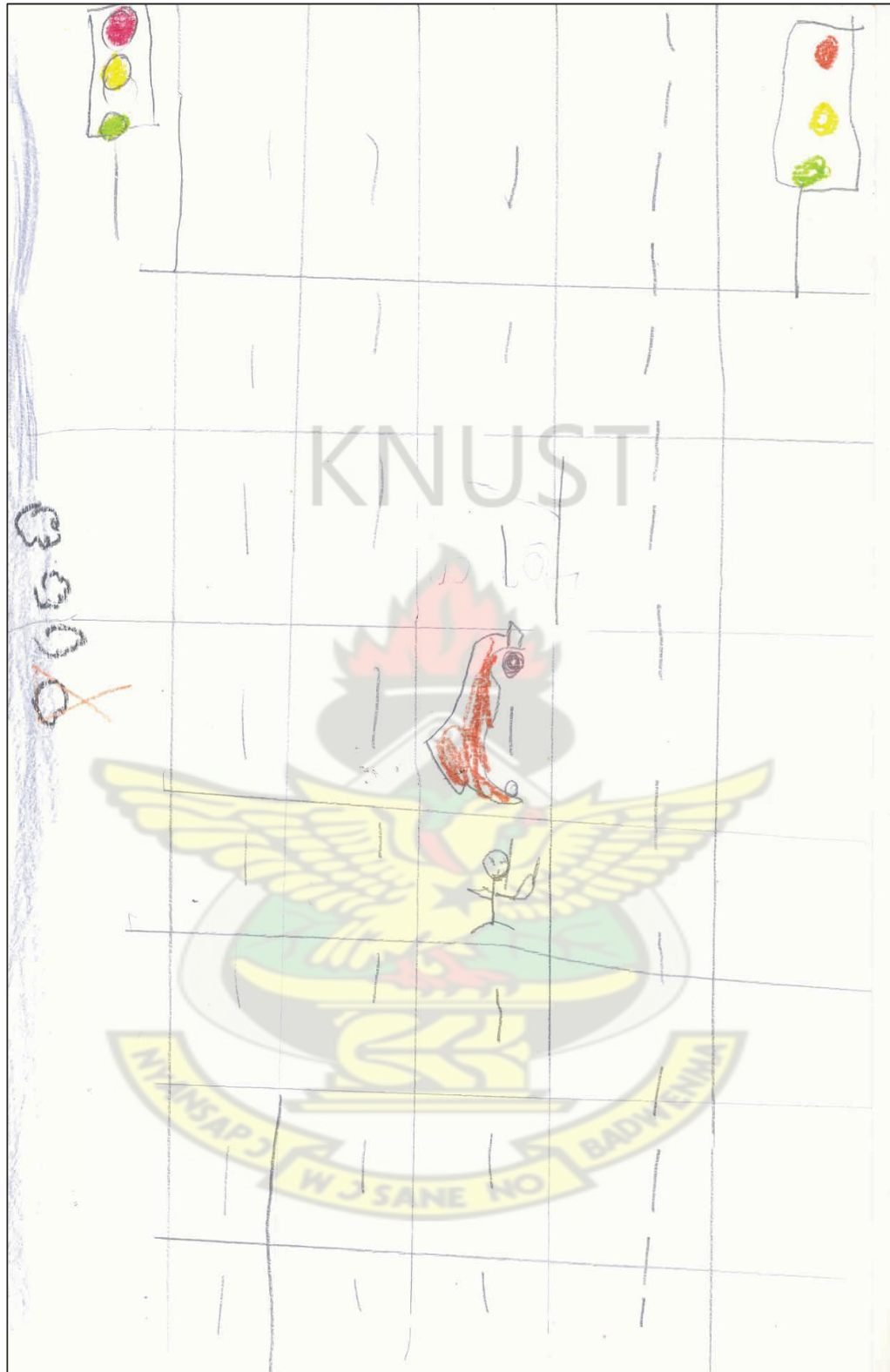


Plate 4.5 (a): Drawing by Ross Fewnell, 8 years old, Scoil Aonghusa, Ireland. The drawing is titled "The End"

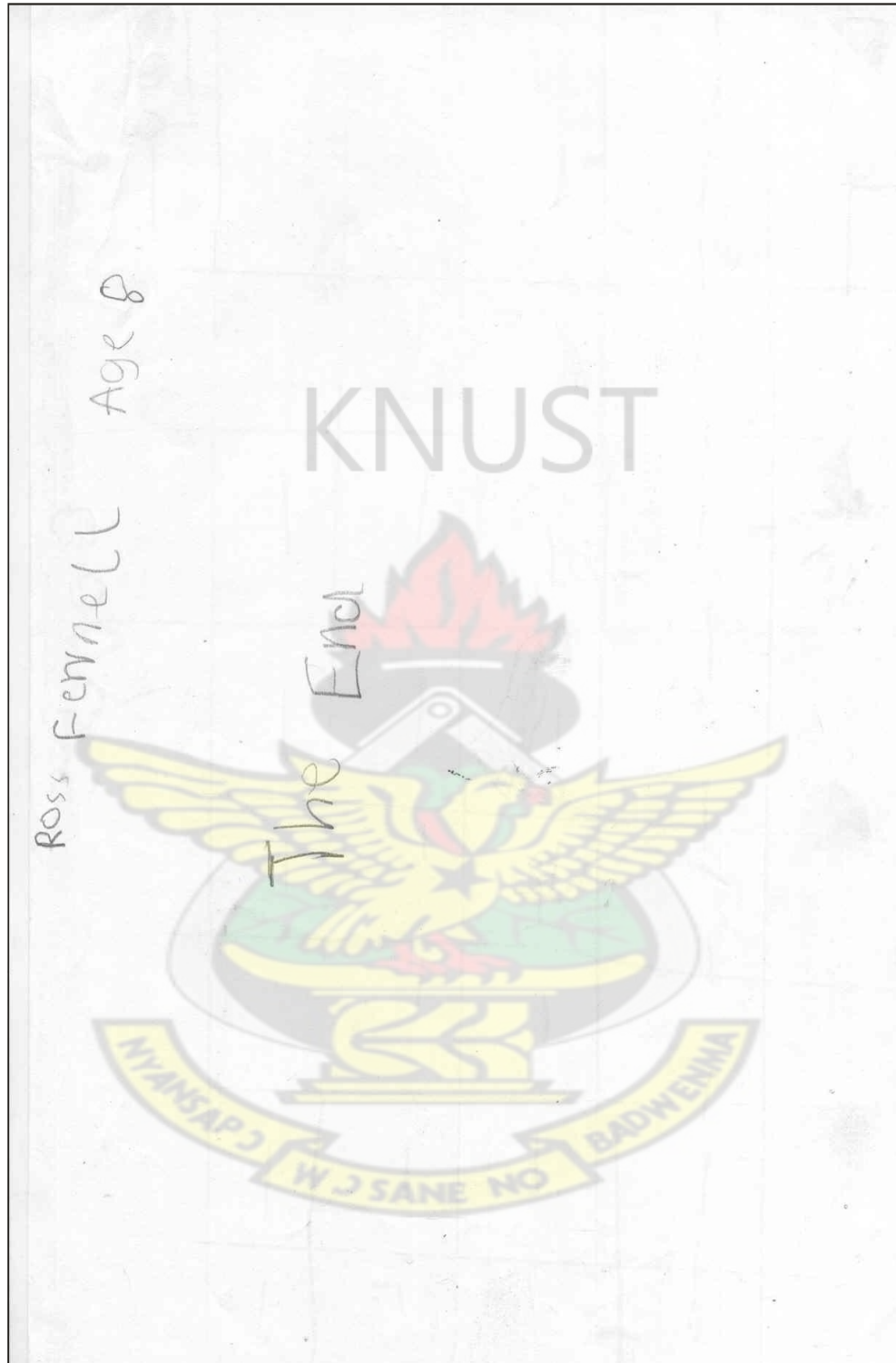


Plate 4.5 (b): Title of drawing (Plate 4.5 (a), "The End" written at the back of the sheet. Scoil Aonghusa, Ireland.



Plate 4.52: Drawing by Tony, 8 years old, Scoil Aonghusa, Ireland



Plate 4.53 (a): Drawing by Jennifer, 8 years old, Scoil Aonghusa, Ireland



Plate 4.53 (b): Back sheet of Jennifer's paper.



Plate 4.54: Drawing by Lenuta, 6, Scoil Aonghusa, Ireland



Plate 4.55: Drawing by William, 6 years old, Scoil Aonghusa, Ireland



Plate 4.56: Drawing by Mohammed, 7 years old, Scoil Aonghusa,,Ireland



Plate 4.57: Drawing by Glenn Bennett, 8 years old, Scoil Aonghusa, Ireland



Plate 4.58: Drawing by Shane Lopez, 9 years old, Scoil Aonghusa, Ireland



Plate 4.59: St. Peter's School, Kumasi, Ghana: Respondent, front row, right, talking to himself in a therapy session



Plate 4.60: Scoil Aonghusa School, Ireland: Respondent, back row, right, talking to herself in a therapy session. In the front row extreme left, another respondent exhibits hand movement along a shape being drawn

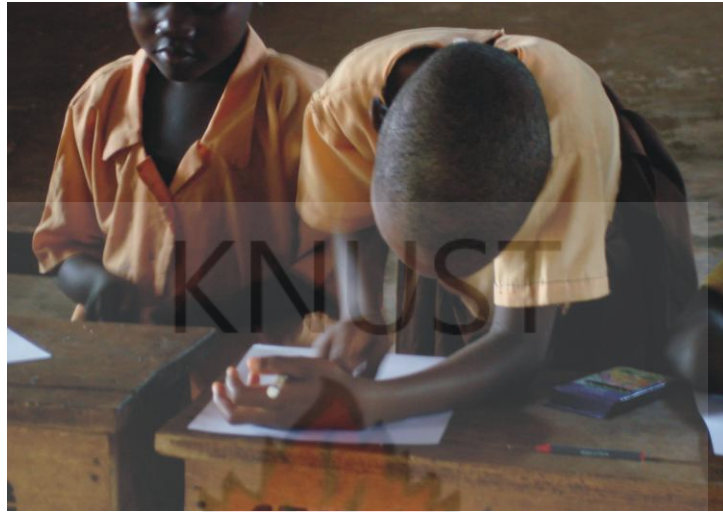


Plate 4.61: Adjikpo Dokuyo School, Ghana: Respondent bends over her drawing in a therapy session



Plate 4.62: Adjikpo Dokuyo School, Ghana: different body movements by respondent in a therapy session



Plate 4.63: Class work (art) by Kofi Tuo Divine, Adjikpo Dokuyo School, Ghana



Plate 4.64: Class work (art) by 5-year-old Jessica, Scoil Aonghusa School, Ireland

signals and symbols. These are traffic lights 70% (Plates 4.49, 4.51, 4.52, 4.53, 4.54, 4.55, 4.58); pedestrian crossing 10% (Plate 4.58); lollipop woman 60% (Plates 4.49, 4.52, 4.53, 4.54, 4.56, 4.57, 4.58). It is likely that the least score of 10% Pedestrian Crossing represented in the drawings of Scoil Aonghusa respondents is because children in Europe are not allowed to cross the street on their own. Children are escorted by adults or older children to cross the street. This street-crossing monitoring is intensified by the control of Lollipop Women positioned at crossing points in the vicinity of schools. This means that, in Europe the acquaintance frequency of school children to Lollipop Women is higher than it is with the Pedestrian Crossing. Consequently, respondents' drawing in Scoil Aonghusa recorded a high degree of the presence of lollipop women (60%). This is a testimony to the discovery that children draw what they mean, think and know, not what they see (Read 1964:132).

4.5.1 Semiological Appraisal of Respondents' Drawings

When children draw, they get themselves physically and emotionally involved in the drawing process (Plates 4.59 - 4.62). These manifest in the form of movements complemented by audible and inaudible expressions, and body gestures. Hammer (1980:71) refers to this as motion, noting that *"motion is occasionally indicated in projective drawings, and most frequently done so by children"*. Mostly, these physico-emotional involvement shows in the respondents' drawings. Vygotsky refers to the audible and inaudible expressions of children as "private speech", that is when children talk to themselves during playing, drawing or when involved in some other motor activity. Berk (2001:54) claims that:

Depending on the situation, this private speech ... can account for 20 to 60 percent of the remarks a child younger than 10 years makes. Many parents and educators misinterpret this chatter as a sign of disobedience, inattentiveness or even mental instability. In fact, private speech is an essential part of cognitive development for all children.

