THE ADMINISTRATION AND ORGANISATION OF INDEPENDENT STUDY TOPICS WITH SPECIAL REFERENCE TO SECONDARY SCHOOL GEOGRAPHY

THESIS

Submitted in fulfilment of the requirements
for the degree of

MASTER OF EDUCATION

of

RHODES UNIVERSITY

by

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December 1991

ABSTRACT

Traditional school subjects are having to compete for a place in a curriculum which is increasingly judged according to its perceived utilitarian value. According to current educational theory, geography's role in the curriculum is to develop concepts, skills, values and attitudes that allow pupils to understand the human and environmental issues which face their communities and communities throughout the world. In order to achieve these aims, teachers need to adopt a learner-centred teaching approach, yet geography teachers are faced with the dilemma of having to develop participatory teaching strategies within an existing structure which is largely product oriented.

This thesis attempts to illustrate how changes can be effected in the approach to the teaching of geography, while working within existing syllabus constraints and while continuing to meet the demands made by the current examination system. To this end, Independent Study Topics are analysed as a means to bring about the desired changes in geographical education. The concept, Independent Study Topics as a 'blanket term' (Diepeveen, 1986) for pupil-centred activities is relatively recent in terms of the South African geography syllabus. In order to obtain greater clarity about the concept and its implications for geography teaching, this study examines current geographical theory relating to learner-centred approaches and relates them to teachers' perceptions of the role of IST in the geography curriculum.

The second aspect of the study is concerned with the implementation of Independent Study Topics in a classroom research setting.

The organisation and administration of Independent Study Topics in a single school setting is analysed and evaluated as a process of change. This analysis provides guidelines for developing a learner-centred approach which is necessary to ensure that geography retains its position in the school curriculum of the 1990's and beyond.

ACKNOWLEDGEMENTS

The initial direction and inspiration for this study came from Professor E A G Clark. My grateful appreciation goes to Arthur Clark for his unfailing support and for the faith he had in me.

I am deeply indebted to Mrs Gillian Boltt, who picked up the pieces after Professor Clark's death. Gillian provided the discipline needed for the final structuring and writing of this study.

My grateful thanks go to my colleagues at the Rhodes University Education Department for their support and friendship during the transition from teaching to lecturing and for making it possible for me to complete the study.

Especial thanks go to Judith Stuart-Watson, who, as Headmistress, had to bear with my 'enthusiasms' and supported me despite the many interruptions to her working day during the three year period in which the classroom research was conducted.

Patsy Rose aided and abetted me in the development of the IST programme and I thank her for her patience and unfailing sense of humour.

Grateful thanks also go to all of my former colleagues for their help and for acting as evaluators.

A study of this magnitude of necessity involved a great many people. My appreciation therefore goes to those members of the private and public sectors of East London and the many other towns and places that the girls and I invaded in the course of our field excursions. Here, I wish especially to mention Mr W Diepeveen, Mr P Gobetz, Mr P Taylor and Mr E Kruuse who allowed me so much freedom and gave so much of their time.

A special word of thanks go to the pupils of Clarendon who, for three years, humoured me by acting willingly as guinea pigs and who so enthusiastically participated in the IST programme. I was always proud of them wherever we went.

Without my family, this study would not have been possible. I am particularly grateful to my daughter, Joanne, for her fortitude during the numerous excursions in which she was either directly or indirectly involved.

Finally, my sincere appreciation to Jeannette Steyn, the only person I know who can decipher my handwriting. Jeannette's friendship and help was invaluable during the many phases of the writing up and typing of the study.

IN MEMORY OF ARTHUR CLARK,

FRIEND, MENTOR AND COLLEAGUE

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CHAPTER ONE

INTRODUCTION

I.I THE I985 REVISED GEOGRAPHY SYLLABUS AND THE EMPHASIS ON LEARNER-CENTRED TEACHING STRATEGIES

The preamble to the I985 Revised Geography Syllabus as adopted by the Cape Education Department (Appendix IA), was unique in that this introduction to the syllabus directed the teachers' attention to more than just changes in syllabus content. In detailing the aims, objectives and teaching approaches, the preamble provided an insight into the participatory teaching strategies that have become a feature of school geography since the I960's. Changes that emphasise a learner-centred approach in classroom practice were implicitly introduced by the I973 geography syllabus (Appendix IB), but tended to be obscured by the emphasis which this syllabus placed on subject content (Ledger, I977; van der Merwe, I982). The I985 Revised Syllabus, however, explicitly emphasised the need for geographical education to develop conceptual understanding, skills, values and attitudes and to provide opportunities which allow pupils to reflect, to analyse and to reason in approaching the study of their world and the problems and issues that face it.

By identifying geographical education as being concerned with more than the acquisition of facts, this syllabus stresses the active participation of pupils in the learning process. In adopting this approach to the teaching of geography, the development of a geography curriculum for each standard not only involves planning what pupils should learn, but planning and developing the activities in which the pupils need to be engaged to ensure the acquisition of the desired knowledge (Griffiths, I987; Evans, I990). Thus, while the syllabus content provides an outline of what should be learnt and at what stage it should be learnt and textbooks interpret the facts, concepts and theories contained in the syllabus, the role of teachers is to develop activities which are both relevant to their particular group of pupils and which will enable their pupils to acquire and to refine the skills necessary for analysis, logical explanations, reflection and reasoning.

By implication, teachers need to be innovative and flexible in their choice of teaching strategies and in the selection and development of the syllabus content. They need to look beyond the textbook in order to develop a resource base which will provide their pupils with the necessary opportunities to explore and to investigate problems which, by their nature, foster an understanding of the human and environmental issues with which geography is concerned. Surveys by Ledger (l977) and Ballantyne (l986) revealed that geography teaching in South African schools is largely teacher-directed, textbook orientated and with a strong bias towards the presentation of facts, rather than on the development of skills, values or attributes. Current research (Boqwana, l990; Sarpong, l99l, pers. comm.) in Ciskei and Transkei schools reveals that geography teaching in these areas is based on teacher-tell and the use of the textbook to interpret the geography curriculum. Adopting the teaching approaches which the most recent geography syllabuses advocate will, therefore, require considerable changes in what appear to be current practices in the teaching of the subject.

l.2 FACTORS WHICH INFLUENCE CHANGES IN TEACHING APPROACHES

The problem of implementing changes in teaching approaches has been analysed in relation to the constraints which mitigate against change and the pressures which can be brought to bear to ensure the desired changes. In a review of the l973 geography syllabus, (Earle l976, in van der Merwe, l982) highlighted the following constraints to change in classroom practices:

(i) the absence of readily accessible printed matter which provides the necessary theoretical background and practical guidance regarding the organisation and administration of teaching strategies designed to develop specific skills, theoretical understanding or values;

(ii) a lack of support structures that are able to guide teachers during the transitional stages in which the changes are to be implemented.

The demands of the senior certificate examination and those of the syllabus content, have been identified by teachers as additional constraints to changes in teaching approaches (Ballantyne, l986). Diepeveen (l986, pers. comm.) furthermore emphasised that teachers who use the textbook as the means through which to interpret the geography curriculum, rather than the departmental syllabus, are unlikely to effect changes in their approaches to the teaching of geography.

Pressures which may be exerted to bring about changes in a particular subject area include what could be regarded as external and internal pressures. External pressures such as social, economic and political changes result in paradigm shifts, which in turn effect changes in syllabus aims or content. Ballantyne (l986) reveals that changes in subject content may be relatively easy to implement but that the real difficulty lies in bringing about changes in classroom practices. Superintendents of Education, subject advisors or in-service courses may exert internal pressures to bring about the desired changes. There is, however, no guarantee that such changes will either be adopted or universally implemented as the constraints to change could outweigh the pressures which are exerted to bring about the changes.

Attempts to ensure the implementation of teaching strategies which develop skills, conceptual understanding and values were made in the United Kingdom through the incorporation of pupil research projects in the school leaving requirements for O-level and A-level geography pupils. (Tolley and Reynolds, l977; Walford, l984). The continued reliance on a formal examination as part of the certification requirements for school leavers, however, mitigated against the universal implementation of pupil-centred strategies for the teaching of geography (Walford, l982, l984). Stenhouse (l98l) has emphasised the difficulty of measuring skills, values and attitudes by means of examination systems, which essentially evaluate a product and as such lay stress on the assessment of those behavioural objectives which are easy to identify and to measure. Therefore, pressures which are exerted by changes in the structure and format of an examination system are limited and are no guarantee that participatory teaching strategies will be adopted.

l.3 THE PROCESS NECESSARY FOR CHANGES IN TEACHING APPROACHES

The identification and possible reduction of constraints or the identification of pressures which can be exerted to bring about change only partially address the problem of implementing changes in individual teaching approaches. This study examines change as a process in which the individual teacher:

(i) needs to understand the implications of the desired changes;

(ii) is convinced that the changes are necessary and will benefit the pupils;

(iii) experiences or identifies some factor which triggers the change;

(iv) is able to identify some accessible means which can be used as a vehicle to bring about the change;

(v) identifies a framework which is either in existence or which can readily be developed to ensure that the changes can be maintained, sustained or even expanded;

(vi) is able to develop mechanisms or identify mechanisms which will provide evidence that the changes have been worthwhile and effective.

Any analysis or investigation that attempts to understand the mechanism of change in teaching approaches, therefore, has to consider more than the constraints to change and the pressures which are exerted to bring about the desired change, since changes of this nature are essentially within the domain of the individual teacher or the individual subject department of a school.

This study is concerned with the processes which resulted in a changing approach to the teaching of geography at a particular school, rather than with the constraints to change or with the pressures which may be exerted on a school to bring about change. The case study reveals that in this instance the most important factor initiating the change was teacher dissatisfaction with an aspect of the geography programme, that of the so-called pupils assignments as prescribed by the 1973 geography syllabus. Attempts to develop and improve those activities which were compulsory and formed a part of the pupils' year marks in geography, served to focus the attention of the teachers on activities such as practical work and fieldwork as a means to compensate for the identified deficiencies of the assignment.

A lack of theoretical background relating to participatory strategies, lack of insight into the essential objectives of these activities and a lack of understanding about the procedures needed to develop them exacerbated the problem rather than serving to resolve it. The preamble to the 1985 Revised Syllabus provided the initial theoretical foundation upon which to base the initial development of pupil assignments and fieldwork and led to the identification of these activities as a possible means to achieve the suggested syllabus objectives related to skill development. The preamble also provided the justification for the changed approach to these activities, through the introduction of independent study topics (IST)

I.4 THE PURPOSE OF THE STUDY

The term IST replaced that of assignments and practical work in the I985 Revised Syllabus and while no attempt is made by this syllabus to provide a definition of the concept of IST or to provide specific guidelines for the organisation and administration of these activities, other than to link them to enquiry based approaches, a detailed analysis of the concept provided the necessary structure on which to base IST.

This research is, therefore, concerned with the organisation and administration of IST as a participatory learning approach which will allow the teacher working within the framework of the syllabus and the demands of the existing senior certificate examination to:

(i) develop critical thinking skills which are essential for the pupils' understanding and appreciation of modern geography and the problems and issues with which geography is concerned;

(ii) explore and investigate social and environmental issues which are relevant to the pupils and their community;

(iii) encourage the pupils to reflect upon and to analyse the values and attitudes they have regarding the community and the environment;

(iv) develop specific geographical skills, concepts and principles.

Learner-centred approaches in general and pupil-enquiry techniques in particular are infrequently used in South African school geography, therefore this research seeks to:

(i) clarify the concept of IST as used in the I985 Revised Geography Syllabus in order to:

*demonstrate its relationship to the aims and objectives of the syllabus;

*provide guidance with regard to the types of activities with which IST is associated;

(ii) examine the way in which IST is related to current geographical theory with regard to:

*geographical education aims and objectives;

*teaching strategies which have been designed to develop specific skills, theories or to develop positive attitudes;

(iii) analyse teachers' concepts of and attitudes to IST in relation to:

*the value that teachers place on this aspect of geographical education;

*the organisation and administration of IST; and

*the problems teachers identify in respect of the implemention of IST;

(iv) demonstrate the use of IST as a means to develop the learner-centred aims and objectives of the most recent geography syllabuses.

(v) demonstrate how the application of IST to one aspect of the geography programme resulted in an escalation of changes in teaching strategies and to analyse the processes with which these changes were associated.

The study, therefore, attempts to provide an insight into the mechanics of change which focus on the teacher rather than on the subject. Ballantyne's research (l986) identified this perspective as an essential starting point to generate a greater understanding of the role played by recognised constraints and pressures on changes in teaching practices in relation to the actual factors which effect a change in teaching approaches.

I.5 THE STRUCTURE OF THE STUDY

Chapter two, in analysing the concept IST provides both a definition of the concept and the structure within which this learner-centred approach may be developed in the schools' geography programme. This chapter further identifies the role of IST in the present geography syllabus.

Chapter three provides a theoretical framework for IST in relation to current geographical theory regarding the aims and objectives of geography, the specific learning strategies which have been developed to achieve those aims and objectives and strategies which may be applied to the assessment and evaluation of IST.

Chapter four examines the methodology which this study applied over a period of three years, while chapter five analyses teachers' perceptions of and attitudes to IST in the light of the theoretical analysis of the concept.

The remaining part of the study is concerned with the classroom research undertaken over a period of three years. Chapter six analyses the factors which were instrumental in initiating the changes and the processes with which the initial changes were associated. The problems experienced in the early attempts to develop pupils' work in assignments and to improve fieldwork techniques are identified. Chapter seven analyses the processes which led to the systematic appraisal of IST as a means to develop skills, values and attitudes and describes the pilot study undertaken to reassess and to re-evaluate the role of pupils' work in the above areas, in order to provide a rationale for the possible future development of learner-centred activities. The results of the pilot programme led to an increased belief in the role of IST as a viable means to develop pupils' skills and conceptual awareness and as a means to provide them with opportunities to reflect, analyse and reason in approaching their study of geography.

Chapter eight, therefore, considers the implementation of the IST programme for all the geography pupils from Std 6 to Std 10 in the light of the results of the pilot programme and in relation to the results of the survey which revealed teachers' attitudes to and perceptions of this area of the geography syllabus. This chapter also reveals the escalation of changes in teaching strategies that occurred and analyses the reasons for this escalation and the processes with which they were associated.

Chapter nine evaluates the three-year programme of the study, while chapter ten concludes the study and highlights aspects relating to the changes which occurred.

CHAPTER TWO

CONCEPT ANALYSIS : INDEPENDENT STUDY TOPICS

The adoption of the term IST in relation to tasks situated within an enquiry-based approach to geography teaching in South African schools into the JMB Core Syllabus of 1983, gives rise to the question of why this particular term is used in preference to the terms 'assignment' and 'practical work' of the 1973 syllabus.

In order to answer this question and to clarify the precise meaning of IST with regard to the nature of these tasks and their function in the geography curriculum, the following approach was used:

1. The preamble to the 1985 Revised Geography Syllabus, as adopted by the Cape Education Department, was analysed. This analysis was related to the introduction of the 1993 Draft Core Syllabus (Appendix 2).

2. A former chairman of the Cape Education Department's Geography Study Committee, Mr W Diepeveen, was interviewed.

3. An analysis was made of current approaches in this area of geography teaching and learning in Cape Education Department schools and in schools overseas. The former information was obtained by means of a survey and the latter was obtained through a review of literature relating to the approach in schools in Britain, the United States of America and Australia.

This chapter examines the term IST with regard to its implied conceptual framework in the preamble to the 1985 Revised Geography Syllabus and with reference to the 1993 Draft Core Syllabus. Further clarification with respect to the meaning accorded to IST by the syllabus compilers was obtained from Mr W Diepeveen, whose perceptions of IST are presented. The final stage of the concept analysis is concerned with the identification of IST in relation to a variety of terms describing pupil-centred tasks which are in current use.

The above analysis will provide a conceptual framework:

(i) which will form the basis for further analysis with regard to the implementation and management of IST in terms of its aims and objectives, the strategies which are appropriate to IST and the assessment of IST in schools. (chapter three);

(ii) against which the perceptions of teachers may be tested to ascertain whether discrepancies exist between the way in which teachers perceive the term and the formal theory. (chapter five).

2.1 AN ANALYSIS OF IST IN TERMS OF THE PREAMBLE TO THE 1985 CAPE EDUCATION DEPARTMENT'S GEOGRAHY SYLLABUS WITH REFERENCE TO THE 1993 DRAFT CORE SYLLABUS

The preamble to the revised syllabus of 1985 as adopted by the Cape Education Department is in essence a reflection of the preamble to the JMB syllabus of 1983, and was described as the 'heart of the syllabus' by Diepeveen (1986, pers. comm.) While there are certain differences in the introduction to the 1993 Draft Core Syllabus, this preamble essentially reflects the same learner-centred goals of the 1985 Revised Syllabus.

The reference to IST is presented in the 1985 Revised Syllabus in the section relating to teaching techniques. The recommendation is to:

3.2.7 encourage individual and group research techniques

(a) Pupil involvement, independent activity, initiative, creativity and independence should be extended.

(b) Pupils should learn to rely on personal observation in the field (primary source) and to make use of secondary sources such as: reference books; maps, photographs and diagrams; films, tapes and slides; computers as well as television, the radio and the press.

(c) Pupils need to develop worthwhile attitudes towards learning such as: respect for evidence; critical appraisal of

reporting; suspicion of simplistic explanations; and a willingness to engage in rational discussion.

(d) Pupils need to distinguish between central issues of importance and peripheral issues.

NOTE: Pupils should undertake **short** independent study topics throughout the year on work related to the requirements of the syllabus.

(Preamble - Revised Syllabus for Geography I985, p. 7)

In the I993 Draft Core Syllabus the reference to IST is similarly contained under the section on teaching techniques and teachers are urged to:

3.2.6 encourage individual and group research techniques and pupils should undertake short independent study topics throughout the year on the work related to the requirements of the curriculum.

(Introduction - Draft Core Syllabus for Geography I993, p. 6)

As is evident from the above, neither syllabus attempts to define the term 'independent study topics'. There is no prescription regarding their format, other than that they be short and related to the 'requirements of the syllabus'. Neither syllabus attempts to explain how the teacher is to approach the design and development of IST, other than linking them to 'individual and group research techniques'. The I985 Revised Syllabus does, however, relate research techniques to specific areas of pupil development. By implication, this means that tasks undertaken in this area ought to be designed for the purpose of developing particular skills, values and proficiencies, through the nature of the activity and through the sources which are referred to in the development of the activity. An examination of the I993 Draft Core Syllabus revealed that similar injunctions are given in a number of the sections of the introduction. IST are, therefore, by implication, learner-centred tasks associated with an enquiry-based approach to the teaching of geography.

To understand the nature of such activities and their function in the geography curriculum, it is necessary to relate this approach to the aims and objectives which epitomise the geographical theory which underpins the syllabus. Therefore, a preamble such as that introducing the 1985 Revised Syllabus and the 1993 Draft core Syllabus needs to be analysed in its entirety, with each section seen as an intrinsic part of the whole, if the teacher is to comply with the demands of the syllabus.

2.1.1 IST in relation to the aims of the syllabus

Ballantyne (1986) identifies the 1983 Core Syllabus as one which is concerned with pupil development rather than the 'mere' imparting of geographical facts (p. 26). The aims of geography, as indicated in the 1993 Draft Core Syllabus reiterate the need for the development of those skills and attitudes which will equip pupils, within the framework of geographical education, with the necessary proficiencies to take their place in the rapidly changing world of the 1990's and beyond. Both the revised 1985 syllabus and the 1993 Draft Core Syllabus stress the need for the geography curriculum to provide for both the academically orientated pupil and the non-academic pupil. Since the complete preamble to the 1985 syllabus appears in the junior secondary course as well as in the senior secondary course, it means, by implication, that the syllabus will need to provide the pupil who does not continue with geography after Std 7, with a basic framework of skills, values and attitudes, which, while suited to the younger pupils' level of maturity, are related to the primary aims of the senior secondary school geography syllabus.

The aims of the two geography syllabuses examined illustrate the learner-centred and utilitarian emphasis which has become a characteristic of modern school geography syllabuses. The stress on greater pupil participation in the learning process and greater relevance to the needs of the society indicates a shift in emphasis from teacher-directed approaches to pupil-centred approaches in the teaching of geography. The implication is, therefore, that IST as a learner-centred approach, ought to be employed as a means to develop the skills, values and attitudes with which such a syllabus is associated and that the activities designed for IST should be perceived by the pupils as having relevance. Learner-centred tasks such as IST will, therefore, by implication, form part of an ongoing programme of activities within the geography curriculum.

2.1.2 IST in relation to the syllabus objectives

In as much as IST as a teaching approach needs to be related to the general aims of geography, so it needs to be considered in terms of the specific objectives of secondary school geography. The four sets of objectives in the 1985 Revised Syllabus are concerned primarily with knowledge, skills, perceptions and values. An analysis of these objectives provides an insight into the rationale which ought to govern the development of IST with regard to the nature of the tasks.

This syllabus (p. 3) emphasises knowledge which is 'meaningful and useful' and stresses the interdiciplinary nature of knowledge. The implication for IST is that work done in this area should be perceived by the pupil as having value in that it adds to that body of knowledge which, in terms of R S Peters' definition of education, is 'worthwhile'. (Peters, 1973, p. 16). Relating this view of knowledge to the aims concerning the pupils' understanding of their environment, implies that enquiry in geography ought to be closely linked to the pupils' experiences and interests in order to foster the necessary understanding of those issues and situations which influence their society and the wider community of which they are a part.

The South African syllabuses perceive geography as a vehicle to promote the development of a wide variety of skills. The acquisition of these skills is interpreted by the 1985 Revised Syllabus as a means to aid pupils in the organisation of knowledge. Skills developed through geography ought also to be transferable to a variety of situations. Skill development in the syllabuses is also linked to pupils' levels of maturity. The emphasis on skill development in both the 1985 Revised Syllabus and in the Draft Core Syllabus is a central feature of modern geographical education and is at the heart of learner-centred approaches.

Perceptual awareness is interpreted as being concerned with the development of the pupils' spatial perception of all aspects of the environment and of the processes, patterns and relationships which exist within the environment. To develop perceptual understanding, teachers are encouraged to involve the pupils in activities that will foster their abilities in terms of problem-solving and decision-making. Once again, the active participation of the learner is emphasised in the process leading to understanding.

A further characteristic of modern school geography is that it emphasises the need to develop attitudes and values which will lead to the pupils' appreciation of the environment and an understanding of man's place in the environment. Holding values, which have been inculcated through indoctrinatory methods are, however, considered to be worthless (Kleinig, 1982; Beehler, 1985). The 1985 Revised Syllabus and the 1993 Draft Core syllabus recognise this and encourage the teacher to foster the pupils' abilities to think critically and analytically.

The Rylian notion of knowledge, as that which is situated in the effective and the cognitive domain and which is acquired through the acquisition of facts, propositional knowledge and skills (Griffiths, 1987), is echoed in the emphases which the two syllabuses examined above place on the four sets of objectives. This notion of knowledge implies that the learner needs to be actively engaged in the learning process and that more than the mere presentation of facts is involved. Therefore, the present geography syllabuses are not merely concerned with what the pupils should learn, but with the activities that are designed to facilitate the acquisition of knowledge. The teacher's role is therefore to select and plan the content in concert with the activities that are specifically developed for the acquisition of that knowledge.

The analysis of the syllabus objectives has the following implications regarding the nature of learner-centred tasks such as IST in terms of their application to the "requirements of the syllabus." IST may, therefore, be seen as:

(i) a means which may be employed to expose pupils to a variety of skill areas, which include oracy, literacy, graphicacy and numeracy and as a means to develop proficiencies in terms of problem-solving and decision-making;

(ii) a technique which will expose pupils to a wide variety of primary and secondary sources, which should be used critically and analytically;

(iii) as a strategy which can develop pupils' spatial perceptions of their environment through the analysis and investigation of issues, processes and patterns which affect that environment;

(iv) a technique that will help pupils to develop the values and attitudes which are implicit in geography teaching;

(v) a means to acquire propositional knowledge.

2.1.3 IST in relation to suggested teaching approaches.

An analysis of suggested teaching approaches in the 1985 Revised Syllabus and the 1993 Draft Core Syllabus provides guidance relating to the approaches which may be employed in the design and development of learner-centred tasks such as IST. Current syllabuses recognise that the diversity of geography at school level lends itself to a number of approaches, each of which provides the pupils with a variety of learning experiences. The approaches included in the current syllabus are:

(i) An holistic approach, which emphasises the interaction and relationships which exist between the various components of the geography syllabus. By implication this would include the interactions and relationships which exist in studies of the environment and the communities which form a part of the pupils' learning experiences.

(ii) Problem-solving and decision-making approaches which involve the pupil in critical thinking, problem identification, hypothesis formulation and hypothesis testing that are seen to encourage the pupil to move away from the purely descriptive both in the classroom and with regard to the tasks they complete.

(iii) Thematic approaches that are perceived as attempts to draw together the many strands which make up the reality of a particular environment or a physical phenomenon, thereby increasing the pupils' spatial awareness. Studies related to themes involve the use of a diversity of materials and sources, which the pupil needs to analyse and evaluate.

(iv) Inter-disciplinary approaches which, by allowing pupils to understand the many conceptual links that occur across the school curriculum, enable them to obtain a better understanding of concepts not previously linked. Interdisciplinary studies are identified as approaches which allow pupils to apply the skills they have acquired through geography to a multifaceted situation. By implication, studies such as these increase the pupils' perception of the relevance and value of the skills, concepts or values they have acquired through geography.

These approaches reveal how the design and development of tasks in IST may be varied to achieve a range of objectives and to provide pupils with a number of different learning experiences.

The analysis of the preamble to the two syllabuses examined, while giving little specific indication of how learner-centred tasks such as IST should be implemented or administered, provides the teacher with a clear indication of the nature of such tasks and their perceived role in the geography curriculum.

2.2 INTERVIEW WITH MR W DIEPEVEEN

In order to obtain further clarification of the syllabus compilers' view of IST, Mr W Diepeveen, then Chief Superintendent of Education for East London, was interviewed in his capacity as a former chairman of the Cape Education Geography Study Committee. Mr Diepeveen had been directly involved in the development of the l985 Revised Syllabus as adopted by the Cape Education Dapartment.

The following three questions were put to Mr Diepeveen:

(i) What did the study committee understand by the term IST?

(ii) Why was this particular term used?