Piaget categorised private speech into types (Table 2.2), indicating that they emanate from immature minds, serve little communicative function and rather reinforce motor activity or take the form of sequiturs, where child's verbalisation stimulates speech in the other (Berk, 2001:56). Hammer (1980:163) explains that:

It is much more difficult for a child to make a representational picture of an object than to associate with the object, a symbol, whether aural (word) or graphic (schema). What is certainly important in this connection is to record any verbal fantasies which the child spontaneously associates with his drawings ... there may be no representational connection between the drawing and the fantasies associated with it but the fantasy plus the drawing is obviously a unity from the point of view of typological interpretation

Equally, children move their bodies along certain shapes when drawing. These may tell on the drawings. Children, for instance, may move along the circular perimeter of drawing a vehicle tyre as explained by Hammer's (1980:356) stimulus drawing relation. Gardner and Wolf (1987:310) elucidate this with an example: "*when a child of 1½ or 2 is asked to draw a truck ... a typical child will grab a marker, move it across the paper back and forth rapidly and say 'vroommm, vroommm' as if the marker were itself a vehicle*". Physical movements and verbalisations manifested in respondents' drawings of this study.

4.5.2 Signified and Signifiers in Respondents' Drawings

When verbalisation and body movements are translated into children's drawings, they appear as signifiers. A signifier, according to Gillian (2005:74) is one of the two parts of a "sign" that is a sound or an image attached to the signified, the other part of the sign. The signified, Gillian (2005:74) explains, is a concept or an object, which together with the signifier, are integrated though in practice, are distinguishable at the analytical level. In respondents' drawings of this study, signifiers are most prevalent in the drawings of Scoil Aonghusa respondents (Plates 4.49, 4.50, 4.51, 4.52, 4.54, 4.56). In Plate 4.49, five-year old Emma put the "stop" sound in her work. It is not clear who was cautioning the child-pedestrian to stop. Interaction with Emma revealed that Emma was sympathetic with the child-pedestrian, who was heading for danger and Emma felt that someone must caution the child-pedestrian. Eight-year old Michael's drawing (Plate 4.50) depicts a scene beyond the accident spot where the accident victim is being conveyed to St. Paul's hospital. Michael portrayed the urgency involved in an emergency by showing the sound of the ambulance sirens and blinking lights. Eight-year old Ross' drawing (Plate 4.51) is philosophical. The drawing contains comparatively fewer elements but tells a big story with its signified title "The End" (Plate 4.51b). Ross' road traffic crash scene is one of the highways of Ireland, with pronounced road markings and road furniture where lollipop women are not available. Ross' drawing was the only one with a title. Like five-year old Emma's drawing (Plate 4.49), eight-year old Tony's drawing (Plate 4.52) also contained a "stop" caution for the child-pedestrian but unlike Emma's drawing (Plate 4.49), Tony showed specifically in his drawing (Plate 4.52) that the sound was coming from the Lollipop Woman. Tony creates a speeding vehicle (towards the child-pedestrian) by symbolism. Six-year old Lenutd's drawing

(Plate 4.54) also creates a warning sound, from the Lollipop Woman. Seven-year old Mohammed's drawing (Plate 4.56), creates the warning sound "no" from the lollipop woman and other pedestrians. Nine-year old Shane Lopez also creates a blinking traffic light (Plate 4.58).

The drawings of respondents in Ghana (St. Peter's School: Plates 4.29 - 4.38; Adjikpo Dokuyo School: Plates 4.39 - 4.48), contained no signifiers. Contrasting Ghana's respondents with Ireland's respondents, it is realised that Irish respondents are more cognitively developed. Hammer (1980:71) confirms that gifted children produce many pictures showing motion, whereas feeble-minded children produce drawing with least motion elements. When children are more cognitively developed, they are more receptive to learning. Art is known to be one of the means of the development of children's perceptual and cognitive abilities. Henley (1992:12) emphasises Lowenfeld's idea that art possesses the power and profundity beyond the mere acquisition of skills and techniques, but significantly contributes to the child's creative and mental growth.

That respondents in Ireland were more cognitively developed than their counterparts in Ghana is attributed to, as investigated, differences in the mode of teaching of art in schools in the two countries. In Ireland, art lessons for children are not tailored or restricted to stereotype thinking. The children are set free to dabble in creativity, from doodling to imaginative work. Besides, drawing and creative work were frequent activities for children in Irish schools. Plate 4.60 shows how classroom environment in Ireland is incensed with art.

The classroom environment in Ghana (Plate 4.59), on the other hand, is not art-inducing enough to affect children's sensory ideation. In Ghana, art lessons are

not as frequent as other subjects. Besides, school children are restricted in their drawings and art works. This was Lowenfeld's position (Henley 1992:12) "*which he tenaciously defended against those teachers who sought to impose their own prejudicial and alien forms of expression upon their students*". In Adjikpo Dokuyo School, art lessons were mostly restricted to tracing (Plate 4.63) as opposed to less restricted art in schools in Ireland (Plate 4.64).

Studying children's perceptual abilities, Mundy-Castle (1966:290-299) who studied five - ten year old children in Ghana, and Hudson (1960:183-208) who studied aesthetic responses of other African children, both converged commonly on the conclusion that African children were deficient in perceptual abilities. Dawson (1967:115-128) found that decoding and interpretative abilities among children in West Africa, were affected by cultural influences and experiential opportunities. In a later comparative study with three-year-old children in China, Dawson (1974) found that children in China were capable of decoding three-dimensionality in pictures, and attributed this ability to culture and experience with imagery.

4.6 Cross-Cultural Orientations

Respondents' drawings revealed the differences in the two groups in the study - children from the two schools in Ghana, and children from the school in the Republic of Ireland. These were attributed to the cultural differences between the two groups of respondents. Even in the two groups of respondents in Ghana, St. Peters school and Adjikpo Dokuyo school, intra-cultural difference were realized, though not as pronounced as in the Ghana - Ireland difference. Ross et al (1995:80) indicate that "*an important theme of modern child psychology is that development must be studied*

in context” stressing that “a very important context in which children develop is the culture of their people”.

Generally, individuals develop in a cultural context. This means that culture is central to human development and the by-products of human actions are a reflection of the various cultures in which individuals grow up. Culture moulds the individual's perception and ideas about life. Culture, according to Kindler (1997:165) is *“transmitted patterns of values, beliefs and ideas influencing human behaviour and the objects produced by this learned behaviour”*. Best (1985:7) explains that individuals' mental experiences are predominantly determined by language, the arts, religious and moral practices. Art is found to operate in two forms, (McFee 1986:6) identified as the objective elements (objects made by peoples) and the subject elements (their value systems, roles and attributes). These objective elements are found around individuals in the environment in which they live, and their attributes, roles and value systems constantly relate to events which are processed by the individual's senses and stored as sensory information.

Categorical differences in the drawings of respondents in this study are attributed to cultural and environmental differences. Europe experiences four seasons namely winter, autumn, summer and spring. Children in Europe are particularly attached to summer, because that is the season they can play outdoors freely and free from harsh weather hazards associated with the other seasons. Conscious of summer therefore, 70% of the drawings of Scoil Aonghusa respondents indicated features of the summer season. These were shown by signifiers such as the sun and sky as depicted in Plates 4.50, 4.51, 4.52, 4.53, 4.56, 4.57, 4.58. By contrast, respondents'

drawing in Ghana (St. Peter's School, Plates 4.29 - 4.38; and Adjikpo Dokuyo School, Plates 4.39 - 4.48) did not indicate any meteorological signifiers

4.7 Colour

Children's learning, mood, concentration and behaviour can all be affected by the colours around them. Colour has stimulating effects on learning. Children's moods, concentration and behaviour have been proven by studies by June McLeod. McLeod instigated educationists and psychologists to use much colour in teaching children and this produced very positive results. Her project demonstrated and confirmed the considerable benefits to be gained from the correct and considered use of colour in a learning environment.



CHAPTER FIVE

PRESENTATION AND DISCUSSION OF FINDINGS

5.1 Child Traffic Education

Studying child traffic education in Ghana is one of the objectives of this study. Traffic education for children occurred in basic schools, and has, since its inception progressed gradually. The system of implementation did not have the general effect of reaching all schools in Ghana. Schools in the peri-urban and especially rural areas were most affected. Implementation lapses were identified as:

5.1.1 Duration of Teaching

Instructional time was two hours (n.a., 2007:14) or more (q.v. 4.1). This is beyond the stipulated period for teaching children. Thirty minutes for classroom instruction and 10 minutes for video show were used in a study by Fyhri et al (2004:200) for children (q.v. 4.3.3). When the President's Committee on Review of Education Reforms (Anamuah-Mensah, 2002:30) even found 30 minutes per period inadequate, the recommended time was 33 minutes (i.e. five hours contact or instructional time for nine periods per day).

5.1.2 Class Size

The size of a class influences the teaching and learning process. The GES standard class size for the lower and upper primary levels is 35 maximum (Anamuah-Mensah,

2002:28). In the NRSC child traffic education, an estimated 500 pupils (q.v. 4.1) with different age groups formed a class. The danger is that, in a big class some children escape the teacher's attention. Besides, the subject being taught, with its corresponding teaching method and instructional time, may not be evenly receptive and acceptable to all age groups at the same time (Table 4.2). The Anamuah-Mensah Report (2002:41) advised that *"multi-class teaching is not the best if quality is to be assured in all schools"*

5.1.3 Curriculum Implementers

Trained teachers are expected to continue teaching the road safety course after the NRSC had had one teaching session in the school. This implies that curriculum implementers comprised both trained teachers in the GES and NRSC personnel. The conflicting point is that NRSC personnel are not GES-approved teachers (2.9.4).

5.1.4 Books

Three teachers' resource books were used (q.v. 4.1.5). The publishing and distribution of these books were at variance with the text book policy of the MOEYS. The policy indicates that publishing and distributing¹ text books are to be done by the private sector with 70% text book writing-teams being Ghanaian nationals (MOEYS, 2003:10). It is possible that if the policy were adhered to, all schools would have received copies of the text books. Adjikpo Dokuyo School represents the case of

¹ District Directors of Education were to supervise distribution of books from the depot to schools

remotely located schools which are not beneficiaries of the NRSC educational campaigns.

5.1.5 Child Access to Traffic Education

The NRSC educational campaigns targeted schools in the mainstream GES category of schools. Children in schools outside the GES scope, like Orphanages and Makaranta had not been beneficiaries of the programme.

5.2 Relationship between the NRSC and the GES

The idea of educating children on road safety is credible and achievable as has happened in other countries like Norway (q.v. 4.3.8.2). The study traced the problems associated with the implementation of the traffic education programme in schools to the operational relationship between the NRSC and the GES. The GES has procedures for administering the introduction of new subjects in schools at different levels of instruction. When French and Citizenship Education were introduced as new subjects of study at the upper primary level, they passed through a justification test (Anamuah-Mensah, 2002:29), which equally ensured that all other requirements were met. Teaching and learning of the subjects commenced without any problems relating to uneven distribution of text books. The NRSC's mode of operation is that the schools to be visited were given prior notice. The GES had not yet fully incorporated the road safety education programme into the school curriculum to allow independent teaching and learning from the NRSC's involvement.

5.3 Deriving System of Child traffic education

A learning theory, extracted from varied philosophies of existing theories is established by the study. This was premised on students' empirical positive behavioural changes dictated by respondents':

- (a) level of assimilation consequent of applied principles of child development and learning
- (b) projected cases of potential efficacy based on principles of child development and learning

Three major learning theories, the maturationist, environmentalist and constructivist theories were studied. These theories are built on the constituents of child development. The study pivots mainly on the constructivist theory of learning which proposes the learner's active and direct participation of the learning process, interaction with the environment and people around them, and motivation to seek solutions for themselves. The maturationist theory that learning occurs naturally along the biological processes of growth is acceptable to this study. The study, however, asserts that the growth of the child dictated by nature should be nurtured towards a desired objective. The study does not align with the rote-learning feature of the environmentalist theory but accedes with the proposition that the environment plays a key role in moulding the child's learning and behaviour. However, the environment exudes different data which the child assimilates by latent learning. These may include morally objectionable or irrelevant information. The use of art therapy diagnoses the state of the child's knowledge, making way for what is needed for improvements. Art therapy is subsequently used as a method of enhancing

knowledge. In this study a performance test was carried out on respondents who used art therapy in the study of road safety in relation to those who did not.

5.4 Performance Assessment of Respondents

Analyses of results from respondents' coded behaviour in traffic were done in two different stages. First, assessment was by group (or en-bloc) performance, and second, by specific performance. This was applied to respondents in both schools.

5.4.1 St. Peter's School

In St. Peter's School, there were two groups of respondents, the Control Group and the Test Group. Though focus was on the Test Group, the relativity of the Control Group proved the effectiveness of the teaching method for the Test Group. The Control Group, therefore, served as a relative measure for the Test Group. Assessment of performance was as follows:

- (a) Performance of the Control Group in the pre-survey and post-survey
- (b) Performance of the Test Group in the pre-survey and post-survey
- (c) Relative performance of Test Group and Control Group in pre-survey
- (d) Relative performance of Test Group and Control in post-survey

5.4.1.1 Performance of the CG in the pre-survey and post-survey

Performance improvement of the Control Group was computed as $X(\text{cgA}) - X(\text{cgB})$, where X = mean, cg = control group, A = after (post-survey), B = before (pre-survey).