(iii) In the opinion of the study committee, how important was the development of IST.

According to Mr Diepeveen, the term 'independent' was an attempt to get teachers to move away from the teacher-directed "chalk-and-talk" type of approach to geography. Mr Diepeveen echoed the concerns about the conservative teaching approaches used in schools, which studies by Ledger (1977); Levy (1984) and Ballantyne (1986) had revealed.

The use of 'study-topic' was seen by Mr Diepeveen as an attempt to "wean" teachers from the idea that student based work in geography merely involved giving the pupils a topic and then "expecting them to get on with it." Mr Diepeveen expressed concern about the current practices still existing in schools of expecting pupils to do 'assignments' without any proper guidance or thought about their purpose in relation to the development of skills or values. Such student-based work was regarded by Mr Diepeveen to have little value and he stressed that A K Möllers' analysis and criticisms of these assignments, i.e. that they are such that:

> the inevitable consequences are that the pupils score poorly, that they gain no profitable learning experience, that they acquire no new insights...
>
> (Möller, 1983, p. 103)

were still all too relevant in many schools. Assignments of this nature represent work that has simply been copied from a variety of texts and accompanied by "irrelevant and useless" pictures which, Mr Diepeveen said, increased the headaches of the inspectorate as many of these 'illustrations' were obtained by vandalising public library books.

Mr Diepeveen perceived IST as an approach which would encourage teachers to design and develop pupil-centred tasks which were in keeping with the "spirit" of the new geography syllabus (1985). In this connection Mr Diepeveen stressed that syllabuses should be regarded as a guide and that each teacher is free to adapt the syllabus content to meet the needs of their particular pupils and their own interests. Thus, providing that pupils are adequately prepared for the final senior certificate examination, the geography curriculum of a school ought to be tailored to the socio-economic background of the pupils and to meet the expectations of the community in which the teacher finds himself/herself. Mr Diepeveen emphasised that the syllabus preamble, not the content, ought to be the guide which the teacher follows. Providing that teachers achieve the aims and objectives of the syllabus they are free to innovate and experiment. Therefore Mr Diepeveen identified IST as a "blanket term" covering a wide variety of learner-centred activities.

In the light of the above, Mr Diepeveen indicated that while the design, development and implementation of IST in a school was therefore largely dependent on the needs and interests of the pupils and the teachers, these activities needed to be related to the general aims and objectives of the syllabus.

2.3 IST IN RELATION TO TERMS IN CURRENT USAGE DESCRIBING PUPIL OR LEARNER-CENTRED TASKS

Murray, in his discussion related to "learning geography through classroom and library research," warns that terms such as 'research', 'inquiry', 'discovery', 'data-based learning', 'interpretation' and 'inference making' are related to complex "chains of skills and ideas" and that such terms are often used too simplistically (Murray, l984, p. l00).

If, therefore, IST is accepted as a 'blanket term' covering a wide variety of learner-centred activities, it is important to analyse the various terms used to describe these activities so that the concepts are fully understood. This section of the chapter examines the terms 'project', 'assignment' and 'theme' as the terms most frequently used in South African schools to describe learner-centred tasks.

2.3.l **Pupil projects**

The term 'project' or 'pupil project' is the term most often used by teachers and pupils to describe IST. The following definition by Good is given in Beaumont and Williams (l983, p. l):

> Project: a significant, practical unit of activity having educational value and aimed at one or more definite goals of understanding, involves investigation and solution of problems...planned and carried to completion by the pupil and teacher in a natural 'real-life' manner.

Beaumont and Williams (1983) argue that the conceptual revolution that has changed school syllabuses from the purely information-based type to those which stress the development of concepts, skills, values and attitudes, require methods of teaching and assessment which will enable pupils to be measured with regard to the higher-order skills emphasised by the syllabuses. The authors' contention is that the use of the project approach is a logical tool for such assessment.

A key feature of the project approach is problem-solving, which involves the pupil in critical analysis and evaluation of evidence in order to reach certain conclusions. This, the authors argue, precludes the use of this approach with pupils who have not reached the stage of propositional thinking. In British syllabuses, projects are, therefore, suggested approaches from O-level upwards (Tolley and Reynolds, 1977). For, while Piagetian thinking places the age at which the child reaches 'formal operancy' at twelve, Rhys (in Beaumont and Williams, 1983) considers that pupils most commonly reach this stage at age fifteen. If this argument is accepted, then projects as an activity within the realm of IST are more appropriate to the senior secondary phase of the high school than to the junior secondary phase. Table 2.1 indicates the main features of this stage of the pupils' development.

TABLE 2.1

CHARACTERISTICS OF FORMAL OPERANCY

- assumptions can be accepted for the sake of argument;
- a succession of hypotheses can be made which can be expressed propositionally and tested against reality;
- general propositions can be sought which allow exhaustive definitions and the statements of general laws to be made;
- to go beyond the tangible, finite and familiar in spatial concepts, to conceive the infinitely small and to invent imaginary systems;
- to become conscious of one's own thinking, reflecting on it to provide logical justification for judgements made;
- to deal with a variety of complex relations such as proportionality or correlation.

(Beard, 1968)

In the examination of the characteristics of project work, Beaumont and Williams (l983) give the following guidelines:

Projects should involve:

(i) the solution of a problem;

(ii) initiative by the student group;

(iii) a variety of educational attitudes;

(iv) the presentation of some 'end product';

(v) a considerable length of time, that may range from "a week to a couple of months";

(vi) the teacher as facilitator rather than as a traditional instructor.

Tables 2.2 and 2.3 identify the perceived aims of projects according to Beaumont and Williams' definition of the approach and with respect to the development of O-level projects designed for the "Geography l4-l8" curriculum in Britain. An analysis of the characteristics, aims and objectives of tasks related to this approach emphasises:

i) The high degree of pupil participation and involvement in the choice, design and structure of the activity. Projects, therefore, are individualised in that the particular pupil or group of pupils (if a group project) decide on a study which will cater for their interests.

ii) The role of the teacher as a facilitator rather than an instructor. These activities are therefore unstructured in terms of 'teacher-direction' and because of this, the projects will not have easily predicted outcomes.

iii) That the assessment and evaluation of such activities cannot be related to the more traditional forms of objective-type numerical or symbol assessments, because of their highly individual nature.

iv) The wide variety of areas which may be incorporated into studies of this nature, and which depend to a large extent on individual pupils' areas of interest.

v) The broad spectrum of skills, proficiencies and techniques which can be employed in the design and development of projects.

TABLE 2.2

THE PURPOSE OF PROJECT WORK

- to encourage students to make their own choice of a subject of study and thus encourage a sense of commitment and personal responsibility for the task;

- to give students practice in learning to learn by undertaking a piece of personal research involving activities such as: planning the work, hunting out sources, collecting material, selecting from it and deciding on presentation;

- to enable students to experience the satisfaction of working on a complex task over a period of time with the possibility of producing a result of permanent value and interest to themselves and others;

- to provide scope (where possible) for a degree of cooperation among students in an atmosphere of emulation.

- to provide opportunities for the practice of communication skills in a framework where language is used in a number of ways for real

  communication: seeking information, oral and written reporting, discussing, synthesizing, revising and edition, etc.

(Adderly in Beaumont and Williams, l983, p. 2)

A further feature of projects which needs to be examined in the clarification of the concept is that of the approach which is used in the design and development of these activities. Projects are linked to a particular line of enquiry and frequently associated with a systematic scientific approach (Figure 2.l). This approach is concerned with the identification of a problem, the formulation of an hypothesis, the testing of the hypothesis through the

TABLE 2.3

AIMS AND OBJECTIVES OF INDIVIDUAL STUDIES AT O-LEVEL

1 Knowledge of the:

(a) facts specific to this area of study;

(b) concepts which give meaning and coherence to those specific facts;

(c) higher-order generalisations linking those concepts.

2 Thinking or reflective abilities (conceptual skills) and in particular the ability to:

(a) interpret experience and data by discerning meanings and order;

(b) identify and define problems;

(c) suggest relevant models and hypotheses to be tested;

(d) devise a simple programme of inquiry.

(e) appraise evidence critically.

3 Attitudes, feelings and sensibilities, for example, to:

(a) have sufficient self-confidence to advance opinions which differ from those of others including 'authorities';

(b) tolerate ambiguity and doubt;

(c) suspend judgement when the data available is insufficient;

(d) be ready to acknowledge deficiencies in his findings as failure to solve a problem;

(e) be open-minded enough to examine alternative ideas rationally and to change position when the evidence warrants it.

4 Social and academic skills, including the ability to:

(a) work independently or to take individual responsibility within a larger group project;

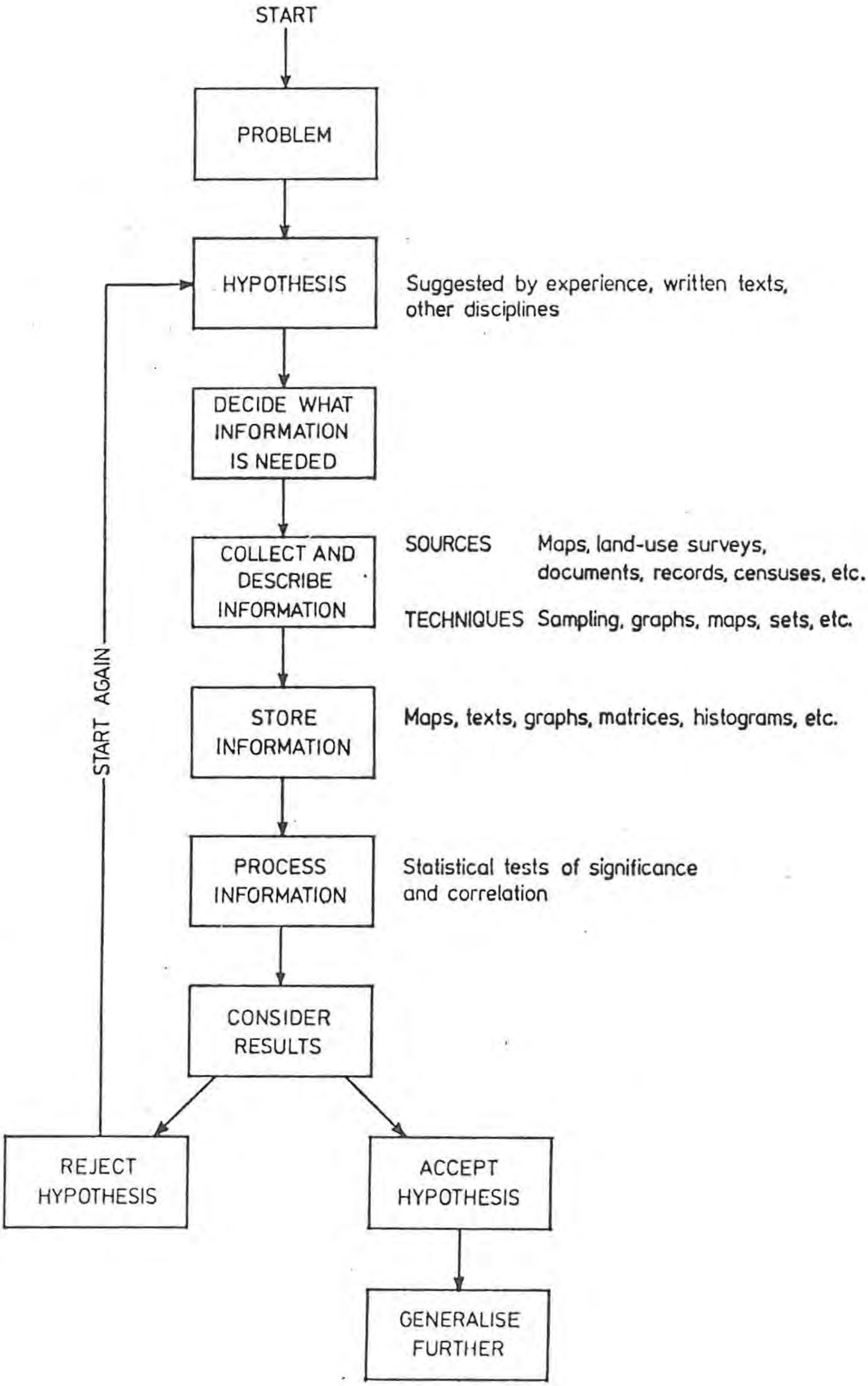
(b) use source books;

(c) process and present data cartographically using appropriate techniques and interpret results correctly;

(d) carry out simple statistical exercises where appropriate and interpret their findings;

(e) express ideas in writing clearly and concisely.

(Tolley and Reynolds, 1977, p. 127)



(after Cole in Bale 1973, p. 200)

FIGURE 2.1

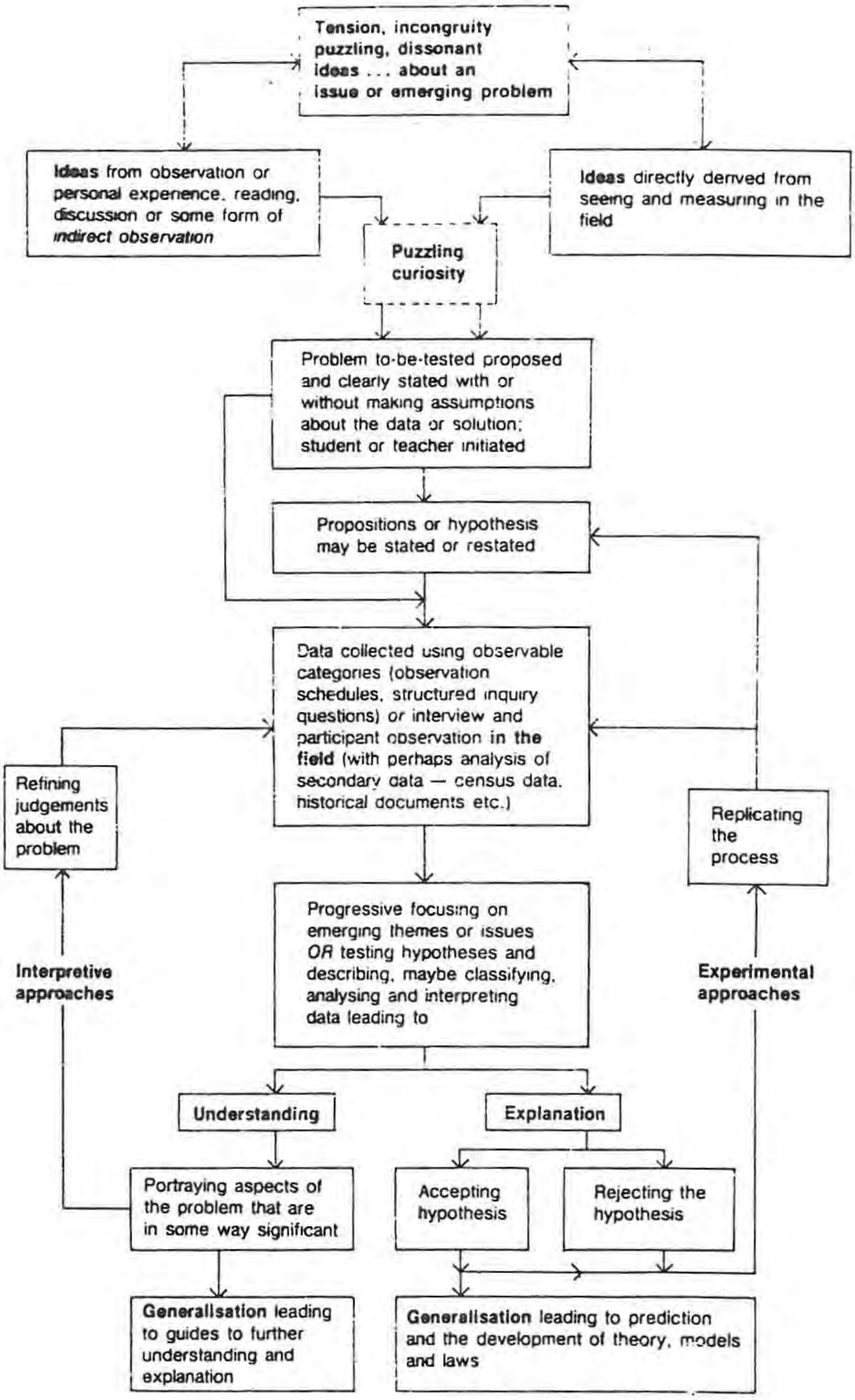
SYSTEMATIC SCIENTIFIC APPROACH TO PROJECT collection and collation of data and its evaluation, in order to either affirm or to reconstruct the hypothesis. The final result of this approach may be seen to rest in forecasting or prediction.

Bartlett (l984) describes a further approach to projects which is based in the humanistic perspective of knowledge and is related to a qualitative rather than a quantitative line of enquiry. (Figure 2.2). A key feature of this particular approach is that the data collected is appraised subjectively rather than objectively. The end result is, therefore, not a single solution, but rather a number of alternative scenarios which examine the interrelatedness of the various aspects of a problem, the so-called 'multiple realities' (ibid, p. 70). This approach is seen to be relevant to present school syllabuses as modern geography is based not only on skills and concepts but on values and attitudes which are subjective rather than objective.

In the design and development of projects, the choice of the pupils' study area will determine the most suitable line of enquiry. Thus a pupil who is concentrating on the analysis of the dynamic equilibrium of a particular beach area is more likely to choose the scientific approach, while a pupil engaged in a case study of development strategies to apply to a particular rural community will choose the latter approach.

Should projects, therefore, form a part of the IST programme in a school, the teacher will need to be aware that, as valuable as such activities are, the pupils will require a considerable degree of training and instruction in the various techniques which are needed for studies of this nature. Chapters seven and eight of this thesis examine the design, development and implementation of projects in a school situation.

The above analysis reveals that the so-called project applies to a specific activity which is governed by a particular set of aims and objectives, has definite characteristics and follows a particular line of enquiry. Thus, the application of this term to general student-based activities is misleading. Beaumont and Williams (l983) make a clear distinction between those problem orientated and structured activities which, while still pupil-centred, are teacher directed in terms of their design, development and outcomes. These latter approaches to pupil-centred tasks are referred to by the authors as 'practical work'. For the purpose of this study this distinction between projects and practical work will be used in the further analysis of terms to describe



(after Bartlett and Cox, in Fien, 1984, p. 68)

FIGURE 2.2

QUALITATIVE AND SCIENTIFIC MODELS OF INQUIRY IN GEOGRAPHY pupil-centred tasks and in the discussion relating to the implementation and development of an IST programme (Chapters seven and eight).

2.3.2 **Practical work**

(a) Short structured activities

Practical work in geography is generally associated with the interpretation and analysis of topographical maps, aerial photographs or synoptic maps. Hurry (l980), however, identifies practical work as any work which involves the pupil. In the context of Hurry's discussion, practical work refers to any structured task or activity which is developed by the teacher and given to the pupil whether in class time, as homework or in the field. Structured activities such as these are designed for revision, for reinforcement or for highlighting and emphasizing certain sections of the syllabus. Practical work may involve the pupil in the completion of worksheets, based on structured questions; in experiments or in the development of models. Such activities are designed specifically to suit the pupils' level of development and abilities. Thus, in terms of this analysis, practical work is identified as being those tasks which are generally designed by the teacher for fairly rapid completion by the pupils.

Tasks such as these may be designed to develop pupils' abilities in terms of problem-solving or decision-making and may be centred on the development of specific skills, concepts, propositional knowledge and values associated with various aspects of the geography curriculum. As such they would form a valuable part of a school's IST programme, being directly related to the requirements of the curriculum and associated with the development of the proficiencies described. Specific strategies with which the tasks may be associated are discussed in chapter three, while their development and implementation are discussed in chapters seven and eight.

Short, structured tasks, such as the above, however, form one aspect of practical work in terms of Beaumont and Williams' analysis (l983). Terms which are commonly used to describe larger structured activities undertaken by pupils include 'assignment', 'theme', and 'independent study theme'.

(b) Assignments

Teachers in South Africa are most familiar with the term 'assignment'. This concept is viewed from the perspectives of Möller (l983) and Hurry (l980), who analyse the term in relation to the form which was suggested by the l973 syllabus and which, according to Diepeveen (l986, pers. comm.), is still the most commonly used learner-centred task in Cape Education Department schools.

Hurry (l980), in his analysis of this type of activity, refers consistently to these pupil-centred tasks as 'assignments', while Möller uses the terms 'independent study theme' and 'assignment' interchangeably. Both authors identify assignments as structured activities which are controlled by the teacher.

Therefore, the teacher's role in developing these activities is to:

(i) designate the area of study;

(ii) determine the structure and format of the activity;

(iii) decide on the length of the completed product; or will

(iv) determine the form which the completed product will take, i.e. a chart, a poster, an essay, a report, etc;

(v) indicate the type of illustrative material that should accompany the completed product, this may include maps, schematic diagrams, photographs, graphs, tables, etc;

(vi) identify the problem or problems which will be investigated if the assignment is to be problem orientated;

(vii) decide on the line of enquiry to be followed if this is applicable to the particular assignment set.

The pupil's role in these activities is seen as being related to

(i) the selection of material which will be suited to the area of study;

(ii) the analysis of the selected material;

(iii) organising the selected material into a coherent and logical whole;

(iv) managing and arranging the time which is allocated for the task.

While assignments are structured and teacher-directed, Möller (l983) perceives these activities as a means to introduce pupils to less tightly structured activities, which are represented by worksheets or data response activities. Assignments may be viewed as a useful tool to develop the skills and techniques which the pupil will need for projects. Thus, assignments should:

(i) provide the pupils with the opportunity to utilize a variety of primary and secondary sources (as assignments may be related to field reports);

(ii) expose the pupil to a variety of skills in terms of the retrieval and collection of information, both in the field and from printed sources;

(iii) develop a variety of techniques related to the presentation of the collected and selected data;

(iv) introduce pupils to problem-solving and decision-making techniques;

(v) emphasise the correct use and development of illustrative material;

(vi) expose pupils to the utilization of a variety of audio-visual techniques, with regard to the development of software and the use of hardware such as cameras, slide-tape projectors, OHP and computers.

Assignments as a part of the IST programme can be applied to all standards in the high school, but are seen as particularly valuable in the junior secondary phase. The implementation and analysis of such activities is discussed in chapters seven and eight, while particular strategies which can be related to assignment work are examined in chapter three.

(c) Themes

While the term 'theme' is frequently used interchangeably with that of 'assignment', an analysis of this particular learner-centred task indicates that it differs from the assignment in a number of respects. An analysis of themes, as discussed by Meirding (I973); Kelly (I978) and Cracknell (I98I) reveals that themes, while having certain basic characteristics, differ in respect to their application regarding the age level of the pupils for whom they are designed. The essential characteristics of themes include the following:

(i) they are related to the pupils' interests, whether done as a group activity or as an individual piece of work;

(ii) they are essentially inter-disciplinary activities;

(iii) they are viewed as an integral part of the teaching programme and much of the work is done in class time;

(iv) the teacher's role is largely supportive rather than directive;

(v) they may use a variety of strategies and approaches but are not directly associated with a particular line of enquiry.

Cracknell (I98I) sees such activities as valuable for younger pupils in that it develops specific skills, attitudes and values which, in the primary phase, are needed for specific disciplines. In the junior secondary phase of high school these activities may be used to introduce pupils to the skills and techniques which they need for more advanced individualised study.

Meirding (I973) and Kelly (I978) view such work as particularly useful in mixed ability classes in the secondary school where pupils are able to work on areas which interest them either as individuals or in small homogeneous groups. Such inter-disciplinary activities are perceived by Meirding as being valuable as a means to encourage pupils to develop their own interests and to use their own initiative.

While thematic work may be more difficult to organise in South African high schools, which are rigidly linked to specific subject areas, it is viewed as a useful strategy to use with slower learners as it allows these pupils to work at their own pace. Other aspects of this approach which make it suited to slower learners include the following. The thematic approach:

(i) is more closely associated with observation than interpretation;

(ii) is related to data collection rather than data analysis;

(iii) need not be problem oriented in the sense that projects are;

(iv) can be tailored to the abilities of the pupils.

This analysis notwithstanding, thematic studies as done in Cape Education Department primary schools, particularly in the senior primary phase, frequently involve pupils in analysis of the collected material and to aspects of problem-solving. Primary schools find this approach particularly useful as it caters for the mixed ability grouping in the schools.

If thematic studies are to be included in the practical component of the IST programme of high schools, most schools would find these activities more suited to the junior secondary classes where team teaching across a variety of disciplines may be possible.

2.4 SUMMARY

The term IST in the I985 Revised Syllabus and the I993 Draft Core Syllabus is identified as a 'blanket term' which covers a variety of approaches to learner-centred tasks. The basic distinction between the various approaches which may be used in the design and development of learner-centred tasks is made between those tasks which are designed as projects and tasks which fall into the sphere of practical work.

Projects are primarily related to problem-solving skills and require the identification of problems and the search for solutions. This type of activity, therefore, emphasizes the pupils' interpretative ability and is based on the assumption that the pupils have reached the stage of formal operancy.
Projects follow a particular line of enquiry, being related either to the

'scientific' or 'qualitative' models. Project work is learner-centred in that the teacher's role is that of a facilitator rather than an instructor. The outcome of such work is difficult, if not impossible, to predict and the results are less easily measured in terms of a marked assessment. Such activities are, by their nature, more suited to the senior secondary phase of the high school.

Practical work is characterised by its high degree of structuring in that the teacher directs and controls the activity. The outcome of such tasks is to a large degree predictable and is generally measurable in terms of a marked assessment. Practical work tends to emphasize the collection and collation of data, whether in the field or from various other sources. Each specific exercise in practical work tends to stress a specific set of skills, which are not confined to the high order skills of analysis, synthesis and evaluation. There is generally no set line of enquiry and the tasks are not linked to any specific model. Practical work may take the form of a variety of short, structured exercises from worksheets to data response exercises to larger structured assignments or inter-disciplinary themes.

Whatever their form, the learner-centred tasks within the school's IST programme ought to be related to the development of skills, values and attitudes and should be so designed that they promote the acquisition of propositional knowledge. The learner-centred tasks should help the pupil to acquire proficiency in terms of problem-solving and decision-making.

The development and implementation of these tasks should be viewed as part of a programme which occurs throughout the year, rather than as occasional activities.

CHAPTER THREE

THE DESIGN, DEVELOPMENT AND IMPLEMENTATION OF IST IN THE GEOGRAPHY CURRICULUM: THEORETICAL CONSIDERATIONS

The preceding analysis concerned the nature and form of IST with respect to the requirements of the present South African geography syllabuses and according to the terms in current use describing these tasks; thereby relating IST to a programme of activities designed to develop concepts, skills, values and attitudes within a practical and a project component. The design, development and implementation of IST, however, needs to be based on a broader theoretical framework than the previous conceptual analysis if IST in the school is to be governed by a set of rational principles which will provide the pupil with a variety of learning experiences that are relevant and worthwhile. Accordingly, this chapter will:

I examine the aims and objectives of the geography curriculum in terms of current geographical theory and the implications of this theory for IST, with regard to the design of the tasks and the approaches which ought to be used for their development and implementation;

2 explore a number of learner-centred strategies which may appropriately be applied to IST in order to develop the skills, values and attitudes which are at the heart of current geographical theory;

3 examine the use of assessment systems which are applicable to the assessment and evaluation of tasks which are concerned with the development of proficiencies in the affective and cognitive domains rather than on the presentation of facts or on descriptions.

As the purpose of this research was to explore the possibility of developing an IST programme as an integral part of the geography curriculum, the following discussion is intended to identify the existing theoretical framework upon which the present geography syllabus is based, rather than to present a critique of either the theory or the syllabus.

3.1 THE AIMS AND OBJECTIVES OF THE GEOGRAPHY CURRICULUM IN RELATION TO CURRENT GEOGRAPHICAL THEORY AND THE IMPLICATIONS FOR IST

3.1.1 Aims as statements of intent in the geography curriculum

Broadly speaking, aims are statements of intent or purpose. In an educational sense they attempt to describe the wider ends towards which educational institutions are working and are characterised by the so-called "mission-statements" drawn up by schools and other educational institutions. Peters (1966, p. 28) refers to aims as a way of "getting people to get clear about and focus their attention on what is worthwhile achieving." In a subject context, Marsden (1976) claims that statements of aims generally justify the reasons for the inclusion of that subject into the school curriculum.

Aims in a subject context are accepted as being both desirable and necessary as they:

(i) serve as guides in the selection of content and methods to be included in the curriculum (Bennett, 1973);

(ii) enhance the 'structure' and 'coherence' of a planned activity (Peters, 1966, p. 29).

There are, however, certain problems associated with the statement of aims for a curriculum.

(i) As a statement of intent an aim such as to engender a love of country is associated with an outcome which is impossible to measure (Graves, 1975).

(ii) There may well be a difference between what the statement of aims intends the subject to achieve and what in fact it does achieve (Graves, 1975; Marsden, 1976). Graves warns that outcomes may be negative as well as positive, may be difficult to predict and to anticipate and that an activity frequently results in numbers of unintended outcomes (Graves, 1975).

Statements of aims reflect the theory which underpins the choice and structure of the content and the approaches to the subject. Such statements in the curriculum involve value judgements concerning the essential concepts which distinguish geography from other subjects (Hall, 1982), and how geographers think about geography. The geographical theory within which the syllabus is located cannot, however, be separated from a particular ideology. This relationship is underlined by Gould (1985) and Graves (1985) who emphasise the links that are forged between geographical paradigms and ideologies and the social, political and economic factors which prompted their formulation and development.

Statements of aims in the current syllabuses also reflect accepted educational theory and the educational expectations of society.

The following analysis of the theoretical framework upon which the South African geography syllabus is based reveals a "palimpsest" (Clark, 1989, p. 46) in which remnants of geographical paradigms are retained and reflected in the statements of aims and in the content and structure of the syllabus.

3.1.2 **Geographical theories and their influence on the South African geography syllabus**

Although Hall (1984, p. 1) avers that "until the 1960's most knowledge in the geography classroom was fit only for the bonfire," Clark (1989), in his analysis of the development of the South African geography curriculum, reveals that some of the brushwood for the bonfire stemmed from traditions which continue to have a useful role in the present geography syllabus.

While the descriptive approaches to the teaching of geography are rightly criticised, geographical paradigms prior to 1960 provide certain perspectives which have value. These include the view of geography as a bridge between the arts and sciences and the interest in regional studies. The former has given rise to the holistic and interdisciplinary approaches to geography and the latter to an interest in the developing and developed nations of the world. While there have been considerable changes in the approach to geography in terms of what is worth including in the syllabus and with respect to the purpose of geographical education, Clark (1989) demonstrates that a school syllabus encapsulates the sum of that which is perceived to have value in a discipline.

Notwithstanding the influences of past paradigms on geography curricula, the following three perspectives have dominated the approaches adopted by geography syllabuses in the western world.

(i) Positivism represents a shift from the descriptive methodologies of rationalism and empiricism to the quantitative approach associated with scientific systematic studies. This approach is characterised by an emphasis on analytical reasoning, a respect for evidence and a search for general principles. This approach to knowledge was a reflection of the technocracy which characterised western society in the 1950's and 1960's.

The 'new geography' of the 1960's and the 1970's adopted the positivist perspective and the quantitative approach formed the basis of school geographies in Britain (Geography 14-18), in the USA (High School Geography Project), in Sweden and in other parts of the western world. The 1973 syllabus introduced South African schools to this perspective. The orderly progression of information and its systematic analysis is a feature of this approach, which Hall (1984, p. 5) views as one of the reasons for its success in schools, making it an "approach to inquiry that can be transferred easily into the classroom." The influence of the quantitative paradigm in the 1985 Revised Syllabus and the 1993 Craft Core Syllabus is revealed in the emphasis on:

* the acquisition of cognitive skills;
* quantitative analysis rather than on description;
* the 'scientific' approach to learner-centred activities.

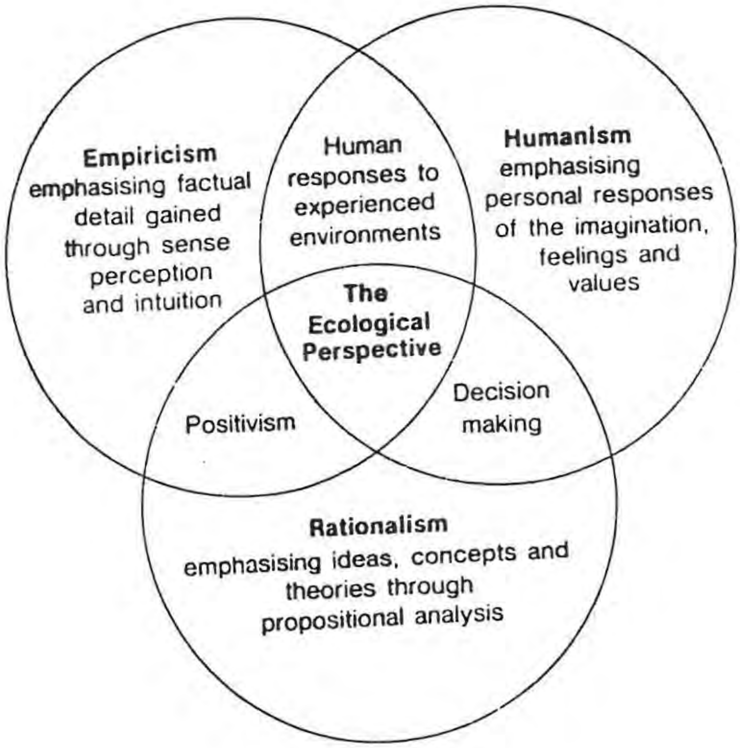
The 1973 syllabus was criticised for its clinical and antiseptic approach to geography (Earle, in van der Merwe, 1982), and for the way in which the 'new geography' either ignored 'man's' role in the environment or if included in a study, reduced him to a statistic.

(ii) The negative reaction of geographers to positivism was an echo of the ideology of social realism or neo-Marxism which portrays the individual as an agent capable of interpreting his environment from his own personal knowledge and experiences (Gould, 1985; Johnston, 1985). Humanistic approaches such as social realism regard knowledge from the perspective of "assimilated experiences" (Hall, 1984, p. 7). This approach represents a shift from the positivist line of enquiry to that of the qualitative approach described in chapter two. A key feature of humanistic perspectives is the greater emphasis placed on values, feelings and emotions in studies related to people-environment investigations. The emergence of humanistic approaches in the latter half of the 1970's and the 1980's is viewed as a reaction to the failure of technocratic attempts to resolve economic, social and political problems. Johnston (1985) identifies the development of social realism in relation to the restructuring of the British society in the 1970's and the 1980's and the call for greater productivity.

In educational terms the humanist paradigm emphasises the development of the "whole child" and therefore reflects the increasing importance placed on the development of the affective domain. In a geographical context this approach led to a concern for human and regional geography, which many geographers felt had been under-emphasised in the 'new geography'. Regional and human studies in geography are, however, examined from an issues-based stance rather than from "an empiricist" view (Johnston, 1985). Thus, while qualitative in nature, they are related to what has been described as a far more open approach than the more traditional descriptive methodologies. The 1985 and the 1993 syllabuses reflect the influence of humanistic perspectives in the greater emphasis placed on an issues-based approach to themes such as urbanisation, rural problems and solutions, environmental management and the management of resources.

Valuable as humanistic approaches may be in alerting pupils to the need for tolerance and as a means to develop care and concern for the environment and the plight of others less fortunate, these approaches were seen as flawed as they over-emphasise what Hall (1984, p. 7) refers to as "the role of the ego" in a world that needs modern science and technology. The geographical pendulum having swung this far left in reaction to the positivist 'right' prompted geographers to search for an approach which was better suited to the needs of the pupils in terms of the reality of the 1980's and beyond.

(iii) Environmentalism or the ecological perspective, which merges the approaches to geographical education of the past three decades (Hall, 1984) developed in response to the perceived need for a



(Hall, 1984, p. 9)

FIGURE 3.1
THE ECOLOGICAL APPROACH TO KNOWLEDGE

'unifying' paradigm which would provide a central conceptual and structural framework for geography courses and which would bridge the gap between the 'locational' and 'environmental' components of geography (Preston-Whyte, 1982). The merger of the various perspectives (Figure 3.1) resulted in what was accepted as a dynamic and flexible approach to the teaching of geography, which could be applied equally well to physical and human geography. The ecological perspective was adopted by the British project, 'Geography 16-19' in 1980 and is reflected in the aims of the geography curriculum (June 1990) proposed for schools in Wales. The application of the environmental approach to geography teaching combines an understanding of process, pattern and relationship in the study of an aspect of the environment with that of perceptions relating to the issues and problems which exist in that environment. The pupil is, therefore, exposed to cognitive and affective processes, within a framework of knowledge which is perceived as having 'meaning' and which is relevant to the pupil's needs.

3.1.3 **Current aims in geography in relation to geographical theory**

The preceding analysis reveals that each geographical paradigm leaves traces which may be identified and isolated, either in the individual aims, in the content or in the structuring of the syllabus. Such an analysis, while exposing the 'rich palimpsest' of the curriculum, is somewhat unsatisfactory as it leaves no lasting impression of 'coherence', 'structure' or 'purpose'. In order to determine whether in fact there is some unifying principle governing a syllabus and what it is, the statement of aims needs to be analysed as a unit.

Before considering the geographical aims of the present South African syllabus, the aims of British school geography will be analysed as being representative of western thinking in terms of modern geography syllabuses. The following analysis is based on the response of British geographers to a challenge issued by the Secretary of State for Education and Science to justify the inclusion of geography into the new centralised curriculum planned for Britain (Bailey, 1986). Geographical aims in British schools emphasise

(i) that the content must be sensitive to the educational needs of the pupils at varying stages of their development, thereby underlining the essentially learner-centred perspective of the curriculum;

(ii) the need for pupils to understand their place in their local community as well as on a national or global scale;

(iii) the need for pupils to be aware of and sensitive to the issues that affect the lives of others as well as the global issues that will affect the lives of all people;

(iv) the pupils' understanding of environmental issues;

(v) an awareness of the power structures that exist in society and the way in which the 'decision-makers' function within power structures, whether they are political, social or economic;

(vi) the development of skills that are especially related to geography;

(vii) learning tecnhiques that will enable the pupil to learn independently.

In relating the above statements of aims to the various geographical paradigms previously examined, it would appear, from the reasons given below, that the 'coherence' and 'structure' of British school geography is essentially provided by the ecological perspective.

(i) The criteria governing the selection of the syllabus content are to be relevant and meaningful in terms of the pupils' educational and socio-economic needs.

(ii) Provision is made for the development of skills in both the affective and cognitive domains.

(iii) There is both a balance and an interaction between human geography and physical processes.

(iv) Recognition is given to the role of values, feelings and emotions as well as to the importance of procedures that govern a modern technologically advanced society.

The analysis of the general statement of aims in the l985 Revised syllabus and the l993 Draft Core Syllabus (Appendix 2) reveals a close similarity with the stance taken by British geographers in terms of the purpose of school courses.

Both the British and the South African geographical aims stress:

(i) the learner-centred perspective, which emphasises the need to cater for the pupils' educational and socio-economic needs;

(ii) that geography as a school subject ought to foster the pupils' awareness and understanding of their community and the environment as well as the social, political, demographic and economic issues which affect the lives of the individual;

(iii) that the subject should also develop the pupils' awareness of global issues that influence and affect the quality of life of mankind within a rapidly changing world;

(iv) that geography in schools should maintain a balance between the pupils' understanding and knowledge of the systems and processes that are related to physical geography and those that are concerned with human geography.

(v) that geography as a subject is perceived as part of the curriculum as a whole and as such is concerned with fostering and developing skills, concepts and values that are both unique to geography and which are associated with the principles related to "education as the transmission of that which is worthwhile in a morally acceptable manner" (Peters, 1966, p. 25).

Therefore, the ecological perspective can be applied to the geographical aims in South African schools in terms of the preceding analysis.

An analysis of the statement of aims of a syllabus reveals much of the 'spirit' of the syllabus (Diepeveen, 1986, pers. comm.), but cannot reveal the rationale governing certain elements contained within the structure and content of the curriculum.

To understand the emphasis placed on particular skills, or approaches, geographical objectives need to be analysed.

3.1.4 **Objectives in the curriculum: the product/process dilemma**

The objectives approach to curriculum planning and design, which characterises present South African syllabuses, originated in America in 1918 in an attempt to clarify the purpose of education. The basic principles of incorporating objectives in curriculum design were developed further in 1949 and were translated into the first functional model of curriculum design using the objectives approach in 1962 (Graves, 1975; Stenhouse, 1981).

In an objectives approach to syllabus design, the aims are perceived to provide the broad framework with the objectives providing the structure. In order to assess the implications of objectives on the planning, development and implementation of an IST programme, objectives are considered in terms of their influence on the design of the geography curriculum; the long-term objectives as stated in the introduction to the most recent geography syllabuses; and the short-term objectives which the teacher is expected to select in planning a lesson or an activity.

(i) Operational objectives are those objectives which the curriculum designer applies as a means of establishing criteria for the selection of the syllabus content and for the structuring of that content. An objectives approach to curriculum design, therefore, is an attempt to ensure that the teacher knows what the pupils ought to learn and what "learning experiences' should accompany the teaching of the content (Taba, in Stenhouse, 1981). Knowing this, it is claimed, will help teachers to set tests and examinations, as they know in advance what is expected of the pupils and will aid in the selection of appropriate learning strategies (Tolley and Reynolds, 1977). Bennetts (1973) claims that a clear understanding of the objectives for geography provides teachers with a broader perspective of the pupils' educational needs.

(ii) The long-term objectives as stated in the preamble to a geography curriculum, provide a broad framework of proficiencies which pupils are expected to acquire in the course of their exposure to the syllabus content and as a result of their learning experiences. The analysis of these objectives in the present syllabuses in chapter two reveals the emphasis that is placed on both the cognitive and the affective development of the pupil.

(iii) Each lesson and each activity is expected to be given focus through the selection and setting of objectives, such objectives are expected "to be closely correlated with the aims of the subject and the resources available" (1993 Draft Core Syllabus, p. 2).

Marsden (l976) suggests that an objectives approach to teaching will aid the teacher by:

* providing the means to ensure that the individual needs, interests and abilities of each pupil can be met;

* facilitating the development and progression of learning, through the sequencing of learning experiences from one stage to another;

* allowing for feedback that is of value to both teachers and pupils.

Essentially, an objectives approach, whether applied to the design of the curriculum and its structure or to the organisation and planning of lessons and the activities within those lessons, is seen as an attempt "to improve practice by increasing clarity about the ends" (Stenhouse, l98l, p. 83).

Stenhouse's analysis of what is referred to as the "organizing power" of the objectives approach to curriculum design and to teaching (l98l, p. 56) reveals that :

(i) through the selection of objectives, aims can be translated into achievable targets, which can be tested, evaluated and improved;

(ii) objectives make it possible for the content to be allied with a wide variety of theoretical considerations in terms of currently accepted educational perspectives and the educational expectations of society.

An objectives approach, however, is not without problems. Much of the criticism arises out of the way in which objectives have been applied, the behavioural bias of objectives in the curriculum and the suggested teaching approaches. Stenhouse (l98l) warns that the selection of objectives involves making value judgements. Objectives cannot be reified and therefore ought to be subjected to the same sort of critical analysis which should be applied to any value statements.

Curriculum design within an objectives model could result in the following problems:

(i) An overly rigid and precise identification of objectives may lead to the belief that only absolute measurable outcomes ought to be catered for. This, Marsden (l976) suggests, will stifle opportunities for creative and spontaneous learning experiences and will reduce innovation and experimentation in a discipline.

(ii) The strict adherence to a set of objectives may cause a teacher to ignore the many unintended outcomes with which most learning experiences are associated. In this way potentially valuable educational opportunities are lost (Graves, l975).

(iii) Objectives in a curriculum may neglect the affective domain as learning experiences related to values, attitudes, feelings and emotions are either difficult or impossible to express in behavioural terms (Bennetts, l973; Gowing, l973; Graves, l975).

(iv) In the translation of the stated objectives of a syllabus unit into a lesson plan a teacher may emphasise learning outcomes which have little educational value, as the "identification of worthwhile outcomes in behavioural terms" which are measurable is difficult (Atkin, in Stenhouse, l98l, p. 72).

More serious, perhaps, is the allegation that the emphasis on behavioural objectives is morally wrong and more closely related to indoctrination than to education, as objectives are essentially predictive and therefore lead to manipulating (Kleibard, in Stenhouse, l98l). In reaction to these and even more fundamental criticisms which attacked the objectives model in terms of the belief that all learning outcomes are predictable and measurable and with regard to the perception that the clarification of the product will improve teaching practice (Stenhouse, l98l), a number of alternative models were developed. The following approach, the process model as analysed by Stenhouse, is discussed here as being pertinent to the analysis of the general aims and objectives of the present geography curriculum.

Key features of the process model include the following:

(i) Learning outcomes are not predicted, thus the processes involved in learning are emphasised rather than the end product.

(ii) The teacher and the pupil are actively involved in the learning process; while the teacher seeks to provide the climate for spontaneous and varied learning experiences, the pupils' input to the learning programme may create unexpected and valuable learning opportunities which the teacher is able to exploit because of the flexibility of the model.

(iii) Actions and activities play a far more important role than a catalogue of facts, thus the learning process and the acquisition of knowledge is the result of the collective experiences of the pupil and the teacher, set within a framework of "procedures, criteria and concepts" (Stenhouse, 1981, p. 85). Table 3.1 illustrates such a framework.

TABLE 3.1

FRAMEWORK OF PROCEDURES FOR THE DEVELOPMENT OF ACTIVITIES

1 To initiate and develop in youngsters a process of question-posing (the inquiry method);

2 To teach a research methodology where children can look for information to answer questions they have raised and use the framework developed in the course (e.g. the concept of the life cycle) and apply it to new areas;

3 To help youngsters develop the ability to use a variety of first-hand sources as evidence from which to develop hypotheses and draw conclusions;

4 To conduct classroom discussions in which youngsters learn to listen to others as well as to express their own views;

5 To legitimize the search; that is, to give sanction and support to open-ended discussions where definitive answers to many questions are not found;

6 To encourage children to reflect on their own experiences;

7 To create a new role for the teacher, in which he becomes a resource rather than an authority.

(Hanley, Whitla, Moo, Walter, in Stenhouse, 1981, p. 92)

A basic problem of this approach is that of assessment, as the pupils' development in terms of a general body of knowledge, skills, values, attitudes and personal growth is considered to be more important than the acquisition of specific factual data within that body of knowledge. The process model therefore comes into conflict with an educational system that attempts to measure pupil development in terms of a product view to learning.

The process approach is, therefore, perceived as being particularly suitable to those sections of the curriculum which are related primarily to understanding.

An analysis of the proposed l993 South African geography syllabus in the light of the preceding discussion reveals that:

(i) The introduction to the l993 Draft Core Syllabus has an essentially learner-centred focus in both the aims and the objectives, which emphasises the development of the 'whole child', thereby precluding behavioural objectives from being used as the sole criterion to measure learning outcomes. The identification of the general long-term objectives in terms of the Rylian notion of knowledge, which perceives the acquisition of knowledge as a process involving the pupil in 'knowing that', and 'knowing how' as well as in a knowledge of facts and concepts, emphasises the need to involve the pupil in varied learning experiences which are both 'worthwhile' and useful. Such learning experiences involve complex cognitive and affective processes and may have outcomes which are not easy to predict. These 'objectives' therefore cannot be seen to be entirely behavioural and reflect the influence of both the positivist paradigm and humanistic approaches which are merged with the ecological perspective to create a more equitable approach to teaching practices.

(ii) The subject content in each standard is divided into a series of modules and then sub-divided into a series of topics. These are detailed according to the factual and conceptual framework which is to be covered by the teacher. An accompanying commentary provides guidance in terms of the appropriate resources to be applied; identifies the occasional activities suited to a particular area of the study and suggests "appropriate" teaching approaches.

Cataloguing content in this manner inevitably gives rise to a behavioural bias with the emphasis on product rather than process, thereby creating the dichotomy which exists in the present syllabuses between the 'intended' outcomes contained in the preamble and the actual outcomes, which result from the teacher's adherence to the content outline rather than the general aims and objectives (Ballantyne, 1986).

An analysis of the proposed geography syllabus for Wales (June 1990) drawn up in compliance with the stated aims as presented by Bailey (1986) for the centralising of geography in the national curriculum, reveals the same dichotomy as that of the South African geography syllabus. Thus, the aims and general objectives reflect the ecological perspective, while the content detail is, if anything, more prescriptive and specific in terms of the behavioural bias than the South African syllabus.

This underlines the problem that exists in terms of the attempts to create a syllabus which reflects the current theoretical principles, yet is of necessity product orientated because of the examination system which attempts to standardise pupil performance.

3.1.5 The implications for IST in terms of the planning and development of a programme based on a process oriented model

The development of an IST programme in schools needs to consider an approach which, while largely based within the process model, includes aspects of the objectives approach as pupils must be adequately prepared for the senior certificate examination.

The developmental stages in such a model are represented in Figure 3.2. The model is divided into three broad phases: the development of the programme for the various standards in the high school analysis, evaluation and feedback after each activity is completed and at the completion of the programme each year. The model may be perceived as a cyclic approach operating on a yearly basis, with the feedback phase influencing the input and output.

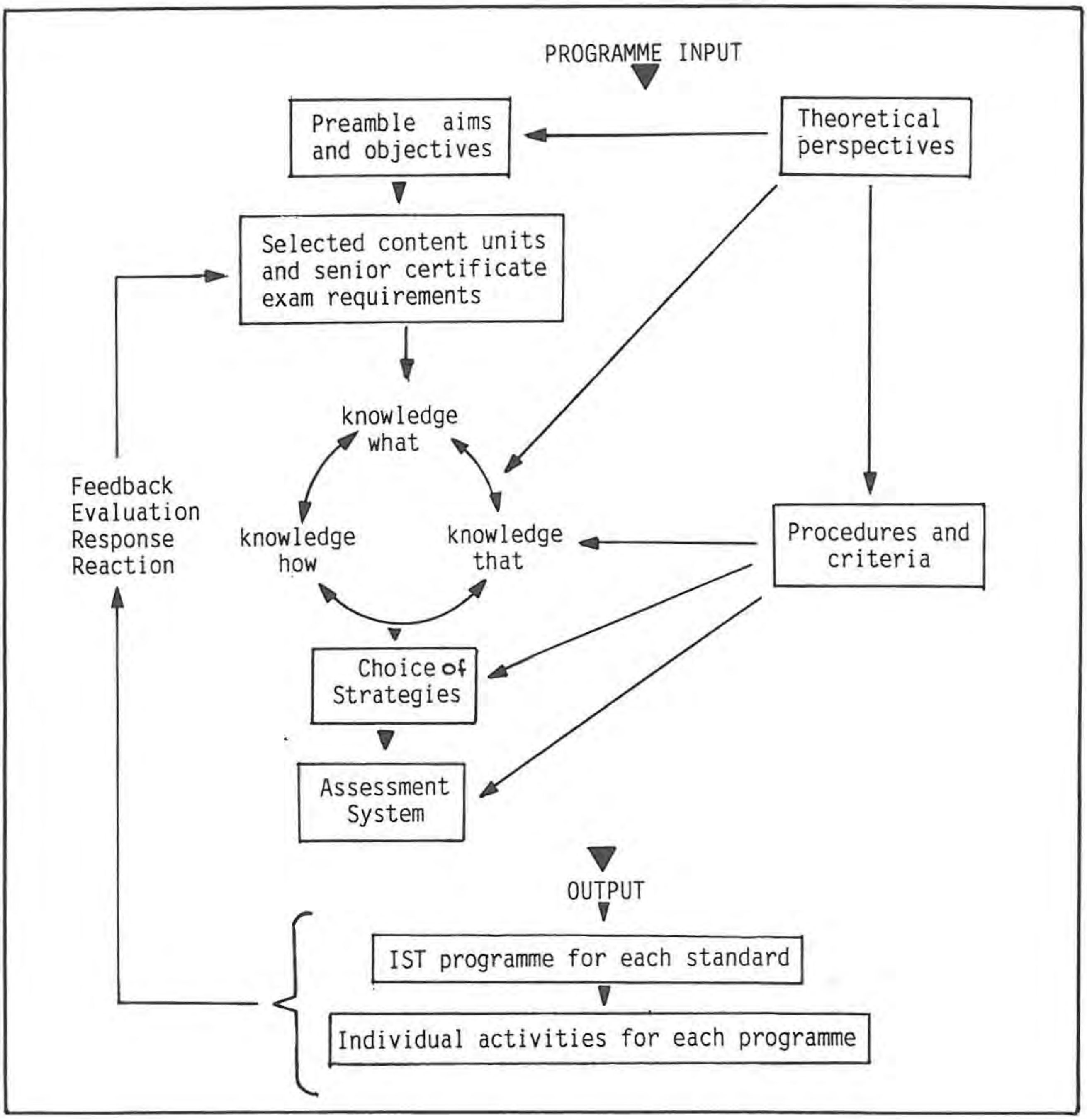


FIGURE 3.2

IST PROGRAMME : DEVELOPMENT MODEL

The first consideration in the development of an IST programme must be in terms of the theoretical perspective which the geography curriculum reflects. The IST programme will therefore be based on the tenets governing the ecological perspective. This perspective provides opportunities to utilize and develop quantitative and qualitative approaches in the design and development of specific activities. The pupils are therefore exposed to the widest possible range of skills and processes in both the affective and cognitive domains (chapters seven and eight). The ecological perspective furthermore creates opportunities for experiential learning which takes the teacher and pupils beyond the confines of the classroom and enables them to utilise the wealth of human, physical and material resources available in their local community. The geography of the classroom is thereby made 'relevant' and 'meaningful' to the pupils as they are exposed to 'real world' situations. The ecological perspective enables the IST programme to translate the aims of the present syllabus into achievable targets and provides the necessary framework upon which to base the general aims of the IST programme.