Thus:

(a) First observation

$$13 (\text{cgA}) - 14 (\text{cgB}) = -1$$

(b) Second observation

$$14 (\text{cgA}) - 14 (\text{cgB}) = 0$$

(c) third observation

$$19 (\text{cgA}) - 16 (\text{cgB}) = 3$$

(d) Forth observation

$$15 (\text{cgA}) - 15 (\text{cgB}) = 0$$

Group performance of the Control Group showed no significant improvement. In the first observation, the mean score of the Control Group in the pre-survey was 14, which dropped to 13 in the post-survey. In the second observation, the mean score improved back to 14 in the pre-survey and remained same in the post-survey. This means that improvement in the second observation was static. The third observation

recorded a sharp improvement of 19, which however, dropped by a difference of 3 (that is 16 mean score). In the forth observation, the mean score in the pre-survey further dropped 15 and remained static in the post survey. The performance improvement data of the Control Group is graphically represented as in Figure 5.1.

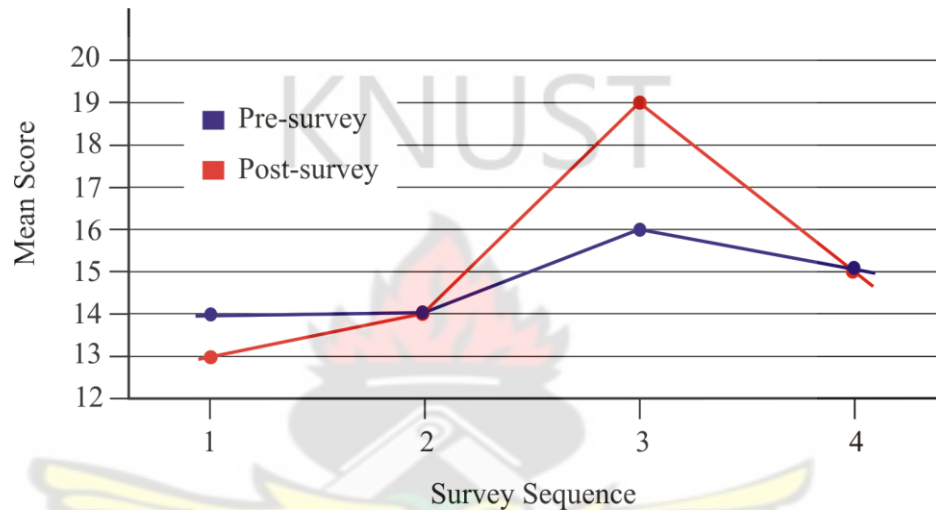


Figure 5.1: Relative performance of Control Group in pre-survey and post-survey

5.4.1.2 Performance of TG in the pre-survey and post-survey

Performance improvement of the Test Group was computed as $X(tgA) - X(tgB)$, where X = mean, tg = test group, A = after (post-survey), B = before (pre-survey).

Thus:

(a) First observation

$$18 \text{ } tgA) - 11 \text{ (} tgB) = 7$$

(b) Second observation

$$26 \text{ (tgA)} - 21 \text{ (tgB)} = 5$$

(c) Third observation

$$33 \text{ (tgA)} - 25 \text{ (tgB)} = 8$$

(d) Forth observation

$$37 \text{ (tgA)} - 33 \text{ (tgB)} = 4$$

In the first pre-survey of the Test Group, respondents' performance was relatively poor. They scored 11 as compared to 14 by the Control Group in the first pre-survey. This is attributed to the difference in the depth of knowledge of traffic education that each group had at the start of the study. From the first post study, however, the Test Group showed significant steady improvement in both the pre-survey and post-survey. In 5.4.1.2, respondents' performance in the pre-survey showed a progressive improvement of 18, 26, 33, 37, indicating a difference of 8 between first and second observation, that is $26 \text{ (tgA2)} - 18 \text{ (tgA1)}$, where 1 = first observation, and 2 = second observation; a difference of 7 between the second and third observation, that is $33 \text{ (tgA3)} - 26 \text{ (tgA2)}$, where 2 = second observation and 3 = third observation; a difference of 4 between the third and forth observation, that is $37 \text{ (tgA4)} - 33 \text{ (tgA3)}$.

In 5.4.1.2, performance of respondents in the post-survey equally showed an improvement in every stage of the observation thus 11, 21, 25, 33, indicating a difference of 10 between first and second observation, that is $21 \text{ (tgB2)} - 11 \text{ (tgB1)}$, where 1 = first observation, and 2 = second observation; a difference of 4 between

the second and third observation, that is 25 (tgB3) - 21 (tgB2), where 2 = second observation and 3 = third observation; a difference of 8 between the third and forth observation, that is 33 (tgB4) - 25 (tgB3). Improvement in the pre-study and post-study are graphically indicated in Figure 5.2.

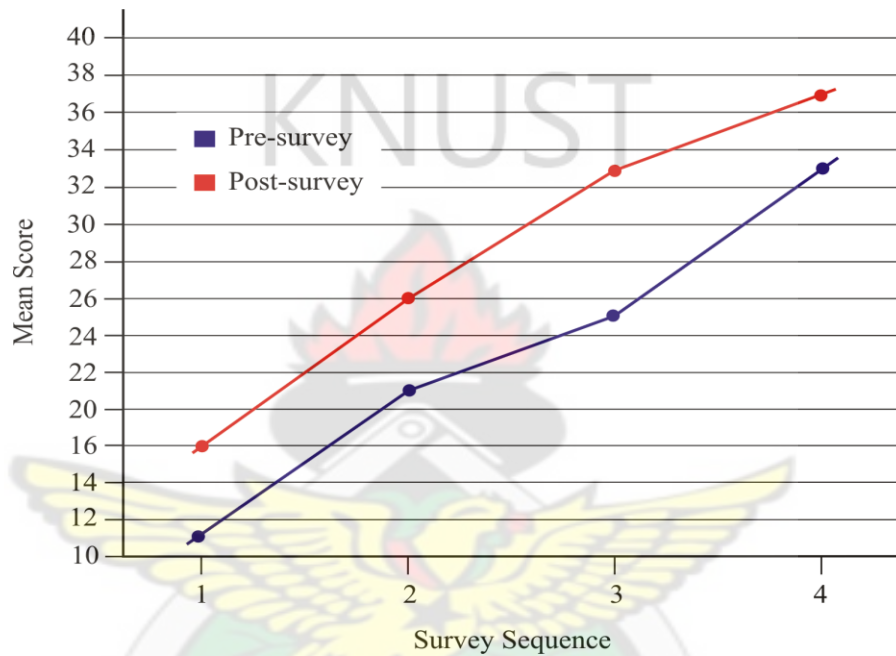


Figure 5.2: Relative performance of Test Group in pre-survey and post-survey

5.4.1.3 Relative Performance of TG and CG in the pre-survey

Relative performance of the Test Group and Control Group was computed as $X(tgB)$ $X(cgB)$, where X = mean, tg = test group, B = before (pre-survey).

Thus:

$$(a) \text{ Mean values of Test Group in pre-survey} = 11_{(1)} \quad 21_{(2)} \quad 25_{(3)} \quad 33_{(4)}$$

(b) Mean values of Control Group in pre-survey = 14₍₁₎ 14₍₂₎ 16₍₃₎ 15₍₄₎

Where (1), (2), (3), (4) = survey sequence.

In the first observation, the Control Group performed better than the Test Group by a mean score difference of 3 (that is 11(tgB) - 14(cgB)). From the second observation onwards, the Test Group performed better. The Test Group improved by a difference of 7 (that is 21(tgB) - 14(cgB)), 9 (that is 25(tgB) - 16(cgB)), 18 (that is 33(tgB) - 15(cgB)) respectively in the second, third and fourth observations. The performance relationship is graphically represented in Figure 5.3.

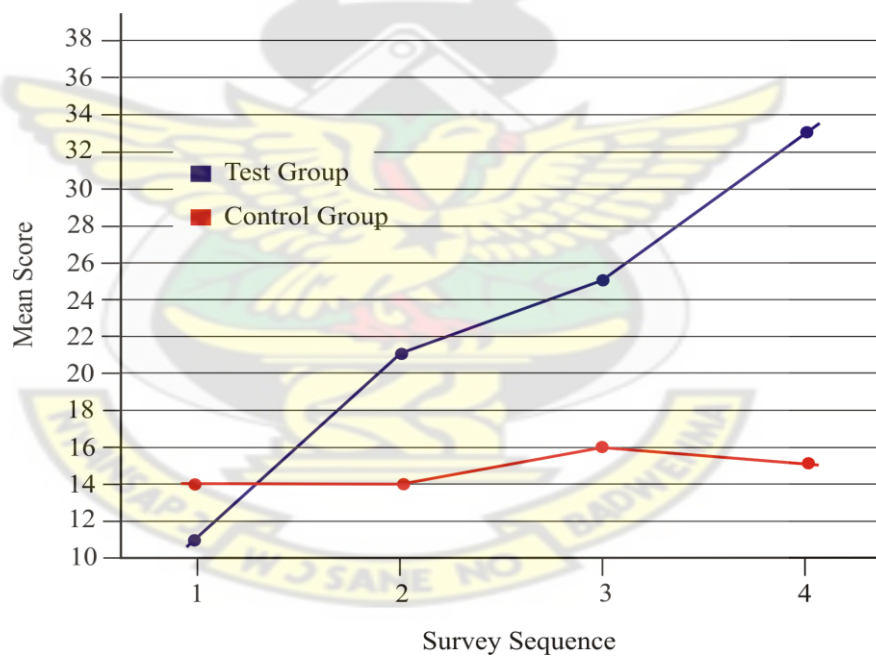


Figure 5.3: Relative performance of Test Group and Control Group in pre-survey

5.4.1.4 Relative Performance of TG and CG in the post-survey

Relative performance of the Test Group and Control Group was computed as $X(tgA) - X(cgA)$, where X = mean, tg = test group, A = after (post-survey).

Thus:

(a) Mean values of Test Group in post-survey = 18₍₁₎ 26₍₂₎ 33₍₃₎ 37₍₄₎

(b) Mean values of Control Group in post-survey = 13₍₁₎ 14₍₂₎ 19₍₃₎ 15₍₄₎

Where (1), (2), (3), (4) = survey sequence.

From the time the Test Group participated in the therapy sessions, its performance improved after the poor performance in the pre-survey, and remained progressively better in the other observations. In the first observation, the Test Group performed better than the Control Group by a mean score difference of 5 (that is $18(tgA) - 13(cgA)$). The Test Group performed exponentially better. The Test Group improved by a difference of 12 (that is $26(tgA) - 14(cgA)$), 14 (that is $33(tgA) - 19(cgA)$), 22 (that is $37(tgA) - 15(cgA)$) respectively in the second, third and fourth observations. The performance relationship is graphically represented in Figure 5.4.

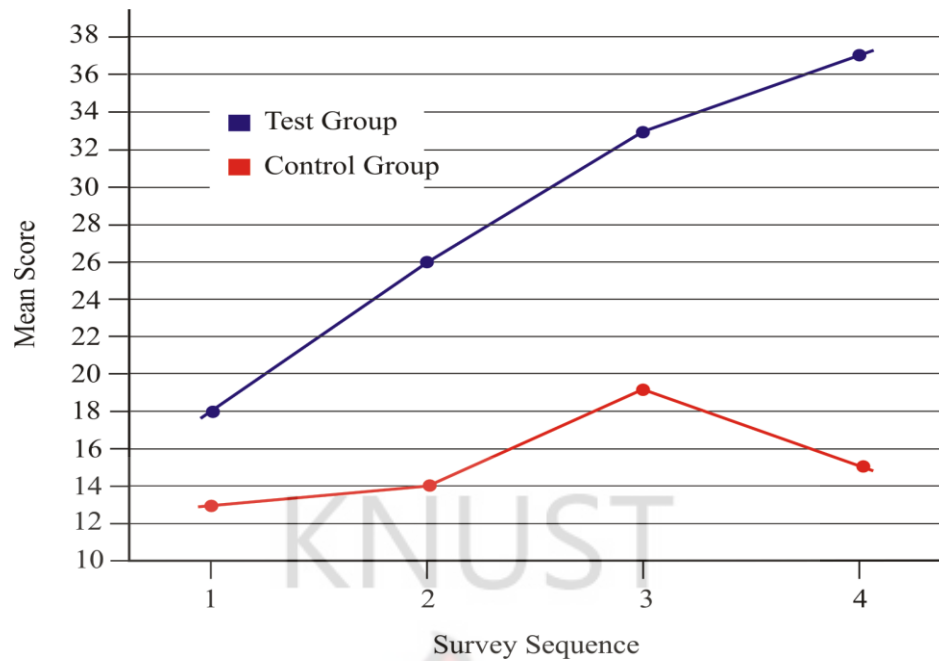


Figure 5.4: Relative performance of Test Group and Control Group in post-survey

5.4.2 Adjikpo Dokuyo School

In Adjikpo Dokuyo School, unlike St. Peter's School, only one group formed respondents that was studied in both the pre-survey and post-survey. Assessment was therefore limited to the performance of respondents in the pre-survey and post-survey. Performance of respondents was computed as $X(rA) - X(rB)$, where X = mean, r = respondents, A = after (post-survey), B = before (pre-survey).