The long-term objectives of a syllabus provide the focus for pupil development in particular areas, but give little indication of precisely what should be developed in each area, how it should be developed and when it should be developed. The detailed content for each year provides the teacher with a guide to the particular area of study which is considered appropriate at a particular stage of pupil development. The content of the curriculum is therefore arranged in order to provide a framework of progression in terms of knowledge.

As the long-term objectives of the present syllabus emphasise 'knowledge', skills, values and attitudes and perception, they have been identified (chapter two) within the Rylian notion of knowledge. 'Knowledge' in terms of this perspective emphasises the interdependence and interrelatedness between facts, concepts, propositions and skills within both the affective and cognitive domains. Therefore, by inference, each area of study presented in the geography curriculum should be analysed in terms of the propositional knowledge and the skills which are implicit in that unit (Griffiths, 1987). In presenting the area of study the teacher will therefore need to identify:

(i) the essential facts and concepts contained in the unit, the so-called 'knowing what' level of knowledge;

(ii) the propositional knowledge which is implicit in terms of the pupils' understanding of the unit of study, thus providing the 'knowing that' level of knowledge;

(iii) the skills, values and attitudes with which the unit is associated, both in terms of the pupils' understanding of the unit and in relation to the tasks set in order to aid the acquisition of the knowledge; this is the 'knowing how' level of knowledge.

The curriculum is, therefore, by implication, based on a progression of development in terms of all three of these levels of knowledge. Much of the identification of the 'knowing that' and 'knowing what' is, however, left to the teacher. The development of an IST programme therefore needs to be based on a similar progression framework. This will form the basic framework of objectives within which the programme operates (chapter 8).

As an IST programme is essentially concerned with the development of the 'actions and activities' (Griffiths, 1987) which pupils undertake during the learning process, the development of a progression framework in terms of the development of skills and proficiencies in the affective and cognitive domains is particularly important. In planning and developing the programme it will therefore be necessary to:

(i) analyse the nature of the skills, values and attitudes within each unit of study;

(i) understand the various skills and skill levels that ought to be developed through the study of a particular area;

(iii) be aware of the age levels at which various skills are appropriate;

(iv) make provision for those pupils who will either not be able to master certain skills or who conversely are capable of more advanced skill development than their peers.

The progression framework within which the IST programme is developed provides the structure of the programme which will reflect the broad statement of aims and which will translate these aims into achievable targets. The teacher and the pupils therefore are guided with respect to what should be achieved, why it should be achieved and when it should be achieved.

3.2 LEARNER-CENTRED STRATEGIES WHICH ARE APPROPRIATE FOR AN IST PROGRAMME

Curriculum aims and objectives and the principles of procedure, while providing a useful starting point for the development of the IST programme's activities, gives little indication of the precise strategies which can be applied in order to develop the required skills, values and attitudes with which the present geography curriculum is concerned. The following analysis of specific learner-centred strategies reveals a wide variety of activities which can be applied to the IST programme, each of which is chosen because of its inherent concern with a particular skill or set of skills.

The selection of the strategies is based on the need to develop activities in both the practical and project components of the IST programme. Each of the strategies analysed has been identified as appropriate to the geography curriculum and reflects the shift in emphasis from the descriptive techniques of rationalism and empiricism to the quantitative and qualitative approaches previously discussed. Certain strategies are more suited to the practical component, others to the project component. All of them, however, provide the pupils with opportunities to develop techniques and skills which can be applied to projects. The following analysis discusses the strategies in terms of their perceived value for IST. The implementation and evaluation of these learner-centred activities is considered in the second half of this thesis.

The following learner-centred strategies are selected as being relevant to the development of an IST programme:

(i) Data processing and data analysis.
(ii) Models.
(iii) Games and Simulations
(iv) Valuing.
(v) Case Studies.
(vi) Fieldwork.
(vii) Computors.

3.2.l Data processing and data interpretation

The increased use of data response-type questions in the Cape Senior Certificate examinations for standard grade as well as for higher grade pupils is a measure of the importance which modern geography places on these techniques of interpretation, analysis and evaluation.

The processing and analysis of data is allied to the pupils' ability to both make generalisations and to apply generalisations in problem solving and decision making. The interpretation and analysis of data is particularly important in developing pupils' graphic skills and graphic understanding, while the use of statistical data develops skills in numeracy (Slater, 1982).

The diversity of geography creates the opportunity to employ a wide range of resources which are suitable for the interpretation and analysis of data. The table below (Table 3.2) lists resources which can be utilised in geography.

TABLE 3.2

DATA SOURCES FOR GEOGRAPHY

Diagrams	Photographs	Models
Maps	Posters	The field
Cartoons	People	Newspaper articles
Advertisements	Sketches	Cassette recordings
Periodicals	Case studies	Films/Filmstrips
Documents	Statistics	Videos
Texts	Graphs	Computer programs
Resource packs		

(Source: based on an idea from the New Zealand geography curriculum renewal programme)

(Slater, 1982, p. 48)

While the emphasis is primarily on the interpretation and analysis of data, data collection has value in terms of a variety of skills ranging from observation to library skills related to searching for and extracting material, to numerous field techniques including interviewing and the development of questionnaires. Slater (1982) provides a list of skills which data processing helps to develop. From this list a wide variety of learning experiences may be chosen for use either in the field or for classroom activities.

TABLE 3.3

DATA PROCESSING SKILLS

Intellectual skills

I	Perceiving and observing
2	Memorising and recalling
3	Understanding instructions/information
4	Structuring information, classifying and organising
5	Questioning and hypothesising
6	Applying information and ideas
7	Elaborating and interpreting
8	Analysing and evaluating
9	Identifying and synthesising
10	Thinking logically, divergently, imaginatively
11	Thiking critically and reflectively
12	Generalising, problem solving and decision making
13	Clarifying and analysing attitudes and values
14	Communicating facts, ideas, concepts, arguments, results, values, decisions, feelings

Social skills

15	Communicating and planning with others
16	Participating in group discussions
17	Listening to other viewpoints and opinions
18	Adopting a role
19	Exercising empathy
20	Working independently
21	Helping others
22	Leading a group
23	Participating in field or research work
24	Exercising choice and discrimination
25	Behaving responsibly and courteously
26	Accepting responsibility for learning
27	Initiating and organising a learning task

Practical skills

28	Talking, reading, writing, drawing, acting...
29	Manipulating instruments and equipment
30	Finding books and resources
3I	Walking an urban trail
32	Using a map
33	Organising a field investigation
34	Preparing a wall display
35	Administering a questionnaire
36	Interviewing a town planner
37	Designing a graph
38	Taking photographs
39	Sketching a building
40	Presenting statistics
4I	Writing a report

(Source: based on an idea from the New Zealand geography curriculum renewal programme)

(Slater, I982, p. 49)

Skill progression in terms of data collecting, data processing and data interpretation ranges from observation, recording, compiling and developing graphs, maps and schematic diagrams to the analysis, synthesis and evaluation of the evidence in order to solve problems or to reach decisions.

While numerical data are used in the compiling of graphs or in tables for analysis, statistical methods in South African schools do not have a particularly high priority. The use of the median,mode, and mean calculation, ranking and sampling are probably the only techniques used in the geography classroom at present. The manipulation and processing of numerical data by means of these relatively simple techniques does, however, give an added dimension to projects and to class activities, such as map interpretation and analysis. Wolforth (l984) justifies the use of statistics in the classroom on the following grounds:

(i) The fact that statistics are an integral part of geographical study and the additional tools provided by the so-called quantitative 'revolution' have increased the quality of geographical explanation, understanding and interpretation.

(ii) The utilization of these tools has encouraged the application of scientific systematic approaches to geography in which hypotheses formulation and testing plays a vital role.

(iii) The use of statistics has provided "new ways of looking at geographical data which, if not dealt with in too heavy handed a way, can be fun.

(ibid, p. l59)

The fun element which Wolforth mentions, along with his warning, is particularly relevant to the IST programme in schools. While statistics and data response activities develop pupils' abilities to analyse, synthesise and evaluate, they provide a dimension to geography which is stimulating, challenging and satisfying. Chapters seven and eight examine these activities in the classroom and for projects.

Data response activities are ideally suited to the development of short structured tasks in the practical component which aim at the development of specific skills or values or propositional knowledge, and are useful alternatives to testing and 'recall-type' worksheets. Use of data response activities in this way helps pupils to develop techniques which can be applied in larger assignments and projects.

3.2.2 Models

The role of theoretical models in the teaching of geography in South African schools was considerably expanded through the introduction of the 1973 syllabus. The Chorley and Haggett definition of models has been used to introduce Std 10 pupils to the model concept since the publication of the first of the textbooks to cater for that syllabus (Swanevelder, 1976). Key characteristics of models are seen to be:

(i) Their ability to present reality in a simplified and structured form.

(ii) The presentation of relationships or processes in a simplified manner.

(iii) The removal of 'incidental detail'.

(iv) Their ability to expose the fundamental qualities of situations, etc.

(Swanevelder, 1987)

Models are generally classified according to the degree of abstraction they employ. The traditional models used in geography are the iconic, analogue and symbolic models. Walford (1969, p. 20) identified the value of models in geographical education as a means to "draw attention to the importance of nomothetic rather than ideographic teaching." The use of models encourages pupils to look for similarities in the study of spatial concepts, processes, etc., and helps in the making of generalisations which can be applied to a variety of real-world situations, whether concerned with place, process or issues (Walford, 1969; Fien, 1984). Models therefore help in the understanding of complex processes, develop an understanding of concepts and principles and by providing structure they aid the acquisition of knowledge. However, experience has shown that valuable as models are for the teaching of geography, pupils need to be aware of the exceptions within the general rules. These 'wild-cards' become important to a full understanding of actual situations, places, etc.

The use of topographic maps, orthophoto maps, aerial photographs and theoretical models such as that of Christaller have familiarised teachers with the model concept.

Theoretical models in IST are useful in activities designed to stimulate discussion and debate in a classroom situation and may be used for data response-type activities which emphasise analysis and evaluation in the understanding of spatial processes, pattern and relationships. Such activities within the practical component of geography are also valuable in developing techniques which pupils can apply to project work. A variety of useful models which can be applied to the practical component of IST and to projects are contained in a publication by Hurst (l972).

The abstract theoretical models are not particularly suited to younger pupils. These pupils do, however, benefit from the use of 3-dimensional models. Developing and constructing these models as part of the IST programme helps to introduce pupils to a variety of abstract concepts and lays the foundation for theoretical models.

3.2.3 **Games and simulations**

Walford (l969, l973) relates games and simulations to the model concepts referred to above. Games and simulations such as role-play and simulation gaming are valuable learner-centred activities which help pupils to develop skills related to problem-solving and decision-making and are particularly relevant to the development of values and attitudes.

(a) <u>Games in geography</u>

Games, as opposed to simulation gaming, are largely board-type activities such as the "Rainforest Game" (Fien, l984, Appendix 3A), and rely to a greater degree on chance than simulation gaming. These simpler games are innovative and exciting ways to introduce pupils to new concepts, skills and values or can be used to reinforce or revise, being useful alternatives to tests and worksheets. Games are therefore useful in the practical component of IST and can also be used to vary the short structured activities used as class activities or as homework exercises.

(b) Simulation gaming

Simulation gaming is, however, more complex in that it combines elements of simulation with the games concept. This approach is particularly useful for the development of problem-solving skills and decision-making skills (Fien, l984). Most simulation gaming involves valuing and attitudes.

Simulation gaming such as those included in Walford (l969) and Smith (l977) will generally take longer to complete than a single 35-minute period, unlike games such as "Rainforest".

These learner-centred activities can form part of the IST programme within the practical component and can utilise class time if it is available or can be used as part of the school's enrichment programme (chapter eight). Simulation gaming generally involves a greater number of players than the simpler geographical games and while they need more organisation and planning, they are the most challenging and stimulating form of simulation.

(c) Simulations using models and role play

Theoretical models and role play can be used in the IST programme to help pupils to develop an understanding and a feeling for the reality being presented (Fien, l984). The manipulation of models such as the Christaller's Central Place model, or Weber's model of industrial location (in Hurst, l972), involves pupils in problem-solving and decision-making in relation to 'real' issues or situations which have been identified in the pupils' own environment. The use of theoretical models in this way adds the following dimensions to pupils' learning experiences as they involve:

* the transmission of basic facts, concepts and principles related to a body of knowledge, thus achieving learning objectives within the area of learning-what;

* the application and manipulation of basic facts in order to identify problems and find solutions;

* analysis, logical exploration and reasoning.

Role play is a form of simulation which can be applied to a wide variety of situations, issues and topics in geography. As a learner-centred activity in the

IST programme, role play may be used as an alternative to written assignments with pupils investigating issues or situations from a number of differing viewpoints. This type of simulation involves the pupils in a search for evidence and its evaluation in a novel manner as their presentation of the material has to be convincing in terms of the role in which they have been cast. An important feature of role play used in this manner is the assessment of each player's presentation with respect to the particular bias they have emphasised (Fien, 1984). Role play used in this way is an exercise in values exploration and values assessment. Pupils are therefore able to incorporate the skills associated with assignments with the added dimension of the role play.

As group activities, games and simulations involve all the participants and develop social and communication skills in addition to those discussed above. Pupils therefore have to listen, talk, read, as well as write and they have to work together, co-operate, negotiate and interact continually, thus giving the teacher a useful insight into this aspect of the pupils' development.

3.2.4 **Valuing strategies**

Smith (in Fien and Slater, 1981) makes the following claim:

> Whether we like it or not, every part of teaching is based in some way upon values; the values of the students, the teachers, the subjects, the resources, the institution. Because of this, schools must face the problems and questions of how to deal effectively with values as part of the educational process.
>
> (p. 47)

Maye (1984) links the role of values in geographical education to the current aims which view the development of values as a means to:

(i) develop the pupils' understanding of society, both theirs and that of others;

(ii) lead pupils to make worthwhile contributions to the community;

(iii) help pupils to adapt to change;

(iv) develop the skills needed to make responsible choices.

Valuing strategies are, in the light of the above, an important aspect of geographical education; however valuing strategies must:

(i) neither offend the sensibilities of those who are dissentors; nor

(ii) alienate those whose values are being challenged.

(Shinn, 1980)

Maye (1984) presents a number of strategies which have been developed to allow pupils to acquire the cognitive and affective skills related to the sorts of judgements and decisions which characterise the development of values and attitudes, while Fien and Slater (1981) describe "values probing."

Each of the strategies is considered briefly.

(i) Moral reasoning is based on the 'moral dilemma' story which is presented incompletely. This reflects the work of Köhlberg and emphasises the role of choice in relation to values problems. Maye describes various ways in which this method could be linked to other investigative strategies, such as that of the case study, simulation or problem solving. Moral dilemmas of this sort are especially useful for younger pupils as it introduces them to the techniques needed for making value judgements.

(ii) Values analysis is based on the examination of evidence which is relevant to a particular issue or situation being investigated. The pupils use the available resources to identify particular values and attitudes. This strategy is a useful means to develop pupils' abilities with regard to the critical analysis of evidence and as a part of the IST programme has the added value of preparing pupils for project work.

(iii) Values clarification is an approach to valuing which aims at giving the pupil the opportunity to "recognise his or her own values and to make values choices in a non-judgemental and non threatening situation" (Maye, 1984, p. 38). Values clarification is closely related to techniques which employ rating, ranking and analysis which lead to the formulation of value statements.

(iv) Action learning or values probing, concern strategies which attempt to involve pupils in issues and to see themselves as part of their environment and community, capable of taking a stance and being involved. These approaches encourage the pupils to analyse and evaluate the evidence associated with a topical or controversial issue and to base their stance on reasoned choices; then, having come to a conclusion, the pupils are encouraged to become participating members in finding a solution to the problem under investigation.

Environmental issues, resource management, settlement problems, economic issues, population and demographic problems, are some of the areas in the present syllabus that are value laden and it is difficult to see how these and other areas can be presented to the pupils without an exploration of attitudes and values. The IST programme is a vehicle which can be used to develop attitudes and values without resorting to values inculcation, which is highly teacher-directed and could lead to indoctrination.

3.2.5 Case studies

A case study is a detailed study of a particular place or phenomenon which could include the application of theory to a 'real world' situation, the clarification of concepts and the collection, processing and analysis of data to solve problems. Long and Roberson (l966, p. l02) give an added values dimension to case studies as they view such studies as a "unit chosen to show human response to an environment."

A case study is a useful strategy for the IST programme and much of the fieldwork done by high schools can be seen as case studies. Thus, the study of a river section, a beach, a hill, a farm, a shopping complex, a suburb or factory complex, is in effect a case study.

Long and Roberson (l966) perceive the case study as a strategy which can bring the field into the classroom, as by using photographs, maps, plans, diagrams, etc., the pupil is able to analyse an area using similar techniques as would be applied in the field.

Case studies can be used as a part of the practical component in IST and as such are useful ways to introduce pupils to a wide range of techniques which they will be able to apply to the development of projects. The case study, however, may be used as an approach in individualised projects using either a systematic scientific line of enquiry or a qualitative perspective from which to do the investigation of the place or phenomena the pupil has chosen to study.

3.2.6 Fieldwork

While fieldwork has a long tradition in school geography, this area of geographical education became an explicit part of the South African school syllabus with the introduction of the 1973 syllabus.

The most notable shift in fieldwork since the 1960's has been from the 'Cook's Tour' approach, which was highly structured and teacher-directed, to that of a learner-centred and enquiry based approach. The suggested fieldwork approaches of the 1960's and 1970's concentrated on the use of a scientific and systematic perspective. Models for fieldwork developed by Everson (1973), Thomas and Rouncefield (1977) and Marker (1980) all clearly demonstrate the emphasis on problem identification and hypothesis testing in relation to a qualitative approach. Implicit in these models is the need for pupils to be trained in the following areas:

(i) Observation

(ii) Recording

(iii) Data collection and the use of measuring, mapping and field sketching and data processing

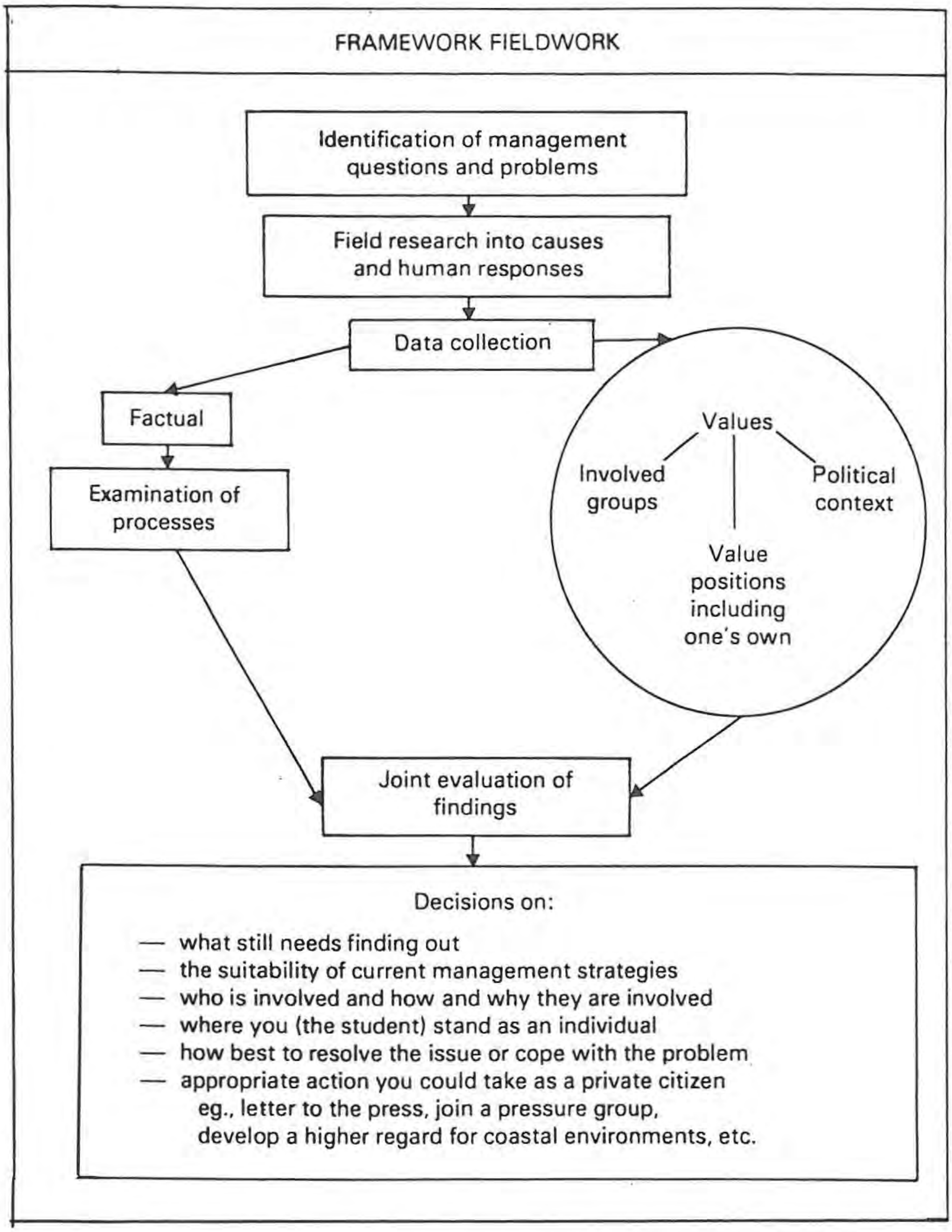
(iv) Problem identification

(v) The formulation of hypotheses

(vi) The use of a variety of methods to enable the 'scientific' testing of the hypothesis

(vii) The development of skills related to analysis, synthesis and evaluation

The latter part of the 1980's saw various approaches added to this 'classic' model and these included 'framework fieldwork' (Figure 3.3), integrated field studies, fieldwork done from a recreational stance (Bull and Daniel, 1981), and



(after Hart and Thomas, in Boardman, 1986, p. 211)

FIGURE 3.3
FRAMEWORK FIELDWORK

sensory fieldwork (Pocock, 1983). These approaches view fieldwork from either a humanistic approach or from the ecological perspective which merges quantitative approaches with qualitative approaches and emphasises affective development through fieldwork in addition to cognitive skills. Thus, pupils are encouraged to develop an aesthetic appreciation for the environment and to explore their feelings and emotions in terms of reacting to an area of study as well as to examine an area analytically and critically.

Fieldwork is probably the learner-centred strategy best suited for developing the skills, attitudes, values and perceptual awareness with which geography is concerned. Fieldwork approaches are an extremely valuable method of developing the pupils' capabilities within a progression framework. Younger pupils can be introduced to geographical techniques at a fairly elementary level, which becomes more complex as the pupils gain in experience and confidence.

3.2.7 Computers

A final aspect which is considered in terms of IST is the use of computers in the IST programme. While this discussion does not link computers to any learner-centred strategy as such, pupil expertise in the use of computers is such that many of them are able to use the computer as an aid to their work in IST. Pupils who are computer literate can be:

(i) encouraged to develop and process data that has been collected in the field;

(ii) assigned to the processing and printing of the written reports needed for group work or can process and print their own reports;

(iii) engaged in developing graphics used for group presentations or for their own projects or assignments.

While it may be argued that the use of computers in the abovementioned manner has little to do with the development of geographical skills, the utilization of the computer in the IST programme helps the pupil to see its potential as a tool for geography.

Pupils who are able to develop programmes can be encouraged to develop games, simulations and revision programmes for their peers or for younger pupils or for slower learners.

The wealth of learner-centred strategies that have emerged in the past thirty years makes the development of an IST programme a dynamic and exciting proposition for pupils and teachers alike. The many strategies which are suited to IST moreover gives enormous scope to teachers and pupils to develop their own areas of interest and their own personal areas of expertise while at the same time developing essential geographical skills and techniques.

The greater diversity of learner-centred strategies which can be employed in an IST programme presents a problem in relation to their assessment as the traditional numerical evaluations are frequently unsuitable in terms of what these activities aim to achieve.

3.3 ASSESSMENT SYSTEMS WHICH ARE APPROPRIATE TO THE IST PROGRAMME

The final developmental stage in the input phase of the developmental model for IST (Figure 3.2) is the choice of assessment strategies which are appropriate both to the various activities and to the general aims and objectives of geography which are concerned with more than the measurement of pupils' behaviour in terms of facts, concepts and cognitive skills. By implication, a curriculum focusing on learner-centred goals will, moreover, require more than a summative assessment of pupil development.

Walford (1984) drew attention to the scarcity of published material regarding the assessment of pupils' work in geography, while Nicol (1978) highlighted the general lack of attention paid to this area of geographical education in South Africa.