Thus:

(a) First observation

$$3(rA) - 1(rB) = 2$$

(b) Second observation

$$5 (rA) - 4 (rB) = 1$$

(c) Third observation

$$7 (rA) - 5 (rB) = 2$$

(d) Forth observation

$$8 (rA) - 7 (rB) = 1$$

Before Adjikpo Dokuyo respondents participated in the therapy session, their behaviour in traffic was poor ($x \leq 0$, where x = at least one coded behaviour). After the first therapy session, however, respondents showed improvement which was maintained till the forth observation. In the first observation, respondents performed poorly in the pre-survey and better in the post-survey by a mean score difference of 2 (that is $3 (rA) - 2 (rB)$). In the second observation, the difference in mean score dropped to 1 (that is $5 (rA) - 4 (rB)$). The difference in mean score again rose to 2 (that is $7 (rA) - 5 (rB)$), in the third observation. By the last (forth) observation, specific performance in some traffic behaviours had improved exceedingly in grades like 82%, but the degree of change was as minimal as 1 (that is $8 (rA) - 7 (rB)$). The performance relationship of respondents in the pre-survey and post-survey is graphically represented in Figure 5.5.

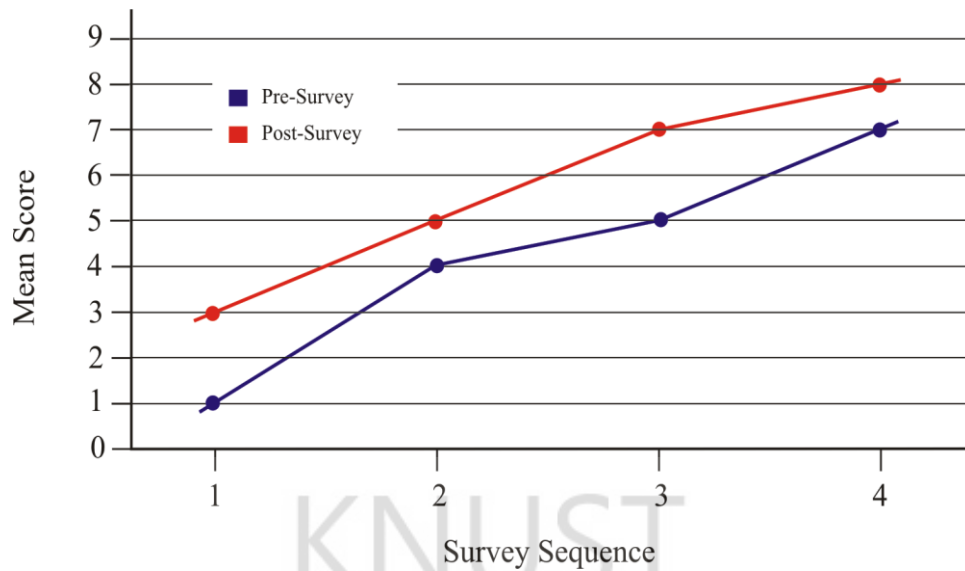


Figure 5.5: Relative Adjikpo Dokuyo respondents in the pre-survey and post-survey

5.5 Specific Performances

5.2.1 St. Peter's School

Specifically, the traffic action in which respondents performed best ($x \geq 50\%$, where x = all performances in one coded behaviour) was the style of crossing the road. This means that a greater number of respondents stopped at the kerb before crossing the road. The least score was 50%, by the Test Group in the first observation of the pre-survey. The highest score was 95%, by the same Test Group in forth observation of the post-survey.

5.6 Performance Improvements

The preceding analyses show that the art therapy sessions had a tremendous impact on the Test Group. From the first participation, respondents in the Test Group showed significant improvement in performance. The Control Group which had had the conventional road traffic education did not improve in performance. Performance of respondents in the Control Group fluctuated between 14 in the pre-survey and 15 in the survey, with the modal performance being 19. Performance of the Test Group improved from 11 in the pre-survey to 37 in the post survey.

5.7 ANOVA Computations

Anova (Appendix 5 to 24) was also used to compute respondent performances, and results tabulated (Table 4.5) to show performance differences. Numbers one to 16 represent St. Peter's School respondents while numbers 17 to 20 are Adjikpo Dokuyo School respondents. Each segment (numbers one to four, five to eight, nine to twelve, 13 to 16) represents a four serial survey sequence computed from Tables 4.3 to 4.6. Unlike St. Peter's School respondents, there was only group for the study in Adjikpo Dokuyo School. Accordingly, the before and after study was applied to one group in all the four serial survey giving a minimal computational data all contained in numbers 17 to 20 (Table 4.5). Regarding St. Peter's School, four categories of computations were done. These are:

- (i) The difference between final and initial performance of the Test Group

- (ii) The difference between final and initial performance of the Control Group
- (iii) Performance difference between Test Group and Control Group in the pre-survey
- (iv) Performance difference between Test Group and Control Group in the post-survey

The 95% confidence limits of the mean $\bar{X} \pm (ts / \sqrt{n})$ (Appendix 26) as stipulated by Loveday (1971:188), were used; where:

t is the $p = 5\%$ value of the t -distribution for $\nu = (n - 1)$

s = sample standard deviation

ν = degree of freedom (q.v. 1.10)

n = number of tasks required of respondents in the road crossing activity.

Performances less than the t -value of 2.45 (appendix 25) were rated insignificant. Consequently, the Test Group (numbers one to four, Table 5.1) showed significant improvements at each level of the survey. The Control Group (numbers five to eight, Table 5.1) did not improve in performance. Performance fluctuated at the survey levels insignificantly. Comparing the Test Group and Control Group (numbers nine to twelve, Table 5.1), performance of the Test Group in the first survey (numbers nine, Table 5.1) was relatively insignificant. This could be largely due to the superior traffic knowledge advantage of the Control Group which comprised members of the Road Safety Club. After going through the therapy sessions, however, the Test Group improved significantly in performance (numbers 10 to 12, Table 5.1), though

there was a slight drop in number 11. The performance improvement of the Test Group showed exponentially in the post-survey (numbers 13 to 16, Table 5.1).

Adjikpo Dokuyo School respondents exhibited low perceptual abilities and a relatively little knowledge of traffic safety during therapy sessions. However, the Adjikpo Dokuyo school respondents eventually scored higher than the St. Peter's School respondents. This could be largely because of the small group instruction type of teaching which gave detailed attention to every child individually. By comparison, in St. Peter's School, time for interaction during therapy sessions was not enough to allow a 100% participation of respondents at all times. In Norway, a similar situation in urban Oslo and non-urban Jessheim, Fyhri (2004:206) attributed the small group instruction comprising 4 – 5 children (as against 6 – 7 children for Jessheim) respectively, as one of the reasons which possibly accounted for the better performance of the Oslo group.

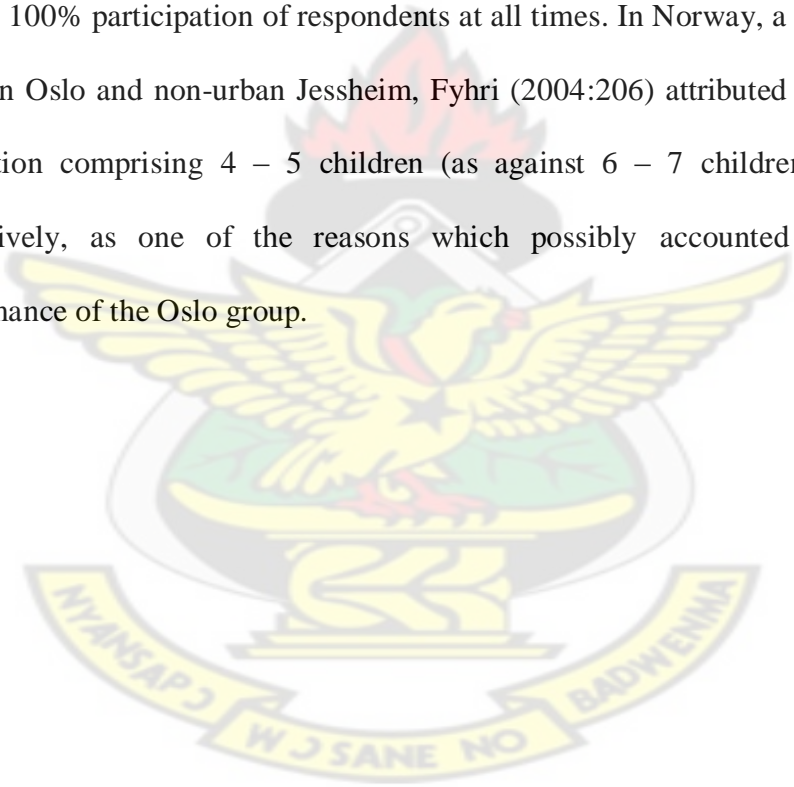


Table 5.1: ANOVA sample analyses using *t*-test

No	App	Survey	Mean Df \bar{D}	SSDev \bar{S}_D	$t \text{ cal} = \frac{\bar{D}}{\bar{S}_D}$	t-values at p= 5%
1	5	tgA – tgB (1)	6.86	1.91	2.64	2.45
2	6	tgA – tgB (2)	8.00	1.98	4.05	2.45
3	7	tgA – tgB (3)	7.57	1.36	5.57	2.45
4	8	tgA – tgB (4)	3.29	0.52	6.30	2.45
5	9	cgA – cgB (1)	- 0.86	0.91	- 0.94	2.45
6	10	cgA – cgB (2)	0.43	1.04	0.41	2.45
7	11	cgA – cgB (3)	2.86	1.47	1.94	2.45
8	12	cgA – cgB (4)	0.00	1.22	0.00	2.45
9	13	cgB – tgB (1)	3.43	1.56	2.22	2.45
10	14	cgB – tgB (2)	7.29	1.15	6.35	2.45
11	15	cgB – tgB (3)	9.14	1.80	5.10	2.45
12	16	cgB – tgB (4)	18.57	1.84	10.1	2.45
13	17	tgA – cgA (1)	4.86	0.88	5.50	2.45
14	18	tgA – cgA (2)	14.86	1.71	8.69	2.45
15	19	tgA – cgA (3)	13.86	2.26	6.13	2.45
16	20	tgA – cgA (4)	21.86	2.79	7.84	2.45
17	21	AD (A – B) (1)	2.00	0.22	9.09	2.45
18	22	AD (A – B) (2)	1.00	0.31	3.24	2.45
19	23	AD (A – B) (3)	1.14	0.14	8.00	2.45
20	24	AD (A – B) (4)	1.00	0.22	4.55	2.45

No: number; App: Appendix; Mean Df: Mean difference; SSDev: Sample Standard deviation; t cal: t calculations; t-values at p: convergence of 5% confidence level at the distribution table; tgA: Test Group in the post-survey; tgB: Test Group in the pre-survey; cgA: Control Group in the post-survey; cgB: Control Group in the pre-survey; AD: Adjikpo Dokuyo

5.8 New Approach to Child Traffic Education

The model is based on philosophies of the constructivist, maturationist and environmentalist learning theories which stipulate that children must:

- (a) have direct participation in the learning process
- (b) interact adequately with the environment and people
- (c) by themselves find solutions to problems
- (d) be nurtured from the nature of the child as moulded by the environment

5.8.1 Approach

5.8.1.1 Classroom setting

The class must be made up of age cohorts not exceeding the stipulated GES class size of 35. The sitting arrangement must be the small group instruction type of five children per group.

5.8.1.2 Art therapy

The art therapy method of teaching road safety is to be used. First, children must be told a story on road safety. Second, the children should produce drawings out of the story. Third, children should tell the story of their drawings to the class. Fourth, children should ask questions or make contributions to the story.

5.8.1.3 Scaffolding

At this time, the teacher should take account of the questions and contributions and modify them to correctness. The teacher must not necessarily provide answers but help the children to reach correct answers.

5.8.1.4 Heuristics

Where there is difficulty in finding solutions, children must be made to explore further after a day or two of interacting with the environment, and some more therapy sessions.

5.8.1.5 Zone of Proximal Development (ZPD)

Taking advantage of the small group instruction type, teacher should monitor to ensure that each child reaches the ZPD (q.v. 4.4.1.1.1).

5.9 Research Questions

The research questions are revisited to ascertain the extent to which they have been answered

- (a) Why is child traffic fatality high irrespective of the intense road traffic education for children?

(b) Why is child traffic behaviour incommensurate with the intensity of road traffic education for children?

The study established that the conventional “look left and right before crossing the road” was too much geared towards rote learning which hardly affected child behaviour. Long before the National Road Safety Commission formally introduced traffic education in basic schools, that type of learning was operational in schools. The formal introduction of traffic education in schools saw an improvement in child road safety though insignificant. The NRSC educational campaigns were more ad-hoc, fast, defied age-group categorisation, and lacked evaluation.

By contrast, this study proved that, a more child-centered approach of teaching, established on the theories of child development is more effective. Using art therapy as a means of teaching, child behaviour in traffic was measured, and real changes in behaviour were found (q.v. 5.4.1 to 5.7). Significantly, children helped one another to find their own answers to some road safety problems which came up.

CHAPTER SIX

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1 Summary of Findings

6.1.1 Impact of NRSC Educational Campaigns

The child traffic educational campaigns launched by the NRSC proved worthwhile. Until child traffic education was introduced into basic schools, children did not have a direct and exclusive traffic education independent of the general adult-bias education. Child traffic educational campaigns equipped children with at least, the fundamentals of road safety. There were manifestations of learning efforts in the formation of Road Safety Clubs in schools, and improved behaviour of children in traffic. This showed in the behaviour of children in schools which had been beneficiaries of the NRSC educational campaigns (eg. St. Peter's School, Kumasi), compared to the relatively poor behaviour of respondents from schools which had not benefitted from the NRSC educational campaigns.

6.1.2 Continuation of Traffic Education in Schools

The NRSC educational campaign which was to be preparatory for a more traditional classroom-based teaching and learning was found not to have been continued by the schools. The materials (instructional media) left in the schools by the NRSC were seldom used for teaching and sparingly used by members of the Road Safety Club.

6.1.3 Distribution of Text Books and Traffic Teaching and Learning Materials

The method of operation of the NRSC in its educational campaign affected the distribution of traffic teaching and learning materials in the schools. Teaching and learning materials were left in the schools that NRSC visited on its campaign trails. That means, schools which were not visited by the NRSC did not receive any of the teaching and learning materials, and therefore child traffic education did not take place in those schools

6.1.4 Class Size

It was found that the class size for the educational campaigns was too large for effective teaching and learning to take place. The children being taught formed a crowd of spectators instead of a class of learners. The slightest of distractions was enough to sway the children away as happened in a teaching session in St. Peter's where learners rushed to follow a vehicle which moved into the school yard during a teaching session (q.v. 4.3.1; Plate 4.7).

6.2 Conclusions

Child traffic education in Ghana was found to have seen some improvements in terms of exclusive educational campaigns, provision of child-suitable textbooks and improved teaching methods for children. These were, however, found to be the conventional teaching and learning processes, which have become obsolete and only remain as fundamental auxiliaries for improved and more interactive child-containable teaching methods.

In many countries where child traffic has been successful, it was found that new teaching methods established on behaviour-affecting principles were used (q.v. 2.7). Some of these were teaching by means of the Table-top Model, artificially-simulated traffic environment and the Treasure Trail Model (q.v. 2.7; Plates 2.2 to 2.5). In a parallel development, this study used art therapy as a major method in teaching road safety to children. That significant changes in behaviour were recorded indicates that art therapy is conclusively commendable for child traffic education.

The teaching methods and teaching aids used by the NRSC in its educational campaigns were good, though not properly administered. The large crowd, forming a class was one reason for the poor administration of teaching methods and use of teaching aids.

Educational campaigns of the NSRC were limited to easily accessible areas. Remote rural areas like Adjikpo, did not receive education from the NRSC as well as text books distributed by the Commission. The child traffic education instituted by the NRSC was therefore not nation-wide.

6.3 Recommendations

6.3.1 Inclusion of other Professionals in Child Road Traffic Education

The broad spectre of road safety has been managed and administered largely by Civil and Transportation Engineers. The 2001 - 2005 Road Safety Strategy in Ghana, for the first time, brought teachers on board the programme to assist in road safety aspects relating to education. There was an improvement, possibly because teachers are better trained for education.

In child road safety, the child is the central point of attention to which safety precautions are applied. The biological, cognitive and social constitution of the child make him a unique subject of study. It is recommended that Psychologists and their related allies, such as Child Developmentalists and Art Therapists should be involved in the educational process of the child in road safety.

The involvement of Psychologists and other related professionals in road traffic education is not a new phenomenon. In developed countries such as the United Kingdom and Sweden, the expertise of psychologists are utilised for the course of road safety. The inference is that, road safety authorities in Ghana are conservative in their approach to child traffic education, or are not abreast of trends in child studies and therefore lack the confidence to implement this recommendation long acclaimed. To disillusion safety authorities of this flu, the media could be used to publish the success stories of countries which have used such expertise to achieve results.

6.3.2 Perceptions of Art

From the study, it was found that, art as a subject of study at the basic school level was at a low ebb, as compared to the same study of art in European schools. The study established that art forms a basis for the child's cognitive skills or development. If drawings of respondents from European schools showed a better semiological advancement over the drawings of their counterparts in Ghana and other African countries (q.v. 4.5.2), then it logically follows that art is pivotal in the cognitive development of the child. Conscientising the people of Ghana, especially parents, to see the essence of art in child development would assist in elevating the

study of art as well as its spontaneous explorations by children. General observation shows that, in Ghana, many children are scolded by their parents for scribbling or engaging in other forms of art activities. They are told to stop playing or stop doing art and study something more 'serious'. The general adult perception of art must first be changed to prepare a healthy parental acceptance of it and its subsequent development as a core subject.

6.3.4 Junior Highway Code

The emergence of exclusive traffic education for children has brought along with it books on child road safety, designed and written to suit the level of the child. One publication, the Highway Code, which is indispensable in traffic literature, has, in many countries, been abridged for child-use, and is known to be yielding positive results. It is recommended that the same is done in Ghana. In areas where the traffic environment is deficient in traffic communication symbols, at least, the Junior Highway Code could make up for enlightening the child's visual fields, which would be useful in the emerging art-related traffic studies for children.

6.3.5 Objectives of Child Road Safety Education

Road traffic education for children has mostly thrived on too broad objectives such as reducing fatalities among children. Such broad objectives usually miss the specific details of the varied characteristics of the child, as an individual, groups of individuals in a bigger group, and the universal group itself forming the class being taught. Child road safety objectives should be largely reduced to smaller units

containing a defined period of study and results measured before moving to another level of teaching. It is such objectives that could make provision for such unfamiliar issues as child behaviour modifications that would require the use of art therapy, for instance.

6.3.6 Teachers and Teaching Methods

The biological composition of the child is different from that of the adult. Mostly, in Ghana, the teaching methods used for adults are the same teaching methods used for children. It is recommended that more child-centered approaches should be employed in the teaching of child road safety. Art therapy is recommended.

6.3.7 Traffic-induced Environment

As per the environmentalist theory of education, the environment is a fundamental base influencing the maturational learning process of the child. The traffic environment, in this case, plays a role in building up the child's perceptive fields. The traffic environment in Ghana, especially in the rural communities, is poorly projected. Drawings of respondents in the rural area in this study showed their inadequate knowledge of traffic (q.v. 4.5.2). To aid the child's learning ability, the environment in which he lives must be rich in things expected of the learner. Traffic environments must be taken into consideration if the NRSC educational objectives are to be achieved.

6.3.8 Re-design Simulated Zebra Crossing

The components of the simulated Zebra Crossing (Figure 4.3; Plate 4.4) used by the NRSC in its teaching campaign were not properly related to depict Zebra Crossing in exact-reality. The child's brain is likely to confuse the two when it comes to using the road. It is recommended that the NRSC redesigns the Zebra Crossing for better teaching and learning processes.



REFERENCES

- Abantanga F. A., & Mock C. N. (1998). *Childhood Injuries in an Urban Area of Ghana. A Hospital-Based Study of 677 Cases*. Springer Berlin p.515 – 518
- Afukaar F. K. (2001). The Characteristics of Pedestrian Accidents in Ghana. *Journal of Building and Road Research*, CSIR-BRRI, Kumasi, Ghana. 7(1).
- Afukaar F. K., & Ackaar W. (2006). *Fatal Road Traffic Accidents Involving Children*. Kumasi: CSIR-BRRI
- Afukaar F. K., & Agyeman W. (2006). *Travel Pattern of Urban School children in the Kumasi Metropolis*. *Journal of Building and Road Research*, CSIR-BRRI, Kumasi, Ghana.10 (1, 2).
- Amenuke S. K. (1976). *A Comprehensive Plan for Primary Art Education in Ghana*. Unpublished Ph.D. thesis submitted to the School of Art and Design, University of Cincinnati, Ohio, USA.
- Ampofo-Boateng, K. & Thomson J. A., (1991). *Children's Perception of Road Safety and Danger on the Road*. *British Journal of Psychology*. 11
- Anamuah-Mensah J. (2002). *Meeting the Challenges of Education in the Twenty First Century. Report of the President's Committee on Review of Education Reforms in Ghana*. Accra: Adwinsa Publications Ltd
- Atta-Quayson J. (1999). *Atlas for Ghana*. London: Unimax Publishers Ltd. pp.8-9
- Awal, I. (2004). (Ed). *Develop Road Safety Ethics in Children*. In Road Safety Dialogue. Newsletter of the National Road Safety Commission.
- Badu N. S. (2002). *Are Our Roads Safe?* The Ghanaian Times. April 4. p. 6
- Berk L. E. (2001). *Why Children Talk to Themselves*. In Child Growth and Development (Eds Jun N E, & Boyatzis J C). Connecticut: Dushkin / McGraw-Hill. p.54
- Best, D. (1985). *Concepts and Culture*. *Journal of Multi-Cultural and Cross-Cultural Research in Art Education*, 3(1)
- Blishen, E. (1970). Ed: *Encyclopedia of Education*. New York: Philosophical Library Inc.
- Bruner J. S. (1969). *Culture, Politics and Pedagogy*. In S.K. Amenuke (1976). A

Comprehensive Plan for Primary Art Education in Ghana. Unpublished Ph.D. thesis submitted to the School of Art and Design, University of Cincinnati, Ohio, USA.

Case, C & Dalley, T. (2005). *Working with Children in Art Therapy*. New York: Routledge

Comhairle Contae Átha Cliath Theas (2008). *South Dublin*. Clondalkin, Dublin 24

Councill, T. (2003). *Medical Art Therapy*. In Malchiodi, C.A. (Ed) 2003. Handbook of Art Therapy. Guilford Publications.

Damsere-Derry, J. (2010). Assessment of Crash Risks Associated with Vehicles' Speeds in Ghana. Paper presented at the CSIR – BRRI Internal Seminar. March 23, 2010. p.24

Davidoff L. L. (1987). *Introduction to Psychology*. New York: McGraw-Hill Book Company

Dawson, J. (1967). *Cultural and Physiological Influences Upon Spatial Perceptual Processes in West Africa*. International Journal of Psychology. 2.

DeCos, P. L. (1997). *Readiness for Kindergarten: What does it mean?* Sacramento, CA, California Research Bureau, California State Library

Demetre, J. D. (1997). *Applying Developmental Psychology to Children's Road Safety: Problems and Prospects*. Journal of Applied Developmental Psychology. 18. Ablex Publishing Corporation.

Demetre, J. D., Lee D. N., Pitcairn, T. K., Grieve, R., Thomson J. A & Ampofo-Boateng, K. (1992). *Errors in Young Children's Decisions About Traffic Gaps: Experiments with Roadside Simulations*. British Journal of Psychology. 83.

Department for Transport (n.d). *Child Development and the aims of Road Safety Education* (No.01), London

Farrant J. S. (1998). *Principles and Practice of Education*. London: Longman Group Ltd.

Fourie, E., Coetzee J., & Raven A (2005). *Road Traffic Education for Children – The Use of Junior Traffic Training Centres*. Proceedings of the 24th Southern African Transport Conference, 11 -13 July. Pretoria, South Africa

Fyhri, A. Bjornskau T., & Ulleberg P. (2004). *Traffic Education for Children with a Tabletop Model*. Transport Research Part F, Elsevier

Hawes, H. & Scotchmer C. (1993). *Children for Health*. Werner Soderstrom Oy.