While many reasons have been given for the lack of open discussion on marking and assessment in geography, Proctor, in his reply to Walford's article of 1984, gave what is perhaps the best summary of the situation in the following statement:

> Teachers rarely discuss their own marking techniques and standards openly. If ever there was a secret garden of the curriculum then marking must be its central rose bed.
>
> (Proctor, 1985, p. 103)

South African geography teachers are likely to take their cue from the assessment techniques used in the senior certificate examinations in the marking of pupils' work. This, and the fact that promotion in the high school is largely summative, leads to an emphasis on numerical assessment. Guidance for South African geography teachers in assessment techniques has been given through the published papers of Nicol (l978) and Earle (l980). These, however, stressed the setting of tests and examinations and other than a brief reference to the essay-type question as part of the internal assessment system, there has been no detailed analysis of the assessment of pupils' work outside of the 'test' system in journals that are readily available to South African geography teachers. This, in spite of the fact that all geography pupils have been expected to do 'assignments' since the implementation of the l973 syllabus.

While the preamble to the l985 Revised Syllabus indicated the areas of pupil development, no guidance was given as to the methods and systems that would be appropriate to measure the development of skills, values and attitudes. Halloway (l984) emphasised the need to link assessment systems to the course objectives. Therefore, the IST programme which is concerned with the development of such proficiencies needs to link the assessment system to these objectives. Assessment in IST should therefore be concerned with the measurement of pupils' development in relation to:

(i) their understanding of concepts, principles and theories;
(ii) skills; and
(iii) values.

Table 3.4 indicates the identification of skills and values which are related to the long-term objectives of a geography curriculum and which, therefore, by implication, need to be assessed.

Lists such as these, which can be translated into "what to look for" checklists (Table 3.5) are valuable guides regarding what ought to be assessed, but they give little indication of how the assessment should take place.

Ideally, an assessment system for a programme such as IST should serve a diagnostic, formative and summative role and should therefore be continuous and cumulative. Halloway (l984) emphasised that there will be an overlap between these areas which monitor the pupils' academic and personal progress and that they should also be an indication of the programme's worth.

TABLE 3.4

EVALUATION OF PUPILS' WORK RELATED TO OBJECTIVES

1 **Skills objectives**

Three major types of skills are included in most courses:

(a) Information gathering skills. Locating, gathering, listing, grouping, organising, transforming, utilising and communicating are commonly cited in course objectives.

(b) Cognitive skills. Forming hypotheses, critical analysis, thinking at abstract levels, inferring are among the objectives of this type. Bloom's (l956) taxonomy is utilised in many statements of cognitive objectives. Taken as a group such objectives promote rational empirical and objective inquiry.

(c) Social skills. These objectives relate to social participation, interaction and group inquiry.

2 **Values objectives.** This is a complex area in which feelings, attitudes and values overlap. There is often a hesitancy to define which values should be nurtured, and how values laden issues should be handled in the geography classroom. Chapter 3 contains advice on these matters.

Fenton (l969) identifies three types of values objectives, namely:

(a) Behavioural values, such as attentiveness and co-operation in class and attitudes to work.

(b) Procedural values are shown in positive attitudes to the subject, valuing of objective and rational inquiry and a willingness to review one's own attitudes in the light of new evidence.

(c) Substantive values encompass the more controversial values such as concern for the rights of others, conservation of the natural environments, preservation of cultural heritage, improvement in the quality of life and promotion of democratic processes.

(Halloway, l984, p. 280)

TABLE 3.5
ASSESSMENT 'CHECKLIST'

1 Objective: Find information

What to look for:

Student

* uses content pages and index
* looks for more than one source
* looks for different kinds of sources (e.g. maps, books, atlases, pictures, resource people)
* compares sources
* uses sources from school, home and community.

2 Objective: Evaluate evidence

What to look for:

Student

* can detect probable bias (.eg. 'This Letter to the Editor says that there should be a total ban on wheat sales to the USSR. Perhaps he is not looking at it from the farmers point of view')
* can distinguish between fact and opinion
* comments on limitations of evidence (e.g. 'This only tells us about the actions of one settler'. 'This is a description of Sydney, not all of Australia'.)

3 Objective: Organise information to form concepts and generalisations

What to look for:

Student

* tries to make groupings, leading to concepts and generalisations (e.g. 'Those services are provided by government but these are provided by voluntary groups').
* asks questions about groupings (e.g. 'Is sawmilling a primary or secondary industry?)
* is prepared to change his conceptual framework. (e.g. 'This boy is not an immigrant, even though his parents come from Italy. He was born here').
* makes generalisations (e.g. 'I think all of these valleys are densely populated').
* reviews his generalisations in the light of new evidence (e.g. 'The country has been prosperous most of the time; but then there was a severe drought and many people suffered heavy losses, so some people are not prosperous some time.')

4 Objective: Participate in small groups

What to look for:

Student

* understands the need for rules in a group
* participates in deciding rules
* shares tasks and roles in a group
* accepts role of leader
* appreciates qualities in other members
* can put aside personal goals for group cohesion

5 Objective: Development of empathy

What to look for:

Student

* recognises significant similarities and differences between situations (e.g. communities, families, countries, places, periods).
* is capable of understanding feelings and values other than her own or those of her society.
* is able to tolerate other values.
* can infer the feelings and actions of others from knowledge of their situation.

(Halloway, 1984, p. 282)

An analysis of systems of assessment reveal that the teacher has the following options:

(i) impression marking, which assesses a piece of work by means of a single mark or symbol and evaluates the work 'holistically';

(ii) a numerical assessment, which allocates a set number of 'marks' and which is most commonly associated with objective-type questioning.

(iii) criterion marking, which is based on a 'checklist' system which either allocates a set number of marks for each criterion or which allocates marks according to a ranked scale.

(iv) informal marking, which does not attempt to provide any numerical assessment, but is based on constructive comments or on less formal general comments.

The methods described above are related to the assessment of a particular piece of work which the pupil has produced. Each method has advantages and problems. Thus, while impression marking may be an effective as well as fairly rapid method of assessment, Marsden (l976) identified a number of problems associated with this system when used for assessment of essays, reports or projects. These include:

(i) problems of standardisation which in terms of the IST programme will occur where different teachers mark the same piece of work across the standard group;

(ii) the difficulty of disassociating the individual pupil from his/her work, thus the inclination may be to mark the weaker pupils more leniently where they have given evidence of effort;

(iii) giving undue weight to the 'cosmetic appearance' of the work;

(iv) problems related to differing teacher expectations and differing quality of teaching;

(v) the difficulty in certain types of assignments of knowing how much help the pupil has obtained either from peers or from parents.

These problems suggest that criterion marking would be more appropriate in the assessment of such tasks (Tolley and Reynolds, 1977; Graves, 1980; Beaumont and Williams, 1983). Halloway (1984) has, however, identified a number of shortcomings related to this latter system. These include the fact that criterion marking:

(i) is too time consuming;

(ii) may be too rigidly applied and therefore overload the total effect of the work;

(iii) may inhibit the pupils' creativity and spontaneity.

Notwithstanding these problems, criterion marking provides greater objectivity and gives the pupils a better insight into their own work as they are able to see at a glance those areas in which they have achieved their objectives and where remedial work is needed. Where the various criteria are accompanied by constructive comments the pupils are given further immediate and valuable feedback. A particularly valuable strategy to use in criterion marking is to explain to the pupils exactly what is meant by the criteria and what is expected from them, with the proviso that originality is both encouraged and given recognition. Halloway (1984) and Beaumont and Williams (1983) have suggested that projects at senior level should be assessed throughout the various stages of the project's planning and development. This will provide the teacher and the pupil with a clearer picture of the progress that has been made and while basing the summative assessment on a criterion framework (Table 3.6) the final result will reflect a more objective and holistic approach.

TABLE 3.6

PROJECT ASSESSMENT

Presentation	(neatness, clarity, appropriate illustrations	10
Research	(references, bibliography, personal investigation)	25
Content	(coherence, relevance, continuity and significance)	25
Conclusion	(interpretation of evidence presented)	25
Oral examination		15

The diversity of activities in an IST programme provides opportunities to incorporate a number of different marking systems. Thus, short structured activities which are objective in nature can be marked by means of a numerical assessment; assignments, field reports and projects can use criterion marking; while group presentations, pupil seminars and peer group teaching can be assessed informally by means of criterion marking or even by impression assessment.

Peer group assessment or evaluation is a method which is valuable in the IST programme and is particularly well suited to group and individual presentations. This technique gives the pupil insight into what teachers and examiners expect and allows the pupil to become an active critic rather than a passive observer (Stenhouse, 1981; Hall, 1984; Proctor, 1985).

Pupil profiling (Proctor, 1985; Graves and Naish, 1986) is an attempt to reflect the diagnostic, formative and summative elements of assessment, by building a cumulative picture of the pupils' academic and personal progress over a period of time. The examples included in Figures 3.5 and 3.6 reveal that this system of pupil evaluation may incorporate a variety of assessment methods, which are largely determined by the type of activity on which the assessment is based and includes the teachers' informal assessment of the pupils' progress.

PROFILE IN GEOGRAPHY

NAME ....

PERSONAL ASSESSMENT 1983/5	
DECEMBER 1983	
JULY 1984	
JANUARY 1985	

	SKILL ASSESSMENT	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4
UNDERSTANDING/ COMMUNICATION	RECALL	Can recall basic facts after prompting.	Can recall basic facts independently	Can recall a range of facts.	Sound memory and understanding
		DEC 83 JULY 84 JAN 85	DEC 83 JULY 84 JAN 85	DEC 83 JULY 84 JAN 85	DEC 83 JULY 84 JAN 85
	REASONING WRITTEN	Can construct basic answers.	Can enlarge on basic facts.	Can construct a reasoned argument.	Ability to apply complex concepts and relationships clearly and concisely.
		DEC 83 JULY 84 JAN 85	DEC 83 JULY 84 JAN 85	DEC 83 JULY 84 JAN 85	DEC 83 JULY 84 JAN 85
	REASONING ORAL	Can communicate basic points.	Can develop basic arguments.	Can discuss points in a clear and accurate way.	Can debate arguments in a logical and systematic way.
		DEC 83 JULY 84 JAN 85	DEC 83 JULY 84 JAN 85	DEC 83 JULY 84 JAN 85	DEC 83 JULY 84 JAN 85
	PRESENTATION	Work is usually moderately neat.	Presentation is usually satisfactory.	Frequently takes care over work.	Consistently thorough careful presentation.
		DEC 83 JULY 84 JAN 85	DEC 83 JULY 84 JAN 85	DEC 83 JULY 84 JAN 85	DEC 83 JULY 84 JAN 85
DATA RESPONSE	DECISION MAKING	Can make basic decisions with guidance.	Can evaluate basic information.	Can assess and evaluate a range of information.	Ability to evaluate complex information and identify patterns and processes
		DEC 83 JULY 84 JAN 85	DEC 83 JULY 84 JAN 85	DEC 83 JULY 84 JAN 85	DEC 83 JULY 84 JAN 85
	MAP WORK	Can locate places using an atlas.	Basic understanding of maps of any scale.	Good understanding of maps of any scale.	Can interpret thoroughly maps of any scale.
		DEC 83 JULY 84 JAN 85	DEC 83 JULY 84 JAN 85	DEC 83 JULY 84 JAN 85	DEC 83 JULY 84 JAN 85
	STATISTICAL	Can interpret basic information	Can interpret and apply basic information.	Good understanding and application of a range of information.	Understands well complex data and techniques.
		DEC 83 JULY 84 JAN 85	DEC 83 JULY 84 JAN 85	DEC 83 JULY 84 JAN 85	DEC 83 JULY 84 JAN 85
	ACCURACY	Can complete basic work accurately.	Can complete a range of basic work accurately.	Good level of accuracy at a variety of levels.	Consistently high standard of accuracy at all levels.
		DEC 83 JULY 84 JAN 85	DEC 83 JULY 84 JAN 85	DEC 83 JULY 84 JAN 85	DEC 83 JULY 84 JAN 85

	ASSESSMENT	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4
PRACTICAL (FIELDWORK)	USE OF EQUIPMENT	Basic understanding of a limited range of techniques.	Moderate competence in applying a limited range of techniques.	Can apply a range of techniques.	Good understanding and application of a range of techniques.
		DEC 83 JULY 84 JAN 85	DEC 83 JULY 84 JAN 85	DEC 83 JULY 84 JAN 85	DEC 83 JULY 84 JAN 85
	FIELD SKETCHES	Can draw simple field sketches.	Can recognise and illustrate some key features.	Can identify and illustrate most key features.	Can identify and illustrate clearly all key features.
		DEC 83 JULY 84 JAN 85	DEC 83 JULY 84 JAN 85	DEC 83 JULY 84 JAN 85	DEC 83 JULY 84 JAN 85
	REFERENCE USE	Can find sources when guided.	Can use standard sources of information.	Can use several sources of information.	Shows initiative in using a wide variety of sources.
		DEC 83 JULY 84 JAN 85	DEC 83 JULY 84 JAN 85	DEC 83 JULY 84 JAN 85	DEC 83 JULY 84 JAN 85
	INITIATIVE	Seeks frequent guidance.	Can carry out a series of instructions independently.	Requires little guidance.	Shows originality and independence.
		DEC 83 JULY 84 JAN 85	DEC 83 JULY 84 JAN 85	DEC 83 JULY 84 JAN 85	DEC 83 JULY 84 JAN 85

GENERAL SUMMARY

SUMMARY/DESCRIPTION OF COURSE FOLLOWED

FINAL ESTIMATED EXAMINATION GRADE ....

Signed ....
Head of Department/Teacher in Charge

FIGURE 3.4
PROFILING IN GEOGRAPHY
(Graves and Naish, 1986)

GEOGRAPHY HALF TERM ASSESSMENT SHEET

CLASS 3 P (Top ability band)

TERM SPRING

TEACHER COLLARBONE

NAME	Range 0-5 Class/Home Skills 1	2	3	4	Assessment Test (Year) K 27	A 24	C 38	J 11	%	Comments
Cindy	A	4	3	2	17	24	19	8	69	Under-achieving
Sarah	4	5	4	3	23	24	32	9	90	
Janice	1	A	A	1	16	23	25	6	70	A lot of illness
Penny	3	3	3	3	22	24	28	9	83	
Michelle	3	3	4	3	15	22	26	6	69	Quiet in class
Jackie	3	4	4	2	16	24	27	6	73	
Donna	A	4	3	2	20	23	28	9	80	Early Illness
Beveley	3	3	3	2	15	20	22	6	63	
Samantha	3	3	A	2	18	15	25	7	65	Tries hard
Jackie	A	4	2	2	26	24	31	8	89	Very enthusiastic
Kim	3	4	3	2	21	22	25	7	75	
Jasbir	4	5	4	3	12	21	22	5	60	No homework
Carmel	3	3	4	3	7	21	18	5	51	
Lucy	3	5	4	2	24	22	32	10	88	Homework often late
Bijal	4	4	4	3	19	20	29	9	77	
Joanna	3	0	2	1	17	22	29	10	78	On report
Tina	2	4	3	2	12	16	26	6	60	Lacks confidence
Laura	4	4	3	3	18	24	26	8	76	Versatile
Cynthia	4	5	4	3	16	19	20	8	63	New this term

mro 18.6.82

(Graves and Naish, 1986)

FIGURE 3.5

PROFILING IN GEOGRAPHY

The development of a comprehensive IST programme in the school could make pupil profiling a viable method of evaluation in South African geography departments, where the primary emphasis has hitherto been on the summative evaluation of the pupils' progress.

The assessment of pupils' work, while being one of the most important functions of teaching, is one of the most frustrating, primarily because of the difficulty of ensuring that the most accurate and fair assessment is made. The development of a variety of learner-centred activities which utilize a number of forms of assessment may help to present a more valid and more satisfying picture of the pupils' progress.

3.4 SUMMARY

The analysis of the theoretical framework within which the present syllabus is situated reveals a wealth of opportunity for geography to be developed as an exciting and dynamic part of the school curriculum of the 1990's. Modern school geography recognises that the value of a discipline presented at secondary school level is based on academic rigour which is tempered by an attempt to relate the material to the pupils' socio-economic experiences.

The geographical paradigm which gives the syllabus its structure and direction provides the academic worth, while the aims and objectives which reflect the needs of the pupil and the educational expectations of the society give relevance to geography. The teacher therefore faces the challenge of presenting a geography programme which will meet the academic, social and personal needs of the pupils. To adhere strictly to the presentation of the facts and concepts catalogued in the detailed analysis of the content may well lead the pupils successfully through the senior certificate examination, but in doing so the 'spirit' of the syllabus is lost.

The development of a programme of learner-centred activities designed to function as an integral part of the curriculum and as an approach to the teaching of geography, provides the necessary opportunities to meet the requirements of the syllabus. The location of IST in a process oriented model provides a framework which links the theoretical perspectives, the aims and objectives, the various learner-centred strategies and the methods of assessment by means of a system of procedures and criteria to the activities of the programme.

CHAPTER FOUR

RESEARCH PROCEDURES

For IST to be accepted as an integral part of the geography curriculum, geography teachers in South African schools will need to be convinced of its value and viability as a learner-centred approach that promotes propositional knowledge and develops skills, values and attitudes. The development and implementation of an effective IST programme in geography, however, implies a degree of change in classroom practices. Where such changes are advocated, purely prescriptive measures have little chance of success (Ledger, 1977; Ballantyne, 1986). Any recommendations for change of this nature need to be based on an understanding of the prevailing factors that influence geography teaching practice and on a set of strategies which are not only shown to be beneficial, but which can be applied to the existing structures. Accordingly, this study aims to:

(i) establish teachers' perceptions of IST with regard to their role in the geography curriculum;

(ii) investigate a variety of classroom research designs and procedures that can be applied to the development of an IST programme;

(iii) demonstrate the application of these procedures within the existing school structure in accordance with the learner-centred guidelines of the Revised Geography Syllabus of 1985 and the Draft Core Syllabus of 1993.

In order to achieve these aims the research procedures involved the following:

(i) the collection of data related to teachers' perceptions of IST and to the organisation and administration of IST in Cape Education Department schools;

(ii) a pilot study, situated in a single school, to investigate the feasibility of developing an IST programme that emphasises skill development and propositional knowledge;

(iii) the development and implementation of a high school programme for IST in the same school, employing a variety of learner-centred strategies in both the practical and project components of IST, designed to develop skills, values and attitudes and to promote the acquisition of propositional knowledge.

4.I TEACHER PERCEPTIONS OF IST: RESEARCH DESIGN AND PROCEDURES

To achieve the first aim, the initial stage of the research was concerned with the collection of data pertaining to:

(i) teacher interpretations of the concept IST;

(ii) teacher perceptions of the value of this approach as a teaching strategy;

(iii) current practices in the application of this approach; and

(iv) problems that teachers encounter in the application of IST in schools.

The diversity of the information needed for this section of the study resulted in a three-phase survey which involved:

I a series of interviews;
2 a panel discussion;
3 a questionnaire.

The staged survey method was chosen primarily because of the difficulties related to the use of one method to assess definitions of IST alongside perceptions related to specific practices applied to IST and as a means of increasing the reliability and the validity of the results within the research locale.

4.I.I The administration of the interviews

The initial objective of the survey was to obtain information relating to the interpretation of IST by teachers. Since this involves understanding how teachers think about the concept, interviews were considered to be preferable to a questionnaire for the first phase of the survey. The interviewing strategy chosen, however, needed to be informal in order to give the teachers interviewed an opportunity to express themselves freely and spontaneously. The focused interview (Cohen and Manion, 1984) is an interviewing strategy that is informal and largely non-directive. The distinctive feature of these interviews is that while the respondent has the freedom to describe his experiences spontaneously and fully, the interviewer is able to focus the discussion on particular areas which have been identified as significant. This is made possible by the interviewer's prior analysis of the situation being investigated. Therefore, having analysed the concept of IST in terms of the discussion in chapter two, the researcher chose this strategy in preference to a structured or a completely informal interview as a means to establish the extent to which teachers' perceptions of IST related to current interpretations of the concept.

Interviewing methods have been criticised as research tools for a number of reasons. The chief weaknesses which have been identified are the limited number of respondents that can be reached and problems related to bias (Open University, Social Sciences, 1979; Cohen and Manion, 1984).

The 25 teachers interviewed for this phase included geography teachers and senior history and biology teachers. These teachers, representing 5% of the total number of schools included in the survey, were drawn from the school at which the researcher taught and from the local high schools offering geography to Std 10. The relatively small size of the sample and its location was a cause for concern in terms of the validity of the responses in relation to the wider survey population. In an attempt to solve this problem, open-ended questions were included in the questionnaire, which allowed for comparison between the data obtained in the interviews and the questionnaire. By providing such comparisons a system of convergent validity (Cohen and Manion, 1984) increases the validity of the survey methods employed.

The second problem, that of bias, is problematic in informal-type interviews, particularly where a specific theory is investigated as there is a tendency for the interviewer to probe for answers which substantiate the theory. Therefore, the guidance given by the interviewer ought to be minimal and the respondents' definitions of the situation must be allowed full and free expression. In this series of interviews the researcher restricted the discussion to how teachers conceptualise IST and how they perceive its application to geography.

The interviews were completed before the questionnaire was finalised in order to provide a basic framework for the structuring of the questionnaire and to ensure that the latter survey method could be used for convergent validity.

4.I.2 The administration of the panel discussion

The strategy employed in the panel discussion was determined by the criteria of the focused interview rather than by formal and structured prepared answers. The focus for this discussion was on teachers' perceptions of IST with regard to its conceptualisation, its organisation and administration in the school and on the various strategies which teachers employed for IST.

The panel discussion made use of purposive sampling in that the six panelists were all geography subject heads. The aim of this phase of the survey was to ascertain how the teachers responsible for the development of IST in schools regarded IST as a strategy within the geography curriculum. The researcher invited two geography subject heads from primary schools to participate in this discussion as a way of comparing the perceptions of IST in primary and secondary schools.

In leading the panel discussion, the researcher was able to maintain the necessarily subordinate role which gave the panelists the freedom to carry the discussion when once the focus had been provided.

This phase of the survey was also completed before finalising the questionnaire.

4.I.3 The construction and administration of the questionnaire

The primary aims of the questionnaire used in the third phase of the staged survey were to ascertain (i) how IST is administered and organised in schools; (ii) teachers' perceptions of IST as a teaching strategy; and (iii) the problems that are encountered in the application of IST.

Use was made of closed and open response questions in the questionnaire construction. Open response questions were included in each of the sub-sections relating to teachers' perceptions of IST. While a closed response format facilitates a rapid and accurate summary of results, the open format has certain advantages, in spite of the time taken to analyse these sections of a questionnaire. These advantages are described as follows:

(i) They permit a ventilation of feelings. People can express their exact opinion in an open-ended response, whereas if asked simply to check items they may feel they have been forced into responses that do not exactly match their attitudes.

(ii) Open-ended questions may produce responses which draw the evaluator's attention to a situation or aspect that was unanticipated when constructing the questionnaire.

(iii) Open-ended questions do not limit the range of possible answers as do closed response questions.

(Henerson, 1978, p. 61)

In this survey, open response questions were considered to be particularly relevant and valuable in ascertaining teachers' responses to the perceived benefits of IST as a teaching strategy and as a means to identify the perceived constraints associated with the application of IST in geography.

In the construction of the questionnaire items, care was taken to ensure that questions in both official languages were clear and unambiguous. Attempts were also made to keep the instructions as clear as possible and to limit the length of the statements to avoid unnecessary reading time, as short, pithy, easily read and understood questions and statements create a more favourable effect and increase the likelihood of a better response to the survey. Length was also a consideration and the design was such that the questionnaire could be completed within a maximum time of 30 minutes.

The content of the questionnaire was grouped as follows:

(i) Section A was concerned with the collection of personal data that would reflect teacher experience and the school milieu. The design of this section was such that the survey population could be grouped into a variety of subsets which would reflect differences between schools located in metropolitan areas and in smaller centres; between boys', girls' and co-educational schools, and between English, Afrikaans and dual medium schools. The responses of these subsets could then be compared with the general group responses.

(ii) Section B was designed to obtain data about teachers' perceptions of the value of IST as a teaching strategy.

(iii) Sections C and D were related to specific teaching practice in the organisation, management and assessment of IST.

(iv) Section E was concerned with the problems teachers encounter in the application of IST.

Having completed the first two phases of the survey by the end of the first term of l986, the questionnaire was developed and tested by means of a pilot survey, representing 5% of the total schools surveyed. The pilot survey was restricted to the local high schools to facilitate its administration.

In order to provide a numerically realistic sample (20%), the pilot survey was completed by all the geography teachers at the schools. After discussion with the teachers involved in the pilot survey some minor adjustments were made before finalising the questionnaire, which was then scrutinised by a selection of teachers, academics and the regional Chief Superintendent of Education, in an attempt to eliminate ambiguous questions.

The final questionnaire (Appendix 4A) was sent to the l40 schools, who, in l985, had submitted geography candidates for the Cape Education Department Senior Certificate examination. This included schools in South West Africa/Namibia and Transkei. The names and addresses of these schools were obtained from the Chief Superintendent of Education for East London. Each of the schools was asked to submit one return. This not only reduced administration problems for the schools and the researcher, but the results of the first two phases of the survey and the pilot survey revealed that the administration and design of IST programmes in schools is uniform within each school. Therefore it was not considered necessary to attempt to obtain a return from every geography teacher in the employ of the Cape Education Department.

A major problem relating to questionnaires is ensuring their completion and return, especially with regard to postal surveys. To ensure as high a return as possible, letters to the head teachers as well as letters to the geography subject heads accompanied the questionnaires (Appendix 4B). It was hoped that these letters would serve to elicit the co-operation of the head teachers as well as stimulate the interest of the teachers concerned.

The questionnaires were posted to schools in May 1986 and were sent with a stamped, self-addressed envelope for the return of the questionnaires.

4.1.4 **Problems associated with the survey method**

The survey undertaken for this study was largely concerned with teachers' attitudes to IST, attempting as it did to ascertain how teachers conceptualise IST, the value they place upon it as a teaching approach and how IST is implemented in the schools. While it is accepted that the term 'attitude' is somewhat elusive, Ballantyne (1986) suggests that in educationally orientated surveys of this nature, where the teacher's attitude to an aspect of his environment is the chief concern, a general definition of the term is appropriate. Thus, where a survey is not concerned with the establishment or evaluation of psychological attitude scales, the researcher's concern is less directly focused on exact measurements of the differences between the respondent's beliefs, feelings, intentions and behaviour (ibid, p. 89). Therefore, for the purpose of this survey, Second and Backman's definition of the term 'attitude' (in Ballantyne, 1986, p. 90) is accepted, viz: "certain regularities of an individual's feelings, thoughts and predispositions to act towards some aspect of his environment." In ascertaining attitudes towards IST this survey, therefore, attempts to find out what teachers know about IST; whether they react positively or negatively to the notion; whether the former factors influence the implementation of IST, and to what extent; or whether the implementation of IST in schools is influenced by factors other than the individual's attitudes towards it.

Notwithstanding the more general nature of this survey in terms of attitude assessment, the primary problems with which the researcher had to contend were those of validity and reliability. Validity in research is defined as "the extent to which the results can be accurately interpreted and the extent to which the results can be generalised to population and conditions" (Wiersma, 1986, p. 4). Reliability in research "refers to the consistency of the research and the extent to which studies can be replicated." (ibid, p. 6).

The fact that this survey was confined to white teachers in the employ of the Cape Education Department mitigated against the general validity of the wider survey, equally, the relatively small sample of the interview population and the panel discussion influenced the validity of the survey. The informal interview, as mentioned, is prone to problems of reliability. The following attempts were made in the course of the survey to reduce these weaknesses as far as possible:

(i) The staged nature of this survey allowed for comparisons to be made between the different sample groups, in this way providing a system of cross-checking of data, so reducing the problem of validity. Reliability was also increased by the repetition of specific aspects which were included in all three stages of the survey.

(ii) The researcher attempted to keep the interviews as non-directive as possible, while providing the focus, thus attempting to increase their validity (Cohen and Manion, 1984).

(iii) The statements selected for the items related to teachers' perceptions of IST as a teaching approach reflected the theory contained in the preamble to the revised geography syllabus of 1985. Although these statements were placed within categories reflecting different aspects of IST, they were randomly set within each section to avoid clustering or patterns that could invalidate the results.

(iv) Questionnaire items which were directly related to attitude were scaled, allowing for the assessment of respondents' reactions along a scale, from favourable to neutral to unfavourable. The use of scales such as these in attitudinal surveys reduces the rigidity of the questions and therefore increases the validity.

Working within the constraints of the location and sample population, the survey attempted to reduce as far as was possible the problems of validity and reliability, while accepting that "it is practically impossible to attain perfect validity in a study" (Wiersma, 1986, p. 6).

4.1.5 Data analysis for the survey

The interviews and the panel discussion were tape-recorded and transcribed. These results were qualitatively analysed and measured against the results of the questionnaire.

The questionnaire results were computerised and the raw scores of the group responses as well as those of the subsets were indicated as percentages and ranked. The group responses were compared with the various subsets and statistically significant differences were indicated by applying the chi-square test to the results.

4.I.6 Research location for the survey

Questionnaires were sent to all Cape Education Department schools offering geography from Std 6 to Std I0. The interviews were conducted among teachers residing within reach of the East London Teachers' Centre, while the panelists for the discussion group were teachers at East London primary and high schools.

Permission to distribute the questionnaires was obtained from the Cape Education Department, while permission for the interviews was obtained from the Chief Superintendent of Education for East London. The local geography study group associated with the East London Teachers' Centre co-operated with the arrangements for the panel discussion which was held in the Centre. The Cape Education Department's permission to conduct the survey was granted with the proviso that the departmental regulations (Appendix 4C) accompany the questionnaire. An essential condition of such research is that absolute confidentiality be maintained in the analysis and presentation of the results.

4.2 CLASSROOM RESEARCH: DESIGN AND PROCEDURES

The second priority of this study was to develop methods and procedures that could be applied to the design of an IST programme for high school geography and to analyse the processes with which the development of the programme is associated. The nature of IST is such that it is primarily concerned with the development of skills, values and attitudes and the acquisition of propositional knowledge through learner-centred activities. The design, development and implementation of a programme such as this within a school needed to take the following into consideration:

(i) the experiences, needs, interests and aptitudes of the pupils for whom the programme was to be designed;

(ii) the interests, expertise and teaching experience of the teachers who were responsible for the administration of the programme;

(iii) the geographical location of the school and the composition and expectations of the community which is served by the school;

(iv) the school structure.

Specific considerations in terms of the location of the IST programme within the geography curriculum included:

(i) the constraints of the senior certificate examination;

(ii) the demands of the geography syllabus;

(iii) the skills, attitudes, values and theories that are appropriate for each standard in the high school;

(iv) the resource-base needed for the development of learner-centred activities in geography.

The latter set of factors are relatively general and therefore applicable to all schools offering geography to Std l0. However, the former aspects which influence a learner-centred programme vary from school to school. The situation of this study in one school necessitated a research approach which was appropriate both to the geography curriculum and to the school milieu. The constraints and particular circumstances governing this study led to the decision to locate the research within the sphere of classroom enquiry or classroom research.

4.2.l **Defining classroom research**

Hopkins (l985) identifies research which is initiated by a teacher and which is located in a particular school as classroom enquiry or classroom research, rather than as action research.

Classroom research is seen to differ from action research in two areas:

(i) with respect to the agent who initiates the research and with regard to the purpose of the research;

(ii) with respect fo the process which governs the research.

(ibid)

In classroom research the teacher initiates the research in order to improve the classroom or school environment either through innovation or through a reassessment and re-structuring of the existing situation in the school within which the teacher is operating. Action research is generally initiated by an agent outside of the particular school environment and is undertaken in order to test a general theory or to provide a general theory which is widely applicable. While this study seeks to develop guidelines for a learner-centred approach in geography through IST, the limitations of the research locale precludes the development of a general theory.

The methodology and evaluation processes associated with action research are prescriptive and rigid, as they are contained within a particular framework or model. While classroom research identifies and follows a methodology and is subjected to rigorous evaluation, the choice of the methodology and the evaluation system is governed by the school milieu and the teachers' area of expertise rather than by a prescribed model. The perception of IST as part of a process rather than a product created the need for a research structure which was sufficiently flexible to meet the various needs of the study, yet which would provide a framework within which to work.

The following five principles are advocated by Hopkins (l985) as a means to ensure that classroom research has value and is suited to the situation in which it takes place. The first principle is that the research ought not to interfere with the teacher's normal classroom duties, nor ought it to adversely affect the pupils in any way. Secondly, the method of data collection must be neither too demanding of the teacher's time, nor must the method be one which the teacher is unable to understand easily or to apply. Thirdly, the research must be associated with a definite methodology and a system of evaluation, which, while not overly prescriptive, must be rigorously applied. The fourth principle is related to the teacher's commitment to the investigation, while the final principle is concerned with the general ethics which ought to govern classroom enquiry of this nature, such as observing the school protocol, obtaining the necessary authorisation and working through the correct channels (Appendix 4D).

The principles which govern classroom research and the degree of flexibility they permit within a particular school situation made this an appropriate approach to apply to this study, for the following reasons:

(i) The researcher needed the co-operation of her colleagues in the geography department as each geography teacher had to take the responsibility of administering an aspect of the programme. Therefore, because each of the individual teachers had different areas of expertise, interests and commitments, it was necessary to develop a method of enquiry which would suit each teacher as well as the demands of the study.

(ii) The researcher's colleagues in the three year period in which the study was conducted differed considerably in terms of their teaching experience and the method of investigation and evaluation had to be such that all the teachers could relate to it.

(iii) The composition of the geography staff changed each year as time-table changes and general staff mobility either introduced new teachers to the programme or removed others. The research approach therefore needed to be able to cater for these variations.

(iv) The IST programme had to be developed within the constraints of the geography syllabus and in relation to the school milieu. The study could therefore not disrupt nor intrude upon the general running of the school or on the general teaching.

(v) The pupils for whom the programme was designed varied considerably in age, ability and aptitude and the approach to the development of the programme needed the sort of flexibility which could cater for these differences.

(vi) The project component of IST will vary according to the pupils' individual interests. Since each group of girls in the senior secondary phase differed in this respect, the research approach had to take this factor into consideration.

(vii) If IST is to be effective the programme needs to be dynamic and based on a framework which provides for progression of skills, values, etc. The IST programme must therefore be such that it caters for the development of the pupils within the space of a single year and during the five years of their high school. A research approach which is to meet these requirements must not only be flexible but must allow for a degree of autonomy between the various standards, the different groups in these standards and even between one set of activities and the next.

4.2.2 Research location

The classroom research component of this study was conducted at a high school for girls in the East London metropolitan region. The study was conducted for a period of three years. The pilot programme undertaken in the first year involved the Std 7 and Std 9 pupils, providing a sample size of I84 pupils. All the geography pupils at the school were involved in the subsequent study. The average sample size in each of these years was 365 pupils.

Each standard is divided into a number of classes according to the pupils' subject choice. In the period in which the study was conducted, the Std 6 and Std 7 groups consisted of five individual classes in each standard, while the senior secondary geography groups included two classes per standard. The average class size at the school was 30 pupils.

While the researcher initiated the study, the design, development and implementation of the programme was a co-operative effort involving all the teachers at the school. The composition and size of this group varied from year to year, being dependent on time-tabling arrangements and general staff mobility. The teachers engaged in geography instruction varied from three to four. The researcher was the only teacher who taught geography exclusively. Apart from the researcher, one other teacher was involved in the entire three year period of the study.

Aspects of the IST programme within the project component and extra mural programme (chapter eight) involved pupils and staff members from other local East London schools.

One advantage of this type of research is that official permission from the Department of Education is not necessary. The researcher was, however, fortunate in obtaining the support of the school principal, the Superintendent of Education and other school principals whose pupils and staff were involved in sections of the programme.

4.2.3 Research procedures

The classroom research was conducted in two stages. The first phase involved the development and administration of a pilot programme for IST. The second phase of the study was concerned with the implementation of the results obtained from the initial study and the ongoing development of the IST programme throughout the school.

The purpose of the pilot study was to investigate the feasibility of developing a series of learner-centred activities, designed specifically to promote skills, values, attitudes and propositional knowledge. This stage of the research involved the Std 7 and Std 9 pupils, the researcher and three other teachers. These two groups were chosen primarily in order to compare the levels of skill development and skill progression in the course of a year between the pupils in the junior and senior secondary phases of the high school. The programme was designed and monitored by the researcher while on study leave.

The second stage of the study, developed over a period of two years, was designed to include all the geography pupils from Std 6 to Std l0. The researcher and the full complement of geography teachers were involved in the administration of the IST programme during this period. During this stage of the study the practical and project components of IST were fully developed and incorporated a wide variety of learner-centred strategies. The project component was extended to include an enrichment programme, which, while primarily involving the pupils at the school, included pupils and teachers from other schools on a number of occasions.

A detailed analysis of the development, administration and evaluation of the pilot programme is given in chapter seven, while the subsequent development of the study is described in chapter eight.

The study was based on the following framework:

(i) a general structure which could be applied to the entire school programme for IST; and

(ii) the development of programmes for each standard which were designed to meet the needs of each group each year.

The general structure within which the IST programme for the school was designed included the following:

(i) the identification and setting up of long-term aims and objectives for the school's IST programme;

(ii) the identification of skills, values and propositional knowledge within the geography syllabus;

(iii) the development of a framework for skills progression from Std 6 to Std l0;

(iv) the identification and development of a resource base for IST, which could be utilized by all the geography pupils in the school;

(v) the identification and testing of a variety of learner-centred strategies which could be applied to the practical and project components of IST in the various standards;

(vi) the development of a general assessment strategy for practical tasks and projects which could be used for general pupil profiles in geography;

(vii) an analysis of the obstacles which affect pupil performance in IST.

Development in these areas did not follow any predetermined stages, but evolved as needs were identified. This aspect is a characteristic of the process model approach which was applied to the development of the IST programme (Stenhouse, l98l).

The design and development of an IST programme for each standard involved the following stages:

(i) the identification of the specific needs of the particular standard in terms of the proficiencies to be developed and in relation to the demands of the syllabus;

(ii) the setting of specific objectives based on the above;

(iii) the design of the programme with regard to the practical tasks, project work and the enrichment programme;

(iv) the design and develoment of the individual tasks;

(v) teacher evaluation of the practical components before their implementation;

(vi) the evaluation of the project proposal by the facilitator and the individual pupil before the testing of the hypothesis;

(vii) the administration of the particular activites;

(viii) the assessment of each activity;

(ix) the evaluation of the activity by the teachers and the pupils;

(x) the final evaluation of the years' programme and its reassessment and general planning for the following years' IST programme for that group.

While the IST programme for each standard was developed as a unit, the programme design was developed within the general structure of the long-term aims and objectives, the skill framework and the selected learner-centred strategies.

The development of the general structure for the programme and of the individual standard units was achieved through the co-operation of the researcher with the other geography teachers. Thus, while teachers were responsible for the administration of the programme of the particular classes they taught, all of the teachers were present at the planning of the year's programme for the school. This was done in order to develop a continuity in the programme from standard to standard and to ensure that the general aims and objectives were kept in sight.

Workshops were conducted with the geography teachers during the period in which the study was undertaken. The purpose of these workshops was to ensure that all the teachers understood the basic theory on which the IST programme was based and to develop their expertise in terms of the strategies that were employed in the IST programme. The researcher was very aware of the sensitive nature of these workshops and care was taken in the selection of material for each session, as too much at any one time was daunting. The researcher encouraged the teachers concerned to participate fully and as the individual teachers became more confident, their input increased considerably and the researcher was able to play a less directive role in the workshop situation. This was important as it was necessary for the teachers concerned with the programme to take the initiative in the development and design of the various aspects of the programme.

4.2.4 Data collection and analysis

The collection and analysis of the data in this study was closely linked to the evaluation measures chosen for the programme, since the data needed for the study was related to an analysis of:

(i) whether the needs and interests of the pupils were being met;

(ii) whether the demands of the syllabus were catered for;

(iii) the development of the pupils in terms of the specific objectives of the programme;

(iv) the design of the individual activities;

(v) the various strategies that were employed;

(vi) the teachers' reactions to the programme; and

(vii) the pupils' reactions to the programme.

Information relating to the above was primarily gathered through the ongoing evaluation of the programme and the individual activities by the teachers, the pupils and the researcher. Information collected through the process of evaluation was minuted and collected into annual reports which formed the basis for the discussion and evaluation of the IST programme at the end of each year. These reports played an important part in the planning and development of the following year's programme for IST.

A second method of data collection was through the assessment of the pupils' work. The assessment system was based on criterion marking and written comments. This provided the teachers with an insight into the pupils' progress in terms of specific skill areas and with regard to their personal development. These results were analysed for each pupil and were used to analyse the progress of the group, both quantitatively and qualitatively.

4.2.5 Evaluation

The nature of this study was such that evaluation was necessary:

(i) at each stage of the development of the individual programmes for the various standards;

(ii) for each of the activities included in the programme;

(iii) at the conclusion of the programme for each standard at the end of the year;

(iv) for the entire school programme;

(v) for the development of the aspects relating to the general structure of the programme as they were completed and at the culmination of the research;

(vi) for the research programme.

Programme evaluation of this nature is most frequently associated with either a formative or a summative evaluation. Formative evaluation is the ongoing evaluation of a programme while it is being developed and aims at the provision of information regarding the improvement of the programme, the suitability of the material included in the programme and to the pupils' progress in specific areas of the programme. Summative evaluation is done at the completion of a programme and attempts to determine the success or failure of the programme (Stake, 1973; McElroy, 1984).

Evaluation approaches which may be used are preordinate approaches or responsive approaches (Stake, 1973). Preordinate evaluation is concerned with "emphasising statements of goals, the use of objective tests, standards held by programme personnel and research-type reports" (Stake, 1973, (in Madaus, 1983, p. 292). Preordinate evaluation is seen as valuable where it is necessary to ascertain whether specific goals have been reached or where specific outcomes need to be measured. Preordinate evaluation is seen as particularly appropriate to a summative evaluation done at the completion of a programme.

Responsive evaluation has been suggested as an alternative approach which is particularly relevant in a naturalistic enquiry such as action or classroom research (Stake, 1973). This type of evaluation is primarily concerned with observation and feedback and provides the programme designers, developers, evaluators and participants with opportunities to analyse and discuss those aspects with which the programme is concerned. Evaluation, therefore, becomes multifaceted with inputs from a variety of sources other than the evaluators per se. Responsive evaluation is therefore an approach which allows for a considerable degree of flexibility in decision making as it is essentially related to an ongoing evaluation. As such, this particular approach is seen as particularly appropriate to formative evaluation, but is possible for a summative evaluation as the data gathered can illuminate a programme's strengths and weaknesses (Walker, 1971; Stake, 1973).

Both approaches have limitations. Preordinate evaluation models tend to be rigid and may obscure valuable events within a programme. These approaches may also result in self-fulfilling prophesies which underplay weaknesses or problems since this type of evaluation occurs within a specific structure or framework which measures pre-identified criteria or outcomes. Responsive evaluation approaches, however, are criticised for their subjective nature, for the time involved in the gathering of data, for the difficulty in developing evaluation instruments before the evaluation of the programme, or proving their reliability, since such instruments are part of the programme development (Williams, 1986).

The problems associated with preordinate evaluation models have led to the increased use of responsive approaches in studies such as action research and classroom enquiry. Triangulation methods attempt to reduce the conflicts identified between responsive evaluation and that of preordinate valuation by including evaluation by non-participant observers as well as participants in the programme; by evaluating a variety of events within the programme' by using a variety of evaluation instruments or by employing a combination of all of these aspects (Cohen and Manion, 1984; McElroy, 1984; Hopkins, 1985).

The method of evaluation which is employed is largely determined by the nature of the particular programme, the needs of the participants, whether these are the designers and developers of the programme or the 'clients' for whom the programme is developed, the time available and the costs involved.

As a classroom research project, this study lent itself to responsive evaluation as indicated by the identification of the research procedures and the needs assessment for evaluation. The evaluation was largely dependent on discussion and analysis of the specific activities designed and developed for the programme. The evaluations in these instances involved the researcher as the participant observer. Members of the geography staff at the school, other staff members at the school and teachers at other schools who were involved in any way with the programme acted as non-participant observers. The pupils played a particularly important role in the evaluation process by means of their evaluation of the activities which was done through evaluation questionnaires or through less formal discussions in feedback sessions with the teachers and the researcher. The ongoing assessment of the pupils' work provided one of the key evaluation instruments during the three year period of the study. While Superintendents of Education provided informal evaluations of the pupils' work, which was monitored each year, as discussed in chapter nine, greater use could have been made of these 'outside' evaluators. Responsive evaluatuion was therefore used for each stage of the programme development and also played an important role in the summative evaluation (chapter nine).

Specific questions raised by teachers about the programme's outcomes, and attempts to assess whether specific objectives regarding pupil development in skill areas had been achieved, resulted in the use of preordinate evaluation during the pilot programme (chapter seven) and as a part of the summative evaluation (chapter nine). This evaluation approach was primarily based on the results of the pupils' assessed work in IST.

The reliability and validity of an evaluation system depends, to a large extent, on the objectivity of the methods used, the variety of measurements and assessments and on the expertise of the evaluators and their commitment to the evaluation. This study attempted, as far as was possible, to eradicate problems related to validity and reliability by evaluating a wide variety of activities; by team evaluation, and by including the pupils as well as including a variety of criteria. The consistent and ongoing evaluation of each stage of the development of the study attempted to reduce the general problems related to evaluation while working within the constraints of the study.

There were, however, a number of factors which, of necessity, influenced the evaluation. These included:

(i) the initial lack of expertise in terms of evaluation. None of the teachers involved in the programme had previously been involved in an evaluation of this nature;

(ii) changes in the allocation of classes to individual teachers from one year to the next and the changes that occurred in the staffing arrangements, created problems related to the maintenance of evaluating and assessment standards;

(iii) the nature of the programme; the variety of tasks set and the progressive developmental character of the tasks, with their differing objectives, complicated the work of the evaluators.

4.3 SUMMARY

This study was primarily based on a staged survey and a classroom research. The survey, which was undertaken to ascertain teachers' perceptions of IST and to establish how IST is implemented in schools, provided a valuable backdrop against which to develop the methods and procedures which were designed to establish IST as an essential and integral part of the geography curriculum.

The design of the staged survey was such that data obtained from the various respondents could be cross-referenced and checked against the results of the classroom research. The research approach used in the classroom enquiry and for the evaluation of the programme provided the flexibility and freedom necessary for the development of a programme such as the IST programme. The less prescriptive nature of the classroom research approach also enabled the researcher to deviate from the set pattern to develop or test aspects that arose from the survey.

CHAPTER FIVE

ESTABLISHING GEOGRAPHY TEACHERS' PERCEPTIONS OF IST: RESEARCH RESULTS

The specific objectives of each stage of the three-phase survey influenced the structure of the various phases and determined the size and composition of the sample groups. The focused interviews, conducted during the first four months of 1986, aimed at obtaining a broad spectrum of interpretations of the term 'independent study topics' (IST). Therefore, the subjects were selected from a cross-section of teachers. The panel discussion, also held during the first school term of 1986, was confined to geography subject heads, as these are the teachers who determine the development of IST in the geography curriculum. The final phase of the survey, the questionnaire, attempted to obtain responses from all Cape Education Department schools offering geography from Std 6 to Std 10.

The organisation of chapter five is such that the results of each of the three stages of the survey are presented in the order in which they were conducted. The concluding commentary analyses the results in terms of their implication for IST in Cape Education Department schools.

5.1 INTERVIEW RESULTS

The first teachers to be interviewed were history and biology subject heads, who had been involved in the development of pupil based tasks for a number of years. The inclusion of non-geography specialists in this phase of the survey was done in order to compare their perceptions with those of geography teachers, since, in theory, the interpretation of the term ought to be similar in all school subjects where IST forms a part of the curriculum. The geography specialists selected for these interviews included a representation from the metropolitan areas, as well as teachers from the smaller centres. This sample group included beginner teachers as well as experienced teachers, since their perceptions would give some indication of how IST is presented to students during teacher training. (Table 5.1).

TABLE 5.I

SIZE AND COMPOSITION OF INTERVIEW SAMPLE
(expressed as percentages)

(% Respondents according to category (N = 25)

	Male	Female
Percentage (Totals)	48	52
History and Biology subject heads	8	28
Geography teachers	44	20
East London geography teachers	32	4
Geography teachers from smaller centres	12	16
Beginner teachers	12	4

Since words reflect our thinking, this first phase of the survey attempted to ascertain what teachers think about IST. The interview method chosen for this phase meant that the teachers had to verbalise spontaneously and could not, when hesitant about the definition, turn to the preamble or a dictionary. Each teacher was therefore asked to define what they understood by the term IST. With the exception of three teachers, the following views were expressed:

(i) IST was seen as work done by the pupils, with the teacher's guidance.

(ii) It should be related to some sort of research.

(iii) The end product would be a written report.

This written report was variously referred to as a 'theme', an 'assignment', a 'project', a 'task' or as 'practical work'. Thus, the initial reaction among teachers is that IST involves some sort of product which has to be completed by the pupils working on their own but under the supervision of the teacher.

Teachers using the various terms, 'themes', 'assignments', 'projects', 'tasks', etc., interchangeably, saw the differences between the terms as being related to differences in length and detail. So, for example, 'practical work' and 'tasks' would be identified as a shorter or less detailed piece of work than an 'assignment' or a 'project'.

None of the teachers interviewed attempted to link the terms they used to describe IST either to a specific set of aims or to particular skills. Nor was there any attempt to relate a specific term to a particular line of enquiry. There was also no consensus regarding the length or detail of the end product when used in conjunction with the various terms. Practical work was perceived as tasks involving 'worksheets'. For the geography teacher practical work was synonymous with the interpretation and reading of topographic and orthophoto maps or aerial photographs. This interpretation among geography teachers may possibly be ascribed to the connotation given to practical work by the I973 syllabus, which related the term specifically to Paper II (since I989 called Paper I) of the examination in Stds 8, 9 and I0, which deals exclusively with the interpretation and reading of such maps and photographs.

In these initial interviews teachers made no reference to the possible role of the teacher other than providing 'guidance'. No attempt was made to differentiate between the teacher as an 'instructor' or as a 'facilitator'. Nor were the pupils' roles defined in terms of their input as to the choice of the topic, the development of the work or the end product.

The I985 Revised Geography Syllabus is not unique in its encouragement of a non-directive pupil-centred teaching approach, as this has become a general aim across the school curriculum. The recommendation that IST be done by pupils throughout the year is, however, an attempt to suggest a practical method which can be used by geography teachers to develop this approach.

The responses from teachers interviewed during this phase of the survey showed that non-geography specialists as well as geography teachers have a limited view of IST. Their perceptions reveal a general lack of understanding of the concept, and serve to highlight the discrepancies that exist between education theory and practice with regard to the application of learner-centred approaches such as this.

5.2 PANEL DISCUSSION RESULTS

The six primary and high school geography subject heads for the panel discussion were selected so that single-sex as well as co-educational schools were represented. Ballantyne (I986, p. I00) describes the 'typical' geography teacher as 'male', and this would appear to apply to subject heads as well, as the only female representation on the panel was from a girls' school. (Table 5.2).

TABLE 5.2

SIZE AND COMPOSITION OF PANEL
(expressed as percentages)

% Respondents according to category (N = 6)

	Male	**Female**
Sex	83	17
	Primary	**High**
Institution	36	64
	Single sex	**Co-ed**
Institution description	36	64

Each member of the panel was initially asked to comment on the following:

(i) their understanding of the term IST;

(ii) how they interpreted the recommendations of the I985 Revised Syllabus in terms of the scope, format and organisation of this aspect of the syllabus.

This was followed by a general discussion of the topic.

The initial responses largely reflected the views expressed during the first phase of the survey, although only one of the panelists had been a member of the previous survey group. Once again the term IST was interpreted as a task set by the teacher for completion by the pupils with the teacher's guidance.

The terms used to describe IST, such as 'assignment', 'project', 'task', etc., were also used interchangeably by this group of teachers. Topic choices were again seen as the prerogative of the teacher, with the end product being some form of written report. Pupils were not seen to have any role to play in the decision making process related to the final format. With one exception, the panelists reaffirmed what had been revealed in the interviews with individual teachers.

A different view was presented by a subject head at a primary school, who described his experiences with what he called a 'very bright group of standard fours'. The speed at which this class worked made the teacher realise that if their attention was to be maintained he would have to vary his teaching activities. He also explained that because this class was 'competitive' and 'mark-orientated', any work he set would have to be perceived by the pupils as being 'meaningful'. The initial experiments were related to the setting of extra worksheets and 'assignments' within the syllabus. This, he said, was soon seen to be 'more of the same' and led to pupil resistance. In 'desperation' he changed roles and asked the pupils what they wanted to do. This accordingly led to the pupils choosing topics which were developed with his help. The boys then presented their work to the class in the form of short seminars, which, in turn, led to an increased number of activities outside the classroom.