- Henley, D. R. (1992). *Exceptional Children, Exceptional Art. Teaching Art to Special Needs*. Davis Publications Inc.
- Hillman, M., Adams J., & Whitelegg J. (1990). *One False Move ... A Study of Children's Independent Mobility*. London: Institute for Policy Studies.
- Hunt, J.M. (1969). *The impact and limitations of the Giant of Developmental Psychology*. In D. Elkind & J. Flavell (Eds.), *Studies in Cognitive Development: Essays in Honour of Jean Piaget*. New York, Oxford University Press
- International Bible Society (1984). *The Holy Bible*. Michigan: Zondervan Corporation. p.1528-9 Matthew 19:14
- Kindler A. M. (ed) (1997). *Child Development in Art*. Virginia: National Art Education Association.
- Leedy P. D. & Ormrod J. E. (2005). *Practical research. Planning and design*. New Jersey: Pearson Prentice Hall
- Lee, D. N, Young, D. S & McLaughlin, C. M. (1984). *A Roadside Simulation of Road Crossing for Young Children*. *Ergonomics*. 17.
- Lee S. (1994). *Pedestrian Safety in Korea. Its Characteristics and Road Safety Measures*. *IATSS Research*. 18(1)
- Loveday R. (1971). *Statistics*. Cambridge: University Printing House.
- Mensah K. J., & Afukaar F. K. (2008). *Child Pedestrian Deaths in Ghana*. *Daily Graphic*. 24 November 2008. p.7
- Ministry of Education, Youth and Sports (2003). *Textbook Development and Distribution Policy for Basic Education*. MOEYS, Accra.
- Munday-Castle (1966). *Pictorial Depth Perception in Ghanaian Children*. *International Journal of Psychology*. 1.
- Murray, G. (1996). *Safe Ways. A Road Safety Educational Resource for Teachers of P5s*. Transport Research Laboratory
- Mustapha S. (2002). *The Carnage on our Roads*. *Daily Graphic*, September 25. p.28
- N.A. (2007). *Road Safety Commission takes education to classrooms*. *The Ghanaian Times*. September 24. p.14
- Nacino-Brown R, Oke F.E., & Brown D. P. (1982). *Curriculum and Instruction*. London and Basingstoke: Macmillan Press Ltd.

- National Liberation Council (1966). *White Paper on the Report of the Education Review Committee (Together with the Recommendations in Brief of the Education Review Committee and the Report of the Special Committee on Delimitation of Functions of University Institutions)*. Ministry of Information, Accra
- National Road Safety Commission (2006). National Road Safety Strategy II. 2006 – 2010. Ministry of Transportation, Accra.
- National Safe Kids Campaign (2003). *National Safe Kids Campaign: Promoting Child Safety to Prevent Unintentional Injury*.
www.safekids.org/tier2_rl.cfm/folder_id=540
- Nsiah-Achampong N. K. (2004). *The Impact of Traffic Education on Road Safety in Ghana. The Case of Selected Geographical Areas in Ashanti Region*. Unpublished MA thesis submitted to the School of Graduate Studies, KNUST, Kumasi.
- Ornstein A. C., & Lasley T. J. (1995). *Strategies for Effective Teaching*. New York: McGraw Hill. p.303-4
- Papalia E. D, Olds S. W, Fieldman R. D. (2004). *A Child's World. Infancy Through Adolescence*. New York: McGraw Hill
- Powell, D.R. (1991). *Strengthening Parental Contributions to School Readiness and Early School Learning*. Washington DC, US Department of Education
- Read, H. (1964). *Education Through Art*. London: Faber and Faber Ltd
- Rothengatter, J. A. (1981). *The Influence of Instructional Variables on the Effectiveness of Traffic Education*. Accident Analysis and Prevention, 13
- Sandels, S. (1975). *Children in Traffic*. In Zeedyk M. S., Wallace L., & Spry L. (2002). *Stop, Look, Listen? What young children Really do when crossing the road*. Accident Prevention Analysis. Elsevier.
- Santrock, J. W. (1998). *Children*. Iowa: Brown and Benchmark
- Santrock, J. W. (1995). *Children*. Iowa: Brown and Benchmark
- Santrock, J. W. (2004). *Child Development*. New York: McGraw-Hill.

- Schagen, I. V., & Rothengatter T. (1997). *Classroom Instructions versus Roadside Training in Traffic Safety Education*. Ablex Publishing Corporation
- Solomon-Ayeh, B. E. (2009). *The Spatial Dynamics of Street Trading in Ghana and Its Implications for Policy*. Unpublished PhD dissertation submitted to the School of Graduate Studies, Kwame Nkrumah University of Science and Technology, Kumasi – Ghana. p.120
- Tanner D., & Tanner L. N. (1980). *Curriculum Development. Theory into Practice*. New York: Macmillan Publishing Co. Inc.
- Thomson, J. A., & Tagg, M. (1992). *An Ecological Approach to Spatial Orientation and Action Planning*. Paper presented at the Second European Conference in Ecological Psychology, Glasgow
- Tight, M (1996). *A Review of Road Safety Research on Children as Pedestrians. How Far Can We Go Towards Improving Their Safety*. IATSS Research. 20(2)
- Tyler, R.W (1957). *The Curriculum - Then and Now*. In D. Tanner and L.N. Tanner (1980): *Curriculum Development. Theory into Practice*. New York: Macmillan Publishing Co. Inc.
- United Nations Children's Fund (2004). *UNICEF at a Glance*. New York: The United Nations Children's Fund. p.20
- Wheeler D. K. (1967). *Curriculum Process*. Hodder and Stoughton, London: Sydney
- Wimmer D. R., Dominick J. R. (1987). *Mass media research. An introduction*. Belmont: Wadsworth Publishing Corporation
- Will K. E. (2005). *Child Passenger Safety and the Immunity Fallacy: Why What We Are Doing Is Not Working*. Accident Prevention and Analysis, Elsevier Science Ltd, Netherlands.
- Woode, H. (2003). *Presidents in Accidents*. Daily Graphic. April 24. p.7
- International Bible Society (1984). *The Holy Bible, New International Version*. Colorado Springs. Matt 10:13 – 16
- World Health Organisation (2007). *Youth and road safety*. Geneva: WHO Press.
- Wuest, D., and Lombardo, B., (1994). *Curriculum and Instruction. The Secondary School Physical Education Experience*. London: Mosby
- www.answers.com/topic/romanticism. march 15, 2010
- www.blurtit.com/q680891.html. March 15, 2010.

Zeedyk M. S., Wallace L., & Spry L. (2002). *Stop, Look, Listen? What young children Really do when crossing the road*. Accident Prevention Analysis. Elsevier

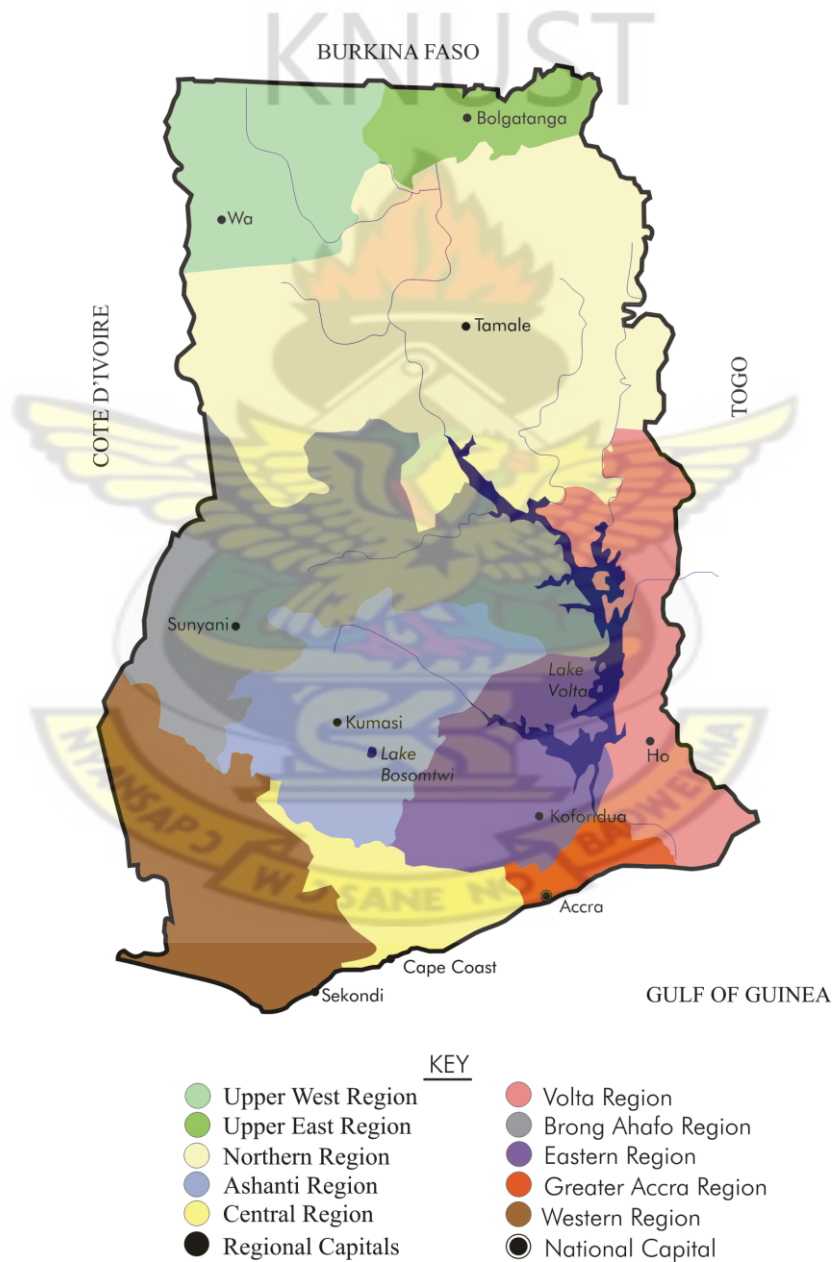
KNUST



APPENDICES

Appendix 1

Political map of Ghana



(Source: Atta-Quayson, 1999)

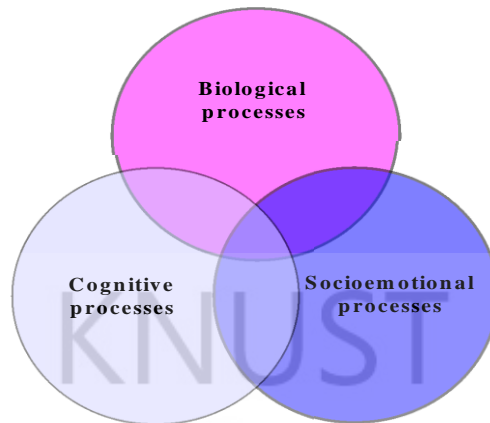
Appendix 2

Map of the Republic of Ireland showing location of Dublin



Appendix 3 (a):

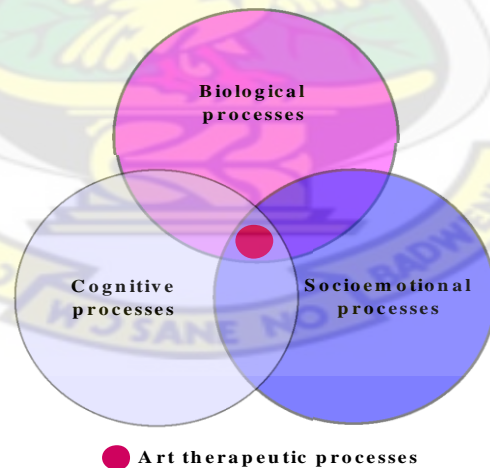
Biological, cognitive and socio-emotional processes. Changes in development are the result of Biological, cognitive and socio-emotional processes. These processes are interwoven as the child develops.