The teacher described a particular weekend excursion to a local beach resort in order to illustrate one of the techniques he had used with the class. The boys had been given no a priori instruction before the excursion. They were not given worksheets and were not asked to produce any follow-up reports. The teacher invited the local nature conservator, the museum ornithologist, who is also a keen environmentalist, and the museum conchologist, to accompany the group. These three 'experts' were to act as mentors during the course of the weekend. The class was divided into groups and rotated among the mentors who had developed a series of self-discovery activities in their own fields for the boys to do. To test the results of this experiential learning he invited the mentors back to the class a week later. Each of them spent time with the class questioning them on the areas they had covered in the field. According to the teacher concerned, the results were extremely favourable and the boys subsequently asked for more such excursions.

As a result of the experiences described by this teacher, the discussion that followed was able to focus on strategies which, at that time, were completely new to the group of subject heads present. Questions were raised with regard to the aims of IST, the type of skills that could and ought to be incorporated, the role of the teacher, as well as issues directly related to the organisation and management of the IST programme. The general consensus at the end of the session was that IST could in fact move beyond the confines that existed in 1986 with regard to the topics set, the formats used, as well as the general aims and objectives.

Both the interviews and the panel discussion highlighted the fact that few teachers in the secondary schools had read, much less analysed, the implications of the preamble to the Revised 1985 Syllabus in relation to IST. Furthermore, few teachers actually understood how to implement learner-centred approaches such as IST, or fully understood the role that such approaches can play in the development of skills, attitudes and values. The results of the forum discussion have emphasised the need for in-service courses to expose teachers to the use of learner-centred approaches. So, too, the value of teachers meeting in an informal way to share ideas and to develop strategies to improve teaching practice was evident.

5.3 QUESTIONNAIRE RESULTS

The 103 returns obtained from the questionnaire represented a response from 73,6% of the Cape Education Department schools that, in 1985, had entered geography candidates for the Cape Senior Certificate examination. An analysis of these returns (Table 5.3) showed a numerically even spread from respondents teaching at:

(i) schools in metropolitan areas and from the smaller centres;

(ii) English medium and Afrikaans medium schools; and

(iii) day schools and boarding schools.

The fact that three-quarters of the respondents were geography subject heads is particularly valuable for this research as the IST programme in schools is likely to be controlled and monitored by these teachers.

TABLE 5.3

GEOGRAPHY TEACHERS' PERSONAL DATA SUMMARY
(Expressed as percentages)

PERSONAL ITEM	% RESPONDENTS ACCORDING TO CATEGORY (N = 103)		
		<u>HOD</u>	<u>Other post level</u>
School post		76	4
	<u>1-5 years</u>	<u>6-10 years</u>	<u>More than 10 years</u>
Teaching experience	23	42	35
		<u>Std 6-8</u>	<u>Std 9-10</u>
Highest geography standard taught		9	91
	<u>English</u>	<u>Afrikaans</u>	<u>Dual medium</u>
Medium of instruction	37	36	27
	<u>Boys only</u>	<u>Girls only</u>	<u>Co-ed</u>
Description of school (a) according to sex	11	10	79
		<u>Day school</u>	<u>Boarding school</u>
Description of school (b) according to accommodation		41	59
		<u>City school</u>	<u>Other</u>
Description of school (c) according to locale		49	51

The broad cross-section of responses to the questionnaire indicates a wide range of experiences. Comparisons can therefore be made between single sex and co-educational schools; English and Afrikaans medium schools; and day schools can be compared with boarding schools. An analysis of the various subsets can reflect differences in teacher attitudes and practice regarding IST that might otherwise be hidden by the general experiences of the group as a whole.

These responses, when linked to the perceptions revealed during the interviews and forum discussion, give a broad view of:

(i) teacher perceptions related to the meaning and scope of IST;

(ii) the way teachers perceive the benefits of IST; and

(iii) teacher practice in the organisation and management of IST.

The final phase of the survey was completed in June l986. The questionnaire (Appendix 4A) was structured to provide the following information:

I The accessibility of audio-visual equipment and the suitability of library and media-centre facilities for the development of IST.

2 Teacher attitudes related to the value of IST.

3 The implementation of IST in the geography curriculum with regard to the way IST is organised and administered.

4 The assessment techniques used in IST.

5 The problems geography teachers encounter in the organisation of IST.

The results of this phase of the survey are presented according to the five sections as indicated above. The responses of the entire sample population for the questionnaire are analysed in each of the sections, then compared with the analysis of the various subsets into which the sample population has been grouped. Statistically significant variations in each subset were indicated in the processing of the raw scores using the chi-square test. Where such variations occur they are referred to in the analysis of each section of the results.

5.3.I THE ACCESSIBILITY OF AUDIO-VISUAL EQUIPMENT AND THE SUITABILITY OF LIBRARY AND MEDIA-CENTRE FACILITIES FOR THE DEVELOPMENT OF IST IN CAPE EDUCATION DEPARTMENT SCHOOLS

This aspect was included in the questionnaire as the revised I985 syllabus in relation to IST states:

> 3.2.7(b) Pupils should learn to rely on personal observation in the field and to make use of secondary sources such as reference books, maps, photographs and diagrams, films, tapes and slides, computers as well as television, the radio and the press.

Questions 4.I and 4.2 were designed to obtain information relating to the availability of audio-visual equipment both in terms of hardware and software and the perceived suitability of library facilities at schools (Table 5.4). The items enumerated in 4.I included equipment that is listed in the departmental catalogue and therefore available to all schools as either monetary or non-monetary items. The only equipment listed in the questionnaire not in the approved catalogue of I986 were 35mm cameras, television sets and video recorders. The latter items were included, as the pilot survey indicated that this equipment was generally available in East London schools.

An analysis of the accessibility of this equipment will give an indication of the ease with which teachers can implement the recommendations of the revised syllabus as well as the possible use that pupils can make of audio-visual materials in the IST programme. The availability of media-centres and media-assistants employed by the schools will give some idea of how convenient it is for teachers and pupils to develop material for use in IST, both in terms of space and time. This section of the survey ought also to give an indication of the equipment and teaching aids that are widely used by geography teachers and with which they are most familiar, as this will influence its potential use in the IST programme.

Printed matter in the form of books, pamphlets, magazines, journals, etc., are

TABLE 5.4

AVAILABILITY OF AUDIO VISUAL EQUIPMENT
(Questions 4.l and 4.2)

4.1 Please tick the items below which are freely available to YOU as a geography teacher:

		ITEM
(a)	Blank video cassettes	40
(b)	Prepared video cassettes	4l
(c)	A television set	42
(d)	A video recorder	43
(e)	A video camera	44
(f)	Blank tape recorder cassettes	45
(g)	Tape recorders	46
(h)	Photographic film	47
(i)	A 35mm camera	48
(j)	Prepared photographic slides	49
(k)	A sound-tape projector	50
(l)	Prepared overhead transparencies	5l
(m)	An overhead projector	52
(n)	A media or resources centre	53
(o)	A technical assistant in the resources centre	54

4.2 Does your school library contain:

(a)	A more than adequate collection of printed material for independent study?	55
(b)	An adequate collection of printed material?	56
(c)	A less than adequate collection of printed material?	57

a valuable resource for learner-centred activities. Question 4.2 therefore gives an indication of how teachers perceive their school libraries as a resource centre.

The results (Table 5.5) showed that over 90% of the respondents have access to OHP's and tape recorders, with television equipment and slide tape recorders readily available to more than 70% of the respondents. The 35mm camera was the least accessible of the 'hardware' items (these cameras have recently been placed on the departmental catalogue and are available to high schools on request.) 'Software' in the form of blank cassettes, video tapes and photographic film tended to be less easily accessible. The data also revealed that 74% of the respondents were at schools that are equipped with media-centres. However, less than one-third of these schools employed media-centre assistants.

Table 5.6 reveals that half of the respondents considered that their school libraries had adequate facilities for IST, while 4% felt the facilities to which they had access was less than adequate. Only 6% of the respondents considered their library facilities to be more than adequate.

The analysis of the subsets (Table 5.7) revealed the following:

(i) Schools in smaller centres are as well equipped with hardware as the metropolitan schools. It was also noteworthy that the smaller centres are also well equipped with media-centres. The only statistically significant difference was that the metropolitan schools are somewhat better supplied with media-centre assistants.

(ii) English medium schools are better equipped with items such as television sets, video-recorders and have easier accessibility to software items than their colleagues at Afrikaans medium schools.

(iii) There are no significant differences in access to equipment between boys' schools and girls' schools, or the single sex schools and co-educational schools.

(iv) The schools most affected by the lack of suitable printed material are the schools in the smaller centres, as well as boarding schools, many of which occur outside of the metropolitan centres. Schools

TABLE 5.5

RANKING OF AUDIO VISUAL EQUIPMENT AVAILABLE FOR IST

Rank	%	Item	A-V Equipment available for IST
l	98	52	An overhead projector
2	92	5l	Prepared overhead transparencies
3	9l	46	Tape recorders
4	75	42	A television set
5	74	50	A sound-tape projector
5	74	53	A media or resource centre
7	7l	43	A video recorder
8	66	45	Blank tape-recorder cassettes
9	55	40	Blank video cassettes
9	55	4l	Prepared video cassettes
ll	54	47	Photographic film
l2	53	49	Prepared photographic slides
l3	46	44	A video camera
l4	44	48	A 35mm camera
l5	2l	54	A technical assistant in the resource centre

TABLE 5.6

SUITABILITY OF LIBRARY FACILITIES
(Expressed as percentages)

	% of respondents according to category	
(a)	A more than adequate collection of printed material	6
(b)	An adequate collection of printed material	52
(c)	A less than adequate collection of printed material	43

TABLE 5.7

AVAILABILITY OF AUDIO-VISUAL RESOURCES AND PRINTED MATERIAL FOR IST. COMPARISONS BETWEEN GROUP RESULTS AND SUBJECTS
(Expressed as percentages)

A-V EQUIPMENT			Total	City schools	Other schools	Boys schools	Girls schools	Co-ed schools	Eng. medium	Afr. medium	Dual medium	Day schools	Boarding schools
Rank	Item	N =	103	50	53	11	10	82	38	37	28	42	61
1	OHP		98	98	98	100	100	98	100	95	100	95	100
2	Prepared transparencies		92	90	94	91	80	94	89	100	86	95	90
3	Tape recorders		91	92	91	100	80	92	92	92	89	91	92
4	Television set		75	80	70	91	90	71	95	58	71	79	72
5	Sound-tape projector		74	74	74	64	70	76	79	66	75	74	75
5	Media centre		74	74	74	73	70	74	76	66	79	71	75
7	Video recorder		71	74	68	81	80	68	89	51	71	71	69
8	Blank tape cassettes		66	70	62	91	60	63	76	59	61	67	66
9	Blank video cassettes		55	64	47	73	60	54	76	39	50	64	46
9	Prepared video cassettes		55	66	45	73	50	54	74	46	43	60	54
11	Photographic film		54	54	55	64	50	54	63	49	50	57	53
12	Prepared photo slides		53	62	53	64	50	49	63	49	46	60	49
13	Video camera		46	48	43	64	30	45	53	35	50	41	49
14	35mm camera		44	54	24	46	50	43	55	38	36	55	33
15	Technical assistant in media centre		21	34	9	36	30	18	11	30	25	31	18
Library facilities													
a)	More than adequate		6	6	6	0	20	5	11	3	3	10	3
b)	Adequate		52	66	38	64	40	51	59	54	39	62	44
c)	Less than adequate		42	28	56	36	40	44	30	43	58	28	53

(A-V equipment listed according to ranking) away from the large centres are further disadvantaged as they have a smaller choice of public libraries to supplement the school facilities.

The following aspects were highlighted by this section of the survey:

(i) While schools are generally well equipped with audio-visual equipment and media-centres, geography teachers will still have to be responsible for putting together resource packages needed for the IST programme, as relatively few schools have media-centre assistants. Where teachers want pupils to develop material for IST using media equipment, they will have to train pupils to prepare the material. This additional demand made on the teachers' time could act as a deterrent in following the recommendations of the revised syllabus.

(ii) The OHP is the most accessible piece of equipment in geography classes and transparencies are likely to be the teaching aid with which the geography teachers are most familiar. The survey also shows that television equipment, slides and tapes are generally accessible. Therefore, the availability of the equipment and teacher expertise should not deter teachers from incorporating videos, transparencies, slides and tapes into the IST programme. The degree to which audio-visual equipment does become a part of the programme will, however, depend on the value the teacher places both on the audio-visual material and IST.

The survey in 1986 failed to consider the increasingly important role that computers are playing in schools. The value placed on computer literacy means that the purchase of computers has a high priority in school budgets. As pupils become more computer literate these items could become a valuable asset in the IST programme, as pupils develop skills which will enable them to process data, to use word processors for reports and to develop software which can be used in geographical games and simulations.

5.3.2 TEACHER ATTITUDES TO THE VALUE OF IST

Section B of the questionnaires required teachers to respond to the following four aspects concerning the value of IST as a learner-centred approach:

(i) The role of IST in the curriculum
(ii) As a means to aid the pupils' academic and personal development.
(iii) As an aid to the teaching of geography
(iv) As a means to develop positive attitudes to geography

5.3.2.l Teacher responses to the role of IST in the geography curriculum

To claim that the first criterion needed for change in teaching practice is the teachers' conviction regarding the worth of the strategy to be employed would appear to be reasonable. Thus, if teachers are not convinced of the intrinsic value of IST as an integral part of the curriculum, there would seem to be little likelihood of the development of IST as a meaningful learner-centred approach.

The response, therefore, to question 5 (Table 5.8), which revealed that 42% of teachers considered IST to be an 'essential and integral' part of the curriculum, with 55% of the respondents believing it to be 'reasonably important', could lead to the conclusion that a considerable number of the survey population were in fact bringing about the necessary changes as recommended by the revised syllabus with regard to IST. In the light of the evidence of the first two phases of the survey, which revealed a narrow and limited view of pupil-based work, it is the opinion of the researcher that no such assumption can be made on the basis of this item alone. At best, all that can be assumed is that a reasonable number of teachers believe that pupils should be engaged in tasks which they complete on their own.

The analysis of the subsets (Table 5.8) revealed no significant differences. It was, however, interesting to note that boys' schools rated IST as more important than their colleagues at girls' or co-educational schools.

To obtain a more accurate assessment of teacher attitudes to IST, the analysis of questions 6.l and 6.3 must be compared with the reaction to question 5. If, indeed, teachers are interpreting IST according to the recommendations of the revised syllabus and accept these recommendations, then there should be a strong correlation between the responses to question 5 and the later items. All the statements contained in questions 6.l to 6.3 reflect the claims that have been made by learner-centred theory with regard to the

TABLE 5.8

TEACHERS' RESPONSES TO THE ROLE OF IST IN THE GEOGRAPHY CURRICULUM
(Expressed as percentages)

B THE VALUE OF INDEPENDENT STUDY TOPICS

5 Please indicate your personal attitude to independent study in high school geography

(a) It is an essential and integral part of the geography curriculum 1

(b) It is a reasonably important part of the geography curriculum 2

(c) It is of little value in the geography curriculum 3

(d) It is actually a waste of time 4

(Please tick the appropriate block)

	Total	City schools	Other	Boys	Girls	Co-ed	Eng.medium	Afr.medium	Dual medium	Day	Boarding
N =	103	50	53	11	10	82	38	37	28	42	61
a) An essential and integral part of geography	41	46	36	64	30	39	45	37	39	36	45
b) Reasonably important	56	54	57	36	70	56	53	55	43	58	53
c) Of little value	2	0	5	0	0	3	2	5	16	4	2
d) A waste of time	1	0	2	0	0	2	0	3	2	2	0

way in which IST can be used to develop the pupils' potential, its benefits as a teaching strategy and as a means to enhance and develop the subject. Furthermore, the claims are all either implicitly or explicitly contained within the preamble to the 1985 revised syllabus. Therefore, those teachers who perceived IST as being an essential and integral part of the syllabus ought, also, to support the claims that have been made with regard to the value of IST in relation to the issues contained in questions 6.l and 6.3.

5.3.2.2 The perceived value of IST with regard to pupil development

The sixteen statements contained in question 6.l of the questionnaire (Table 5.9) reflect the claims made by learner-centred theory and the revised syllabus related to specific ways in which the pupil will benefit from the application of this approach. This section, therefore, focused on the role of IST with regard to the development of:

(i) specific skills, such as problem solving' hypothesis testing; the interpretation of statistical data; as well as communication skills, the use of resource material and observational skills;

(ii) attitudes and values concerned with the pupils' awareness and perception of the community and the environment;

(iii) personal attributes such as the pupils' interests, talents, creativity and self-image.

The analysis of this section (Table 5.l0) revealed that there was no consensus of opinion among the survey population as to the value of IST with regard to the way this approach can benefit the pupil in any of the abovementioned areas.

The responses do not fall within any particular pattern and therefore it cannot be said that teachers generally see IST as being best suited to the development of skills, or to values and attitudes, or to the general development of specific personality traits. Of the five claims that were regarded as having the greatest value in terms of IST, the first two are skills, the third and fifth are related to the pupils' personal development, while the

TABLE 5.9

VALUE OF IST WITH REGARD TO PUPIL DEVELOPMENT

Q. 6.I The following claims have been made with regard to the benefits of independent study. Please rate each of the claims from I-3 as follows:

I indicates that you attach little importance to the claim
2 indicates that you attach some importance to the claim
3 indicates that you attach great importance to the claim

	INDEPENDENT STUDY TOPICS	ITEM
(a)	develops creativity in the pupil	5
(b)	develops a pupil's sense of responsibility	6
(c)	trains a pupil to be self-sufficient	7
(d)	develops a positive self-image in the pupil	8
(e)	develops a pupil's interests and talents	9
(f)	develops a pupil's awareness of his environment	I0
(g)	develops a pupil's interest in the community	II
(h)	develops a pupil's ability to work with other people	I2
(i)	develops a pupil's powers of observation	I3
(j)	develops a pupil's skill in using primary and secondary resource material	I4
(k)	develops a pupil's skill in using statistical data	I5
(l)	develops a pupil's skill in using audio visual equipment	I6
(m)	develops a pupil's understanding of language	I7
(n)	develops a pupil's ability to use geographical terms	I8
(o)	increases a pupil's ability to solve problems	I9
(p)	develops a pupil's ability to formulate and test hypotheses	20

(Please check that the above all have a I-3 rating)

TABLE 5.10

RANKING OF VALUE OF IST WITH REGARD TO PUPIL DEVELOPMENT
(According to mean)

Rank	Mean	% (Rated 3)	Item	Value of IST for pupil development with regard to:
1	2,527	54	14	skill in using primary and secondary resources
2	2,524	59	13	powers of observation
3	2,461	53	5	creativity
4	2,408	53	10	awareness of environment
5	2,398	51	7	self-sufficiency
5	2,398	45	18	ability to use geographical terms
7	2,369	48	6	sense of responsibility
7	2,369	49	9	interests and talents
9	2,272	40	19	ability to solve problems
10	2,175	30	15	skills in using statistical data
11	2,078	29	20	ability to formulate and test hypotheses
12	2,068	26	8	a positive self-image
13	1,971	25	11	interest in the community
14	1,961	23	12	ability to work with other people
15	1,786	16	17	understanding of language
16	1,667	14	16	skill in use of audio-visual material

fourth is a value claim. The five claims that received the least support are just as varied.

An analysis of the skills that were included in this section shows that teachers generally believed that the only skills that IST were likely to develop were related to observation and use of resources, while the high order skills such as problem solving, hypothesis testing and the interpretation of statistical data were given relatively little support. In view of the belief held by teachers that the end product of IST is a written report, it was noteworthy that only 15,5% of teachers rated IST highly as a means to develop language skills.

Anomalies were also apparent in relation to the assessment of values and attitudes. While teachers believed that IST could develop a pupil's awareness and perception of the environment, they did not support the claim that IST could develop an awareness of the community.

It was also interesting to note that IST were seen to have greater value in the development of certain personal attributes such as creativity or self-sufficiency than in the development of most of the skills listed.

The analysis of the responses in the subsets (Table 5.II) revealed that the perception of teachers in the various groups did not differ significantly from the general responses, with the exception of the following:

(i) Teachers at girls' schools rated IST more highly than their colleagues at boys' schools or co-educational schools with regard to its value in developing self-sufficiency in the pupil.

(ii) IST was regarded more highly as a means to develop language skills by teachers at co-educational schools than teachers in single sex schools, while Afrikaans speaking teachers also regarded this aspect more highly than English speaking teachers.

While not statistically significant, the following trends are noteworthy:

(i) Teachers at boys' schools appear to perceive IST as having less value than do their colleagues at either girls' schools or at co-educational schools in terms of developing either high order skills or with respect to the personal development of the pupils.

TABLE 5.11

VALUE OF IST WITH REGARD TO PUPIL DEVELOPMENT

GROUP RESULTS AND SUBSETS (Expressed as percentages according to 3 ranking)

Rank	Item N =	Total	City schools	Other schools	Boys' schools	Girls' schools	Co-ed schools	Eng.med.	Afr.med.	Dual med.	Day schools	Boarding schools
		103	50	53	11	10	82	38	37	28	42	61
1	Observation	59	58	60	55	60	56	53	70	54	57	61
2	Skills in use of resources	54	52	57	46	60	55	58	54	50	57	54
3	Creativity	53	52	55	36	60	55	53	59	46	52	54
4	Awareness of environment	53	62	45	64	90	48	53	62	43	50	56
5	Self-sufficiency	51	52	49	27	80	50	50	51	50	55	48
5	Ability to use geog. terms	45	32	58	18	50	57	26	59	54	43	46
7	Sense of responsibility	48	46	47	18	60	50	37	57	50	45	49
7	Interests & talents developed	49	46	51	27	40	52	37	59	50	50	48
9	Ability to solve problems	40	34	45	27	40	42	37	43	39	38	41
10	Skills in use of statistical data	30	26	34	18	50	29	26	35	29	19	38
11	Formulating & testing hypoth.	29	30	28	9	40	31	26	30	32	26	32
12	Positive self-image developed	26	20	32	18	20	28	16	40	21	21	29
13	Interest in the community	25	22	28	27	30	24	18	34	21	19	30
14	Ability to work with other people	23	18	28	9	10	27	11	30	32	17	29
15	Understanding of language	16	12	19	0	10	18	8	19	21	12	18
16	Skill in use of A-V equipment	14	8	19	18	10	13	16	16	5	10	16

(Listed according to mean ranking)

(ii) Teachers at Afrikaans medium schools have a generally more positive attitude to IST with respect to those areas concerning the pupils' personal development than do their colleagues at English speaking schools.

(iii) The value given to IST as a means to develop pupils' ability to 'use geographicl terms' is illuminating when compared to the value placed on language development.

5.3.2.3 The perceived value of IST to the teaching of geography

This second section of the examination of teachers' perceptions of IST as a teaching strategy focused on the way in which the teacher can benefit through the application of IST (Table 5.12). The statements contained in question 6.2 were therefore directed towards:

(i) the role of IST as an aid to acquire a better insight into pupil progress, aptitude and understanding of the subject;

(ii) the use of IST as a means to develop better pupil-teacher relationships;

(iii) the particular value of IST when applied to mixed ability groups, perceived problematic areas of the syllabus and as a means to develop integrated studies.

The analysis of this question (Table 5.13) reveals that teachers have an even lower regard for IST as a strategy which will benefit their teaching practice, than as a strategy which will be of benefit to the pupil. In this set of thirteen claims, only two were given a 3 rating by more than 50% of the respondents, while eight of the claims were given a 3 rating by fewer than 40% of the survey population.

The use of IST to link theoretical aspects of the subject to 'real-world' situations was the claim that received the greatest teacher support (70,9%).

The support that was given to the claim that IST is a way to assess the pupils' potential for tertiary education (54,4%) revealed the attitude of those

TABLE 5.I 2

THE VALUE OF IST TO THE TEACHING OF GEOGRPAHY

6.2.I Please rate from I to 3 the importance of the following statements as they apply to the teaching of geography

I is of little importance
2 is of average importance
3 is very important

		ITEM
(a)	To assess the pupil's understanding of the subject	2I
(b)	To measure the pupil's progress in the subject	22
(c)	To assess the pupil's aptitude for the subject	23
(d)	To assess the pupil's potential for tertiary education	24
(e)	To gain a better insight into the pupil's personality	25
(f)	To establish a better rapport with the pupils	26
(g)	To motivate the pupils towards a better attitude to the subject	27
(h)	To spend more time with individual pupils	28
(i)	To link the theoretical aspects of the subject to the 'real world' situation	29
(j)	To deal more effectively with problematic areas in the syllabus	30
(k)	To deal more effectively with mixed ability groups	3I
(l)	To prepare the pupil more effectively for examinations	32
(m)	To enhance the co-operation between the different subjects in the school	33

(Please check that the above all have a I-3 rating)

TABLE 5.13

RANKING OF VALUE OF IST TO THE TEACHING OF GEOGRAPHY

(According to mean)

Rank	Mean	% (Rating 3)	Item	IST is of value to the teacher as it enables the teacher to:
1	2,650	71	29	link theory to real world situations
2	2,388	54	24	assess pupils' potential for tertiary education
3	2,359	51	21	assess pupils' understanding of the subject
4	2,340	46	27	motivate the pupils in geography
5	2,301	41	23	assess pupils' aptitude for the subject
6	2,126	40	28	spend more time with individual pupils
7	2,087	34	31	deal more effectively with mixed ability groups
8	2,039	32	30	deal more effectively with problematic areas of the syllabus
9	1,913	23	33	enhance co-operation between different subjects in school
10	1,893	19	26	establish better rapport with pupils
11	1,864	21	22	measure pupils' progress in the subject
12	1,854	15	25	gain a better insight into pupils' personality
13	1,592	17	32	prepare the pupil more effectively for examinations

teachers who believe that IST is best suited to the more academically able pupil. This attitude also reveals much about the way IST is applied in schools, especially when linked to the extremely low support for the claim that IST is suitable for preparing the pupil for examinations (16,5%).

The five claims that received the least support revealed that IST is viewed neither as a means to develop an interdisciplinary approach to the teaching of geography nor as a means to measure pupils' development in terms of their social or personal growth.