(Source: Santrock, 1998)

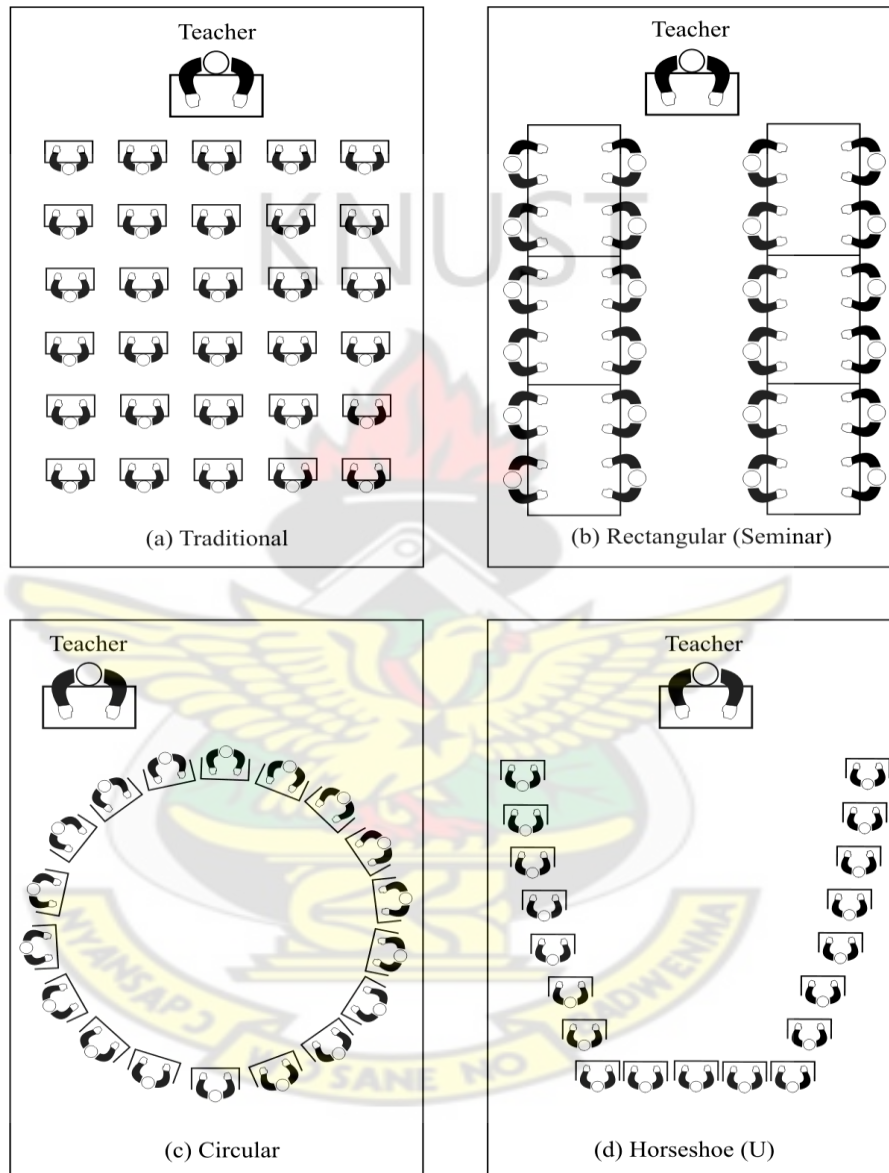
Appendix 3 (b):

Researcher's redefinition of Santrock's biological, cognitive and socio-emotional processes to indicate the central function of art therapeutic processes



Appendix 4

Types of Classroom Arrangement



(Source: Ornstein and Lasley, 1995)

Appendix 5

Observation 1: Performance of Test Group in the pre-survey and post-survey

Tasks	1	2	3	4	5	6	7	Total
tgB (x)	4	20	6	13	6	7	19	75
tgA (y)	11	30	10	15	10	16	35	127
$D_i = y - x$	7	10	4	2	4	9	16	52
$(D_i - \bar{D})^2$	0.20	6.60	11.80	29.50	11.18	2.50	73.44	135.84

$$\bar{D} = \frac{7 + 10 + 4 + 2 + 4 + 9 + 16}{7} = \frac{52}{7} = 7.43$$

$$S_{\bar{D}} = \sqrt{\frac{\sum (D_i - \bar{D})^2}{n - 1}} = \sqrt{\frac{135.84}{6}} = \sqrt{22.60} = 4.753$$

$$\hat{S}_{\bar{D}} = \frac{S_{\bar{D}}}{\sqrt{n}} = \frac{4.753}{\sqrt{7}} = \frac{4.753}{2.646} = 1.80$$

$$t_{cal} = \frac{\bar{D}}{\hat{S}_{\bar{D}}} = \frac{7.43}{1.80} = 4.13$$

Appendix 6

Observation 2: Performance of Test Group in the pre-survey and post-survey

Tasks	1	2	3	4	5	6	7	Total
tgB (x)	13	32	12	18	15	19	37	146
tgA (y)	20	34	25	28	30	27	38	202
$D_i = y - x$	7	2	13	10	15	8	1	56
$(D_i - \bar{D})^2$	1	36	25	4	49	0	49	164

$$\bar{D} = \frac{7 + 2 + 13 + 10 + 15 + 8 + 1}{7} = \frac{56}{7} = 8$$

$$S_{\bar{D}} = \sqrt{\frac{\sum (D_i - \bar{D})^2}{n - 1}} = \sqrt{\frac{164}{6}} = \sqrt{27.333} = 5.228$$

$$\hat{S}_{\bar{D}} = \frac{S_{\bar{D}}}{\sqrt{n}} = \frac{5.228}{\sqrt{7}} = \frac{5.228}{2.646} = 1.976$$

$$t_{cal} = \frac{\bar{D}}{\hat{S}_{\bar{D}}} = \frac{8}{1.976} = 4.04$$

Appendix 7

Observation 3: Performance of Test Group in the pre-survey and post-survey

Tasks	1	2	3	4	5	6	7	Total
tgB (x)	25	30	23	20	28	21	31	178
tgA (y)	31	32	34	28	35	34	37	231
$D_i = y - x$	6	2	11	8	7	13	6	53
$(D_i - \bar{D})^2$	2.47	31.04	11.76	0.18	0.33	29.47	2.47	77.71

$$\bar{D} = \frac{6 + 2 + 11 + 8 + 7 + 13 + 6}{7} = \frac{53}{7} = 7.571$$

$$S_{\bar{D}} = \sqrt{\frac{\sum (D_i - \bar{D})^2}{n - 1}} = \sqrt{\frac{77.71}{6}} = \sqrt{12.952} = 3.599$$

$$\hat{S}_{\bar{D}} = \frac{S_{\bar{D}}}{\sqrt{n}} = \frac{3.599}{\sqrt{7}} = \frac{3.599}{2.646} = 1.3602$$

$$t_{cal} = \frac{\bar{D}}{\hat{S}_{\bar{D}}} = \frac{7.571}{1.3602} = 5.566$$

Appendix 8

Observation 4: Performance of Test Group in the pre-survey and post-survey

Tasks	1	2	3	4	5	6	7	Total
tgB (x)	30	36	31	32	33	35	37	234
tgA (y)	35	38	36	34	37	38	39	257
$D_i = y - x$	5	2	5	2	4	3	2	23
$(D_i - \bar{D})^2$	2.94	1.65	2.94	1.65	0.51	0.08	1.65	11.43

$$\bar{D} = \frac{5 + 2 + 5 + 2 + 4 + 3 + 2}{7} = \frac{23}{7} = 3.29$$

$$S_{\bar{D}} = \sqrt{\frac{\sum (D_i - \bar{D})^2}{n - 1}} = \sqrt{\frac{11.475}{6}} = \sqrt{1.9124} = 1.3829$$

$$\hat{S}_{\bar{D}} = \frac{S_{\bar{D}}}{\sqrt{n}} = \frac{1.3829}{\sqrt{7}} = \frac{1.3829}{2.646} = 0.523$$

$$t_{cal} = \frac{\bar{D}}{\hat{S}_{\bar{D}}} = \frac{3.29}{0.523} = 6.295$$

Appendix 9

Observation 1: Performance of Control Group in the pre-survey and post-survey

Tasks	1	2	3	4	5	6	7	Total
cgB (x)	6	27	7	12	8	9	30	99
cgA (y)	7	21	7	11	8	10	29	93
$D_i = y - x$	1	-6	0	-1	0	1	-1	-6
$(D_i - \bar{D})^2$	3.45	26.45	0.73	0.02	0.73	3.45	0.02	34.86

$$\bar{D} = \frac{1 + -6 + 0 + -1 + 0 + 1 + -1}{7} = \frac{-6}{7} = -0.8571$$

$$S_{\bar{D}} = \sqrt{\frac{\sum (D_i - \bar{D})^2}{n - 1}} = \sqrt{\frac{35.143}{6}} = \sqrt{5.857} = 12.42$$

$$\hat{S}_{\bar{D}} = \frac{S_{\bar{D}}}{\sqrt{n}} = \frac{2.42}{\sqrt{7}} = \frac{2.42}{2.646} = 0.9146$$

$$t_{cal} = \frac{\bar{D}}{\hat{S}_{\bar{D}}} = \frac{-0.8571}{0.9146} = -0.937$$

Appendix 10

Observation 2: Performance of Control Group in the pre-survey and post-survey

Tasks	1	2	3	4	5	6	7	Total
cgB (x)	7	28	6	11	10	8	25	95
cgA (y)	10	27	9	9	12	10	21	98
$D_i = y - x$	3	-1	3	-2	2	2	-4	3
$(D_i - \bar{D})^2$	6.61	2.04	6.61	5.90	2.47	2.47	19.61	45.71

$$\bar{D} = \frac{3 + -1 + 3 + -2 + 2 + 2 + -4}{7} = \frac{3}{7} = 0.429$$

$$S_{\bar{D}} = \sqrt{\frac{\sum (D_i - \bar{D})^2}{n - 1}} = \sqrt{\frac{45.714}{6}} = \sqrt{7.619} = 2.7603$$

$$\hat{S}_{\bar{D}} = \frac{S_{\bar{D}}}{\sqrt{n}} = \frac{2.7603}{\sqrt{7}} = \frac{2.7603}{2.646} = 1.043$$

$$t_{cal} = \frac{\bar{D}}{\hat{S}_{\bar{D}}} = \frac{0.429}{1.043} = 0.4112$$

Appendix 11

Observation 3: Performance of Control Group in the pre-survey and post-survey

Tasks	1	2	3	4	5	6	7	Total
cgB (x)	11	25	10	15	18	7	28	114
cgA (y)	15	27	15	10	23	14	30	134
$D_i = y - x$	4	2	5	-5	5	7	2	20
$(D_i - \bar{D})^2$	1.31	0.73	4.59	61.73	4.59	17.16	0.73	90.86

$$\bar{D} = \frac{4 + 2 + 5 + -5 + 5 + 7 + 2}{7} = \frac{20}{7} = 2.86$$

$$S_{\bar{D}} = \sqrt{\frac{\sum (D_i - \bar{D})^2}{n - 1}} = \sqrt{\frac{90.8572}{6}} = \sqrt{15.143} = 3.891$$

$$\hat{S}_{\bar{D}} = \frac{S_{\bar{D}}}{\sqrt{n}} = \frac{3.891}{\sqrt{7}} = \frac{3.891}{2.646} = 1.471$$

$$t_{cal} = \frac{\bar{D}}{\hat{S}_{\bar{D}}} = \frac{2.86}{1.471} = 1.944$$

Appendix 12

Observation 4: Performance of Control Group in the pre-survey and post-survey

Tasks	1	2	3	4	5	6	7	Total
cgB (x)	13	26	14	7	10	15	19	104
cgA (y)	15	30	10	6	10	11	22	104
$D_i = y - x$	2	4	-4	-1	0	-4	3	0
$(D_i - \bar{D})^2$	4	16	16	1	0	16	9	62

$$\bar{D} = \frac{2 + 4 + -4 + -1 + 0 + -4 + 3}{7} = \frac{0}{7} = 0$$

$$S_{\bar{D}} = \sqrt{\frac{\sum (D_i - \bar{D})^2}{n - 1}} = \sqrt{\frac{62}{6}} = \sqrt{10.33} = 3.215$$

$$\hat{S}_{\bar{D}} = \frac{S_{\bar{D}}}{\sqrt{n}} = \frac{3.215}{\sqrt{7}} = 1.215$$

$$t_{cal} = \frac{\bar{D}}{\hat{S}_{\bar{D}}} = \frac{0}{1.215} = 0$$

Appendix 13

Observation 1: Performance of Control Group and Test Group in the pre-survey

Tasks	1	2	3	4	5	6	7	Total
tgB (x)	4	20	6	13	6	7	19	75
cgB (y)	6	27	7	12	8	9	30	99
$D_i = y - x$	2	7	1	-1	2	2	11	24
$(D_i - \bar{D})^2$	2.0							101.7
	4	12.76	5.90	19.61	2.04	2.04	57.33	1

$$\bar{D} = \frac{2 + 7 + 1 + -1 + 2 + 2 + 11}{7} = \frac{24}{7} = 3.43$$

$$S_{\bar{D}} = \sqrt{\frac{\sum (D_i - \bar{D})^2}{n - 1}} = \sqrt{\frac{101.715}{6}} = \sqrt{16.9525} = 4.117$$

$$\hat{S}_{\bar{D}} = \frac{S_{\bar{D}}}{\sqrt{n}} = \frac{4.117}{\sqrt{7}} = 1.556$$

$$t_{cal} = \frac{\bar{D}}{\hat{S}_{\bar{D}}} = \frac{3.43}{1.556} = 2.217$$

Appendix 14

Observation 2: Performance of Control Group and Test Group in the pre-survey

Tasks	1	2	3	4	5	6	7	Total
tgB (x)	13	32	12	18	15	19	37	146
cgB (y)	7	28	6	11	10	8	25	95
$D_i = y - x$	6	4	6	7	5	11	12	51
$(D_i - \bar{D})^2$	1.65	10.80	1.65	0.08	5.22	13.80	22.22	55.43

$$\bar{D} = \frac{6 + 4 + 6 + 7 + 5 + 11 + 12}{7} = \frac{51}{7} = 7.29$$

$$S_{\bar{D}} = \sqrt{\frac{\sum (D_i - \bar{D})^2}{n - 1}} = \sqrt{\frac{55.4287}{6}} = \sqrt{9.238} = 3.04$$

$$\hat{S}_{\bar{D}} = \frac{S_{\bar{D}}}{\sqrt{n}} = \frac{3.04}{\sqrt{7}} = \frac{3.04}{2.646} = 1.149$$

$$t_{cal} = \frac{\bar{D}}{\hat{S}_{\bar{D}}} = \frac{7.29}{1.149} = 6.345$$

Appendix 15

Observation 3: Performance of Control Group and Test Group in the pre-survey

Tasks	1	2	3	4	5	6	7	Total
cgB (x)	11	25	10	15	18	7	28	114
tgB (y)	25	30	23	20	28	21	31	178
$D_i = y - x$	14	5	13	5	10	14	3	64
$(D_i - \bar{D})^2$	23.59	17.16	14.88	17.16	0.73	23.59	37.73	134.86

$$\bar{D} = \frac{14 + 5 + 13 + 5 + 10 + 14 + 3}{7} = \frac{64}{7} = 9.143$$

$$S_{\bar{D}} = \sqrt{\frac{\sum (D_i - \bar{D})^2}{n - 1}} = \sqrt{\frac{134.854}{6}} = \sqrt{22.476} = 4.74$$

$$\hat{S}_{\bar{D}} = \frac{S_{\bar{D}}}{\sqrt{n}} = \frac{4.74}{\sqrt{7}} = \frac{4.74}{2.646} = 1.792$$

$$t_{cal} = \frac{\bar{D}}{\hat{S}_{\bar{D}}} = \frac{9.143}{1.792} = 5.10$$

Appendix 16

Observation 4: Performance of Control Group and Test Group in the pre-survey

Tasks	1	2	3	4	5	6	7	Total
cgB (x)	13	26	14	7	10	15	19	104
tgB (y)	30	36	31	32	33	35	37	234
$D_i = y - x$	17	10	17	25	23	20	18	130
$(D_i - \bar{D})^2$	2.47	73.47	2.47	41.33	19.61	2.04	0.33	141.71

$$\bar{D} = \frac{17 + 10 + 17 + 25 + 23 + 20 + 18}{7} = \frac{130}{7} = 18.57$$

$$S_{\bar{D}} = \sqrt{\frac{\sum (D_i - \bar{D})^2}{n - 1}} = \sqrt{\frac{141.71}{6}} = \sqrt{23.618} = 4.86$$

$$\hat{S}_{\bar{D}} = \frac{S_{\bar{D}}}{\sqrt{n}} = \frac{4.86}{\sqrt{7}} = \frac{4.86}{2.646} = 1.837$$

$$t_{cal} = \frac{\bar{D}}{\hat{S}_{\bar{D}}} = \frac{18.57}{1.837} = 10.11$$

Appendix 17

Observation 1: Performance of Control Group and Test Group in the post-survey

Tasks	1	2	3	4	5	6	7	Total
cgA (x)	7	21	7	11	8	10	29	93
tgA (y)	11	30	10	15	10	16	35	127
$D_i = y - x$	4	9	3	4	2	6	6	34
$(D_i - \bar{D})^2$	0.7	17.16	3.45	0.73	8.16	1.31	1.31	32.86

$$\bar{D} = \frac{4 + 9 + 3 + 4 + 2 + 6 + 6}{7} = \frac{34}{7} = 4.86$$

$$S_{\bar{D}} = \sqrt{\frac{\sum (D_i - \bar{D})^2}{n - 1}} = \sqrt{\frac{32.8575}{6}} = \sqrt{5.47625} = 2.340$$

$$\hat{S}_{\bar{D}} = \frac{S_{\bar{D}}}{\sqrt{n}} = \frac{2.340}{\sqrt{7}} = \frac{2.340}{2.646} = 0.884$$

$$t_{cal} = \frac{\bar{D}}{\hat{S}_{\bar{D}}} = \frac{4.86}{0.884} = 5.495$$

Appendix 18

Observation 2: Performance of Control Group and Test Group in the post-survey

Tasks	1	2	3	4	5	6	7	Total
tgA (x)	20	34	25	28	30	27	38	202
cgA (y)	10	27	9	9	12	10	21	98
$D_i = y - x$	10	7	16	19	18	17	17	104
$(D_i - \bar{D})^2$	23.59	61.73	1.31	17.16	9.88	4.59	4.59	122.86

$$\bar{D} = \frac{10 + 7 + 16 + 19 + 18 + 17 + 17}{7} = \frac{104}{7} = 14.86$$

$$S_{\bar{D}} = \sqrt{\frac{\sum (D_i - \bar{D})^2}{n - 1}} = \sqrt{\frac{122.86}{6}} = \sqrt{20.4766} = 4.525$$

$$\hat{S}_{\bar{D}} = \frac{S_{\bar{D}}}{\sqrt{n}} = \frac{4.525}{\sqrt{7}} = \frac{4.525}{2.646} = 1.710$$

$$t_{cal} = \frac{\bar{D}}{\hat{S}_{\bar{D}}} = \frac{14.86}{1.710} = 8.688$$

Appendix 19

Observation 3: Performance of Control Group and Test Group in the post-survey

Tasks	1	2	3	4	5	6	7	Total
cgA (x)	15	27	15	10	23	14	30	134
tgA (y)	31	32	34	28	35	34	37	231
$D_i = y - x$	16	5	19	18	12	20	7	97
$(D_i - \bar{D})^2$	4.59	78.45	26.45	17.16	3.45	37.73	47.02	214.86

$$\bar{D} = \frac{16 + 5 + 19 + 18 + 12 + 20 + 7}{7} = \frac{97}{7} = 13.857$$

$$S_{\bar{D}} = \sqrt{\frac{\sum (D_i - \bar{D})^2}{n - 1}} = \sqrt{\frac{214.885}{6}} = \sqrt{35.814} = 5.984$$

$$\hat{S}_{\bar{D}} = \frac{S_{\bar{D}}}{\sqrt{n}} = \frac{5.984}{\sqrt{7}} = \frac{5.984}{2.646} = 2.262$$

$$t_{cal} = \frac{\bar{D}}{\hat{S}_{\bar{D}}} = \frac{13.857}{2.262} = 6.127$$

Appendix 20

Observation 4: Performance of Control Group and Test Group in the post-survey

Tasks	1	2	3	4	5	6	7	Total
cgA (x)	15	30	10	6	10	11	22	104
tgA (y)	35	38	36	34	37	38	39	257
$D_i = y - x$	20	8	26	28	27	27	17	153
$(D_i - \bar{D})^2$	3.45	192.0	17.16	37.73	26.45	26.45	23.59	326.8

$$\bar{D} = \frac{20 + 8 + 26 + 28 + 27 + 27 + 17}{7} = \frac{153}{7} = 21.86$$

$$S_{\bar{D}} = \sqrt{\frac{\sum (D_i - \bar{D})^2}{n - 1}} = \sqrt{\frac{326.86}{6}} = \sqrt{54.48} = 7.38$$

$$\hat{S}_{\bar{D}} = \frac{S_{\bar{D}}}{\sqrt{n}} = \frac{7.38}{\sqrt{7}} = \frac{7.38}{2.646} = 2.789$$

$$t_{cal} = \frac{\bar{D}}{\hat{S}_{\bar{D}}} = \frac{21.86}{2.789} = 7.84$$

Appendix 21

Observation 1: Performance of respondents in the pre-survey and post-survey

Tasks	1	2	3	4	5	6	7	Total
B (x)	0	1	0	2	1	1	4	9
A (y)	2	3	3	4	2	3	6	23
$D_i = y - x$	2	2	3	2	1	2	2	14
$(D_i - \bar{D})^2$	0	0	1	0	1	0	0	2

$$\bar{D} = \frac{2 + 2 + 3 + 2 + 1 + 2 + 2}{7} = \frac{14}{7} = 2.0$$

$$S_{\bar{D}} = \sqrt{\frac{\sum (D_i - \bar{D})^2}{n - 1}} = \sqrt{\frac{2}{6}} = 0.577$$

$$\hat{S}_{\bar{D}} = \frac{S_{\bar{D}}}{\sqrt{n}} = \frac{0.577}{\sqrt{7}} = \frac{0.577}{2.646} = 0.22$$

$$t_{cal} = \frac{\bar{D}}{\hat{S}_{\bar{D}}} = \frac{2.0}{0.22} = 9.091$$

Appendix 22

Observation 2: Performance of respondents in the pre-survey and post-survey

Tasks	1	2	3	4	5	6	7	Total
B (x)	2	4	3	5	3	4	7	28
A (y)	4	6	4	5	4	4	8	35
$D_i = y - x$	2	2	1	0	1	0	1	7
$(D_i - \bar{D})^2$	1	1	0	1	0	1	0	4

$$\bar{D} = \frac{2 + 2 + 1 + 0 + 1 + 0 + 1}{7} = \frac{7}{7} = 1.0$$

$$S_{\bar{D}} = \sqrt{\frac{\sum (D_i - \bar{D})^2}{n - 1}} = \sqrt{\frac{4}{6}} = 0.816$$

$$\hat{S}_{\bar{D}} = \frac{S_{\bar{D}}}{\sqrt{n}} = \frac{0.816}{\sqrt{7}} = \frac{0.816}{2.646} = 0.309$$

$$t_{cal} = \frac{\bar{D}}{\hat{S}_{\bar{D}}} = \frac{1.0}{0.309} = 3.24$$

Appendix 23

Observation 3: Performance of respondents in the pre-survey and post-survey

Tasks	1	2	3	4	5	6	7	Total
B (x)	5	6	5	6	4	4	8	38
A (y)	6	7	6	7	6	5	9	46
$D_i = y - x$	1	1	1	1	2	1	1	8
$(D_i - \bar{D})^2$	0.02	0.02	0.02	0.02	0.73	0.02	0.02	0.86

$$\bar{D} = \frac{1+1+1+1+2+1+1}{7} = \frac{8}{7} = 1.143$$

$$S_{\bar{D}} = \sqrt{\frac{\sum (D_i - \bar{D})^2}{n-1}} = \sqrt{\frac{0.8572}{6}} = \sqrt{0.143} = 0.378$$

$$\hat{S}_{\bar{D}} = \frac{S_{\bar{D}}}{\sqrt{n}} = \frac{0.378}{\sqrt{7}} = \frac{0.378}{2.646} = 0.143$$

$$t_{cal} = \frac{\bar{D}}{\hat{S}_{\bar{D}}} = \frac{1.143}{0.143} = 8.001$$

Appendix 24

Observation 4: Performance of respondents in the pre-survey and post-survey

Tasks	1	2	3	4	5	6	7	Total
B (x)	6	6	7	8	7	6	9	49
A (y)	7	8	8	9	8	7	9	56
$D_i = y - x$	1	2	1	1	1	1	0	7
$(D_i - \bar{D})^2$	0	1	0	0	0	0	1	2

$$\bar{D} = \frac{1 + 2 + 1 + 1 + 1 + 1 + 0}{7} = \frac{7}{7} = 1.0$$

$$S_{\bar{D}} = \sqrt{\frac{\sum (D_i - \bar{D})^2}{n - 1}} = \sqrt{\frac{2}{6}} = 0.577$$

$$\hat{S}_{\bar{D}} = \frac{S_{\bar{D}}}{\sqrt{n}} = \frac{0.577}{\sqrt{7}} = \frac{0.577}{2.646} = 0.22$$

$$t_{cal} = \frac{\bar{D}}{\hat{S}_{\bar{D}}} = \frac{1.0}{0.22} = 4.55$$

Appendix 25

Percentage points of the *t*-distribution

V=	P								120
		25	10	5	2	1	0.2	0.1	ν
	1	2.41	6.31	12.71	31.82	63.66	318.3	636.6	
	2	1.60	2.92	4.30	6.96	9.92	22.33	31.60	
	3	1.42	2.35	3.18	4.54	5.84	10.21	12.92	
	4	1.34	2.13	2.78	3.75	4.60	7.17	8.61	
	5	1.30	2.02	2.57	3.36	4.03	5.89	6.87	
	6	1.27	1.94	2.45	3.14	3.71	5.21	5.96	
	7	1.25	1.89	2.36	3.00	3.50	4.79	5.41	
	8	1.24	1.86	2.31	2.90	3.36	4.50	5.04	
	9	1.23	1.83	2.26	2.82	3.25	4.30	4.78	
	10	1.22	1.81	2.23	2.76	3.17	4.14	4.59	12
	12	1.21	1.78	2.18	2.68	3.05	3.39	4.32	10
	15	1.20	1.75	2.13	2.60	2.95	3.73	4.07	8
	20	1.18	1.72	2.09	2.53	2.85	3.55	3.85	6
	24	1.18	1.71	2.06	2.49	2.80	3.47	3.75	5
	30	1.17	1.70	2.04	2.64	2.75	3.39	3.65	4
	40	1.17	1.68	2.02	2.42	2.70	3.31	3.55	3
	60	1.16	1.67	2.00	2.39	2.66	3.23	3.46	2
	120	1.16	1.66	1.98	2.36	2.62	3.16	3.37	1
	∞	1.15	1.64	1.96	2.33	2.58	3.09	3.29	0

(Source: Loveday, 1971)

Appendix 26

Illustration of Loveday's equation: $X \pm (ts / \sqrt{n})$ (q.v. 5.7)