The responses in the various subsets (Table 5.14), when analysed, revealed few significant differences with regard to the way teachers in the various subsets perceived the value of IST as a teaching strategy. The only significant variations in subsets were as follows:

(i) Teachers at girls' schools and boarding schools perceived IST as having more value as a means to measure progress than their colleagues at boys' schools and day schools.

(ii) Teachers at Afrikaans schools viewed IST more highly than their colleagues at English medium schools as a means to assess pupils' potential for tertiary education. In the analysis of the open-ended section, which follows, a number of Afrikaans teachers commented that IST is better suited to the academically able pupil, which highlights the general attitude reflected in this section.

While not statistically significant, single sex schools differed most from the general responses in terms of their perceptions of IST as a strategy which will enable the teacher to develop an interest in the subject and to get to know the pupils. There is also a difference in the general perception between girls' schools and boys' schools in areas such as the value of IST as a means to:

(i) prepare pupils for examinations;

(ii) enhance co-operation between disciplines;

(iii) deal effectively with problematic areas of the syllabus;

TABLE 5.14

VALUE OF IST TO THE TEACHING OF GEOGRAPHY

GROUP AND SUBSETS (Expressed as percentages according to 3 rating)

Rank	IST enables teacher to:	Total	City schools	Other schools	Boys' schools	Girls' schools	Co-ed. schools	Eng. medium	Afr. medium	Dual medium	Day schools	Boarding schools
	N =	103	50	53	11	10	82	38	37	28	42	61
1	link theory to real world	71	72	70	64	40	69	74	65	75	67	24
2	assess potential for tertiary education	54	54	55	49	50	54	45	62	57	50	53
3	assess pupils' understanding of subject	51	57	44	36	60	41	45	41	61	48	51
4	motivates in geog.	46	42	49	36	30	49	34	49	57	35	52
5	assess aptitude for geog.	41	40	42	30	50	40	37	38	50	38	43
6	spend more time with individual pupils	40	32	54	27	20	43	26	51	43	31	48
7	deal effectively with mixed ability groups	34	32	36	27	20	30	45	32	21	33	37
8	deal effectively with problematic areas of syllabus	32	26	38	46	20	31	26	30	43	26	36
9	enhance co-op. between disciplines	23	20	16	9	30	23	30	19	18	21	23
10	establish better rapport with pupils	19	22	17	0	0	27	13	13	24	21	18
11	measure pupil progress in subject	21	16	26	9	60	18	13	24	28	7	31
12	gain insight into pupils' personality	15	33	21	9	8	21	13	24	18	12	23
13	prepare pupils' for examinations	17	8	26	9	20	17	8	19	25	7	23

(Listed according to mean ranking)

(iv) to assess the pupils' attitude for geography and with regard to the ability of IST to be of use to link geographical theory to the real world.

5.3.2.4 IST perceived as a means to enhance geography

The final question in the section of the questionnaire devoted to teacher attitudes regarding IST as a teaching strategy, examined teacher perceptions of this approach as a means to enhance the subject (Table 5.I5). The eight claims centred in question 6.3.I therefore focused on:

(i) the use of IST as a means to develop the pupils' interest in the subject, to improve their attitude to geography and to increase the popularity of the subject;

(ii) the value of this approach as a means to focus on central issues in the geography curriculum and to develop better teaching and learning techniques;

(iii) the value of IST as a means to enhance the status of the subject and to create a wider awareness of geography as a discipline.

The responses to this question (Table 5.I6) indicate that teachers have a poor perception of IST as a means to enhance the subject. Only one claim in this section, i.e. that IST develops a wider interest in geography, received the support of more than 50% of the respondents, with the remaining seven claims receiving an average of 23% support from teachers. The particularly low response to question 6.3.I highlights the actual value of IST in relation to its formal value with regard to teaching practice. Any teaching strategy, if it is to be considered as an 'essential and integral' part of the subject, ought to result in an increased perception of the intrinsic value of the subject.

The discrepancy between the theory and practice of IST is further highlighted by the apparent contradiction in the 52,4% response to the claim that IST is able to create a wider interest in the subject and the I3,6% support for IST as a means to increase the popularity of the subject.

TABLE 5.15

IST AS A MEANS TO ENHANCE GEOGRAPHY

Q. 6.3.1 Please rate from 1 to 3 the importance of the following statements as they apply to geography

1 is of little importance

2 is of average importance

3 is very important

		ITEM
(a)	increases the 'popularity' of the subject	34
(b)	develops a wider interest in the subject	35
(c)	creates a greater awareness of the central issues within a subject	36
(d)	improves the pupil's attitude to the subject	37
(e)	develops better learning techniques within the subject	38
(f)	improves the teaching of the subject	39
(g)	enhances the status of the subject	40
(h)	gives the community an opportunity to develop an awareness of the subject	41

TABLE 5.16

RANKING OF THE VALUE OF IST AS A MEANS TO ENHANCE GEOGRAPHY

(According to mean)

Rank	Mean	% (Rated 3)	Item	IST enhances geography as it:
1	2,500	52	35	develops a wider interest in the subject
2	2,118	32	36	creates a greater awareness of central issues
3	2,088	25	37	improves pupils' attitudes to the subject
4	2,078	29	39	improves teaching of the subject
5	1,951	27	38	develops better learning techniques
6	1,921	23	41	gives the community an opportunity to develop an awareness of geography
7	1,853	20	40	enhances the status of the subject
8	1,686	14	34	increases the popularity of the subject

The analysis of the responses in the various subsets once again revealed no significant differences in perceptions, with the exception that teachers at Afrikaans medium schools supported the claim that IST could increase the popularity of the subject somewhat more than their colleagues in English medium schools (Table 5.17).

The following analysis of the open-ended section to questions 6.1 to 6.3 gives further insight into the way teachers perceive the value of IST as a teaching strategy and the sort of practice that is likely to result from such views.

TABLE 5.17

IST AS A MEANS TO ENHANCE GEOGRAPHY

GROUP AND SUBSETS (Expressed as percentages)

Rank	IST is a way to:		Total	City schools	Other schools	Boys' schools	Girls' schools	Co-ed schools	Eng. medium	Afr. medium	Dual medium	Day schools	Boarding schools
		N =	103	50	53	11	10	82	38	37	28	42	61
1	develop a wider interest in geography		52	50	55	48	80	47	50	51	57	50	54
2	create a greater awareness of central issues		32	38	26	36	50	30	36	35	21	29	34
3	improve pupils' attitudes to geography		25	26	25	9	10	30	23	30	29	29	21
4	improve teaching of geography		29	26	32	18	10	33	18	41	29	24	33
5	develop better learning techniques		27	20	34	18	29	29	13	35	36	21	31
6	develop community awareness of geography		23	16	30	9	40	23	18	16	39	14	30
7	enhance status of geography		20	16	25	18	20	21	11	27	25	17	33
8	increase popularity of geography		14	14	14	0	0	17	3	27	11	12	15

(Listed according to ranking)

5.3.2.5 Teacher attitudes to IST: analysis of the open-ended questions in items 6.1 to 6.3 concerning attitudes to IST as a teaching strategy

Each of the subsections to the above questions were answered by an average of 25 respondents (24% of the survey group). Despite the fairly low response to these questions, the comments give an interesting insight into how individual teachers perceive and apply IST. The comments can broadly be divided between those teachers who, while in favour of IST, view it in relation to the requirements of earlier syllabuses rather than in the light of present theory, and those teachers who, although in the minority, do alleviate the picture of IST that is presented in the previous set of results for questions 6.l to 6.3.

Of the teachers answering these sections, 28% emphasised the use of IST as a means to cover the 'easier' aspects of the syllabus, particularly in the higher standards. One teacher expressed it thus: "IST helps you to cover the syllabus, i.e. the easier parts of the syllabus can be given to the pupils as independent study topics. This relieves some of the pressure from the teacher and gives him/her more time to deal with the more important issues." This sentiment was echoed by teachers who wrote, "gee mens kans om die makliker gedeeltes, van veral die Std lO syllabus af te handel," and, "Dit help deurdat ek meer ontspanne is en meer tyd het om deeglik op die moeilike werk te kan konsentreer."

This section of the questionnaire revealed that 30% of the respondents viewed IST as best suited to the pupil who is either academically able or who will proceed to tertiary education. Teachers also linked IST to techniques that they believed to be beyond the scope of either the syllabus or their own area of expertise. This was highlighted by the following comment from a teacher: "In senior standarde (9 en lO) kan dit slegs vir diegene wat beoog om na universiteit te gaan, voorberei om tot 'n mate te kan aanpas by die aanbreidings metodes daar. Bostaande vaardighede kan slegs by leerlinge gekweek word d.m.v. navorsingsmetodes kursus, andersins sal hulle dit nie alleen kan aankweek nie en ons as leerkragte het nie tyd daarvoor nie ". Other teachers also saw IST as only worthwhile if the pupil is highly motivated.

Comments such as these were echoed by a number of teachers who did not see the techniques related to IST as being a part of geography or the imparting of these techniques as a part of their role as geography teachers.

Views such as this, however, were contrasted by teachers who perceived IST as an ideal approach to use with mixed ability groups. One teacher clearly expressed it thus: "If properly organised, it caters for all ability levels - that vital enjoyment which is often stretched beyond the reach of the less gifted ". Other teachers supported IST as an area where the weaker pupil could achieve through "...an assignment mark not based on learning but rather on presentation and effort for the weaker pupil, who has a desire to achieve but cannot achieve in an exam," and by giving the weaker pupils "who are better able to express themselves in the making of, say, a 3D model, a chance to gain satisfaction ".

Of the respondents in this section, 35% identified fieldwork as part of IST and emphasised it as being an ideal way to relate the theory to real world situations, thereby bringing "pupils closer to geographical reality" and "giving them a clearer understanding of what they (geomorphological forms) look like and what they are." While many of these comments stressed observation and recording, there were teachers who saw IST as having a wider application, that could benefit the teacher, the pupil and ultimately the subject. For one teacher IST was a "means to develop the scientific method of investigation ". While another teacher interpreted IST even more widely: "Self-studie bring groter helderheid, bevorder insien van verbande, konsolideering van materiaal, ontwerp van nuwe didaktiese tegnieke en klassifiseerings wat bevorderlik vir onderwys kan wees ".The breadth of this perception of IST and that of the following, reveals that while generally negative perceptions to IST tend to be highlighted by the analysis of the majority of responses, there are a number of teachers who view IST as valuable and as an essential part of a geography curriculum, which is interpreted in terms of the preamble as well as the content. Thus, IST for this teacher would "develop general interest in the subject, so that pupils have a broader vision, by understanding what geography aims to achieve the pupils will make my task easier ".

It was also noteworthy that 20% of the respondents in this section envisaged IST as being more than a written report, but looked at the development of models and peer-group teaching, which was described in the following way: "Deur kort opdraggies wat leerlinge dwing om werk voor te berei voordat dit in die klas behandel word. Hulle kan by geleentheid self die klas aanspreek. Die opdraggie moet egter 'n verskeidenheid dek en nie net een lang vraag wees nie." For other teachers IST could "provide teachers with models, audio visuals and data for teaching," by involving pupils in activities which included the presentation of such resources.

It was noteworthy too that l5% of the respondents in this section stressed the value of IST in developing cross-curricular or integrated studies. Three teachers also saw this as leading to greater environmental awareness. One teacher also saw the value of mentors in this respect, saying, "Through IST it is possible to make contact with relevant authorities enabling a better understanding of political issues facing environmental awareness and conservation." Such studies lead also to greater awareness and by using experts in a wide variety of fields, teachers and pupils are exposed to a wide skill-base as well as a broader interpretation of the facts." One teacher described this as a way in which teachers and pupils could explore areas of common interest creating a far more exciting teaching milieu. This approach and its ultimate value was well expressed by the teacher who said that IST is "an extremely useful tool to foster integration and the setting of more lively and challenging examination papers. If properly organised it helps to give life to the subject and opens awareness for more effective teaching."

Teachers also stressed the value of IST in forging better group interaction and better teacher-pupil relationships, giving teachers the opportunity to devote more time to individual pupils, which could mean that "the teacher can disseminate some of his enthusiasm for the subject with the pupils gaining some insight into the teacher's personality and interests ".

IST, therefore, would seem to have value in not only providing the teachers with a better understanding of the pupil, but as a means for the pupil to come to know the teacher better. This, according to one respondent, would lead to "mutual respect," so fostering better teaching and learning techniques.

The positive perceptions revealed in the open-ended sections of questions 6.l to 6.3, although reflecting the opinions of a small minority within the survey population, are an indication that IST is being interpreted and applied as a learner-centred approach in some schools. Where this approach has been applied it has led to the positive benefits described by teachers in this section.

The final sections of the questionnaire were related to specific teaching practice in the application of IST and the problems that teachers encountered in the organisation and administration of the IST programme.

5.3.3 THE ORGANISATION AND MANAGEMENT OF IST

This part of the questionnaire concentrated on five aspects related to specific teacher practice regarding the organisation and management of IST in schools. Question 7.l examined the frequency with which such topics are set. Question 7.2 was concerned with teachers' perceptions related to the role of pupils and teachers regarding the choice and number of topics set in the IST programme, while question 7.3 related to the length of such topics. Question 7.4 examined teachers' responses to the value of IST within particular standards of the high school phase, with question 7.5 being concerned with the time allocated to IST in the school programme.

Since the revised syllabus recommends that:

> Pupils should undertake short independent study topics throughout the year on work related to the requirements of the syllabus,

the researcher wished to assess how actual teacher practice related to the formal recommendations.

5.3.3.l The frequency with which IST should be set

Table 5.l8 reveals that except for a small percentage of schools, IST is not perceived as being part of an organised programme of learner-centred activities.

The analysis of the subsets (Table 5.l8) shows no significant differences from the general responses. Girls' schools, however, tended to respond more strongly to the doing of IST whenever "the subject matter lends itself", than their colleagues at boys' schools or at co-educational schools, who opted for the "once or twice" a year format.

TABLE 5.18

FREQUENCY WITH WHICH IST SHOULD BE SET

GROUP AND SUBSET

7.1 How often do your pupils do independent study topics

EITHER (a) once or twice a year?

OR (b) as often as the subject matter lends itself to independent study topics?

OR (c) within each unit of the syllabus as it is taught?

(Please tick one block only)

RESULTS (expressed as percentages)

	Total	City schools	Other schools	Boys' schools	Girls' schools	Co-ed schools	Eng. medium	Afr. medium	Dual medium	Day schools	Boarding schools
N =	103	50	53	11	10	82	38	37	28	42	61
(a) once or twice a year	51	44	57	55	30	52	44	49	57	52	49
(b) whenever the subject matter lends itself	43	48	38	36	70	42	53	43	36	41	46
(c) within each unit taught	6	8	5	9	0	6	3	8	7	7	5

A later analysis of teachers' perceptions of the areas of the syllabus most suited to the setting of IST shows, however, that there are in fact four areas only which are supported by the majority of teachers in girls' schools, with three or fewer areas supported by more than 75% of the rest of the respondents. Therefore, the figures related to those teachers who supported the claim, "whenever the subject matter lends itself to IST," could perhaps give a distorted picture of the frequency with which IST topics are set in schools.

5.3.3.2 Organisation of choice of topics in IST

Question 7.2 was intended to give some indication of the degree of freedom pupils have regarding topic choice in the IST programme, as well as the extent to which pupils are able to decide on the number of topics they are to do. This section will also give an indication of whether teachers see their role as primarily that of an instructor or whether they see their role as being that of a facilitator.

The results (Table 5.19) reveal the following:

(i) that 45% of the respondents believed that all pupils ought to be required to do the same number of topics within the same framework, but that the range of topics in this framework should allow for individual interests and abilities; with

(ii) 28% of teachers believing that all pupils must do a set number of topics a year, but that the topic choice should be left to the pupils, guided by the teacher;

(iii) another 15% of teachers believed that the number and choice of topics ought to depend on the individual pupil, taking into account each pupil's interests and abilities; while

(iv) 11% of the respondents felt that all pupils must do a set number of topics each year with all pupils doing the same topic.

Once again, there were no significant differences between the perceptions of the various subsets and the general responses.

TABLE 5.19

ORGANISATION OF TOPICS IN IST (CHOICE OF TOPICS)

Q. 7.2 Do you believe that:

EITHER (a) all pupils must do a set number of independent study topics each year where each pupil does the same topic

OR (b) all pupils must do a set number of independent study topics each year BUT that the topic choice be left to the pupil, guided by the teacher

OR (c) all pupils must do a set number of independent study topics each year within the same framework or area, BUT that the range of topics within this framework allow for individual interests and abilities

OR (d) the number and choice of independent study topics must depend on the individual pupil, taking into account each pupil's interests and abilities

(Please tick one block only)

RESULTS (expressed as percentages)

	Total	City schools	Other schools	Boys' schools	Girls' schools	Co-ed. schools	Eng. medium	Afr. medium	Dual medium	Day school	Boarding school
N =	103	50	53	11	10	82	38	37	28	42	61
(a) set number and same topic	11	9	12	9	10	11	8	8	18	10	12
(b) set number but free choice	28	38	19	18	20	32	24	38	22	31	26
(c) set number, choice within area of study	45	44	46	64	60	40	50	40	44	35	51
(d) free choice, no set number	16	9	22	9	10	17	18	14	15	24	11

These results, therefore, indicate that while teachers tend to believe that all pupils should do the same number of topics each year, few teachers control topic choice rigidly. Pupil freedom in this regard is, however, more likely to be contained within a range of topics in a general framework. This also indicates that, with the exception of a few teachers, the teacher's role is perceived as that of an instructor rather than as a facilitator.

5.3.3.3 **Length of topics set for IST**

Question 7.3 assessed the degree of flexibility that is likely with regard to the length of the topics set and pupils' roles in the decision making related to this aspect of IST.

The results of this section (Table 5.20) revealed that:

(i) 68% of teachers supported the idea that some topics should be a set length, with greater flexibility given to others;

(ii) 24% of the respondents felt that no limits should be set on the length of the completed work, with each pupil being free to choose how much time he/she wished to spend on the topic.

(iii) 8% of the teachers believed that the completed work should be the same length for every pupil in the standard.

An analysis of the subsets, while revealing no significant differences in response from the whole survey population, did show that teachers at girls' schools favoured a set length of topic somewhat more than the other groups.

The number of topics and topic choice remains fairly tightly controlled. However, these results show that teachers accept a reasonable degree of flexibility with regard to the length of the completed work.

5.3.3.4 **Standards in which IST should be undertaken**

The Revised Syllabus recommends that IST be done throughout the secondary school standards. Question 7.4 looks at the way teachers respond to these recommendations.

TABLE 5.20

LENGTH OF TOPICS SET FOR IST

			ITEM
7.3	Do you believe that:		
EITHER	(a)	the completed piece of individual work should be the same length for each child in the standard	49
OR	(b)	no limites should be set on the length of the completed work, each pupil being free to choose how much time he/she wishes to spend on the topic	50
OR	(c)	topics should be so designed that some are a set length, whilst others are more flexible in this respect	51

(Please tick one block only)

RESULTS (expressed as percentages)

	Total	City schools	Other schools	Boys' schools	Girls' schools	Co-ed. schools	Eng. medium	Afr. medium	Dual medium	Day schools	Boarding schools
N =	103	50	53	11	10	82	38	37	28	42	61
(a) same length for each pupil	8	10	6	0	20	8	11	5	8	7	8
(b) no limits to length	24	25	23	18	10	25	26	27	17	38	15
(c) some set length, others flexible	68	65	71	82	70	67	63	68	75	55	77

The results of this section (Table 5.2l) indicated the following:

(i) 5l% of teachers believed that IST has most value if applied from Std 6 to Std 9, thereby omitting IST from the final year of the high school phase.

(ii) 3l% of teachers supported the view of IST being applied throughout the high school.

(iii) l2% of teachers saw IST as most valuable in the senior secondary phase.

(iv) 6% of teachers believed IST should only occur in the junior secondary phase.

5.3.3.5 Time allocated to IST

Question 7.5, the final question in this section of the questionnaire, assessed how teachers saw IST with regard to the time that is allocated during the school day for this aspect of the curriculum (Table 5.22).

The results showed that 93% of teachers accepted that IST should be done in school time as well as being a part of the pupils' 'homework'. The remaining 7% of teachers saw IST as falling completely in the realm of 'homework'.

In this section, too, the analysis of the subsets revealed no significant differences when compared to the general responses.

The general analysis of teachers' perceptions related to the organisation and management of IST reveals that few teachers follow the recommendations of the revised syllabus. Teacher practice in this respect is generally related to the following:

(i) At most schools pupils are set IST topics once or twice a year.

(ii) Few schools give pupils absolute freedom in the choice of the topics, their length or the number of 'assignments' they have to complete in a year.

TABLE 5.21

STANDARDS IN WHICH IST SHOULD BE UNDERTAKEN

7.4 Do you believe that independent study topics are most valuable when done:

EITHER (a) at junior secondary level, i.e. Std 6 and 7

OR (b) at senior secondary level, i.e. Std 8 to 10

OR (c) throughout the high school

OR (d) throughout the high school BUT excluding Std 10

(Please tick one block only)

RESULTS (expressed as percentages)

		Total	City schools	Other schools	Boys' schools	Girls' schools	Co-ed. schools	Eng. medium	Afr. medium	Dual medium	Day schools	Boarding schools
	N =	103	50	53	11	10	82	38	37	28	42	61
(a)	junior secondary level	6	2	9	0	0	7	7	8	7	5	7
(b)	senior secondary level	12	14	9	9	10	14	8	10	17	14	10
(c)	throughout the high school	31	28	34	37	30	31	40	22	30	33	30
(d)	throughout high school except Std 10	51	34	48	54	60	48	45	60	46	48	53

TABLE 5.22

TIME ALLOCATED TO IST

7.5 Do you believe that independent study topics should be done:

EITHER (a) in class time

OR (b) only as 'homework'

OR (c) partly in class and partly as 'homework'

(Please tick one block only)

RESULTS (expressed as percentages)

	N =	103	50	53	11	10	82	38	37	28	42	61
(a)	class time	0	0	0	0	0	0	0	0	0	0	0
(b)	only as 'homework'	7	4	9	0	0	8	5	7	7	7	7
(c)	partly in class time, partly as homework	93	96	91	100	100	92	95	93	93	93	93

(iii) Teachers generally perceive their role in the development of IST as being that of an instructor rather than as a facilitator.

(iv) Only one-third of the survey population supported the idea of IST throughout the school phase, therefore the majority of schools will insist on IST probably only up to Std 9.

5.3.4 ASSESSMENT OF IST

In this section of the questionnaire, question 8.l.l concentrated on the actual method of assessment, while question 8.l.2 ascertained how teachers used the assessment of IST in the rest of the mark structure of the subject. Question 8.2 tested teachers' responses to the idea of the inclusion of an IST assessment into the final senior certificate results.

The results of question 8.l.l (Table 5.23) show that 73% of teachers favour the assessment of IST by means of a numerical assessment as well as a written comment. Of the remaining respondents, 22% felt that all that was needed was some sort of numerical assessment, with l% of the teachers suggesting that only a written comment should be used. The other alternative that was suggested was assessment through peer-group evaluation and this was considered as applicable by 4% of the respondents.

These two sections revealed no statistically significant differences within the subsets. Therefore the majority of teachers assess IST by means of a numerical assesment, with a reasonably high percentage of teachers also including a written comment. The IST mark is also incorporated into some or other structure of the general assessment of the pupils, whether it is examination, term mark or as a part of the year mark. The most popular method was to use this assessment as a part of the pupils' final year mark.

The incorporation of the IST marks with the year mark is noteworthy in view of the response to question 8.2, which tested teachers' reactions to the concept of including the Std l0 IST assessment into the senior certificate results. Despite the support for the use of the IST assessment in the final year mark in other standards, 70% of the respondents rejected its inclusion in the Std l0 results (Table 5.24).

TABLE 5.23

METHOD AND CONTROL OF ASSESSMENT

GROUP AND SUBSETS (Expressed as percentages)

			Total	City schools	Other schools	Boys' schools	Girls' schools	Co-ed. schools	Eng. medium	Afr- medium	Dual medium	Day schools	Boarding schools
(i)	Method	N =	103	50	53	11	10	82	38	37	28	42	61
(a)	numerical mark only		8	6	9	0	0	10	9	14	0	10	7
(b)	symbol only		14	6	21	0	20	14	12	16	13	14	14
(c)	written comment only		1	0	2	0	0	1	0	0	4	2	0
(d)	numerical/symbol & comment		73	84	64	100	80	70	76	65	79	69	76
(e)	peer-group evaluation		4	4	4	0	0	5	3	5	4	5	3
(ii)	Control												
(a)	term marks only		4	3	6	0	0	5	8	0	0	7	2
(b)	for examination only		2	4	0	0	0	2	0	5	0	2	2
(c)	year mark only		56	62	55	54	60	56	58	54	63	58	56
(d)	year and term marks		29	28	28	46	30	28	34	27	30	27	32
(e)	none of the above		9	3	11	0	10	9	0	14	7	6	8

TABLE 5.24

INCORPORATION OF STD 10 IST MARK INTO FINAL EXAMINATION RESULTS

8.2 Do you believe that independent study topics in Std 10 should be marked internally by the teacher concerned, but moderated by an external examiner for inclusion into the Senior Certificate Examination?

(Please tick the appropriate block)

RESULTS (expressed as percentages)

		General	City schools	Other schools	Boys' schools	Girls' schools	Co-ed. schools	Eng. medium	Afr. medium	Dual medium	Day schools	Boarding schools
	N =	103	50	53	11	10	82	38	37	28	42	61
(a)	Yes	16	16	15	4	5	22	14	11	6	15	16

5.3.5 PROBLEMS ENCOUNTERED IN APPLYING IST

The problems that teachers encounter in the application of IST will influence the organisation and management of this approach in schools. The variety of problems and their perceived importance will directly affect the success of the IST programme in schools. This section of the questionnaire, therefore, attempted to isolate these problems and to assess the extent of their importance.

The diversity of the IST programme also depends on how teachers perceive the various areas of the syllabus with regard to their suitability for IST. Therefore, this section of the questionnaire attempted to formulate a picture of how teachers view the various sections of the syllabus in this respect.

Question 9.I required teachers to rate the areas of the syllabus with regard to their perceived suitability for IST. Question I0.I isolated problems that teachers are likely to encounter in schools, while question I0.I.2 gave respondents an opportunity to elaborate on problems that they personally encountered in applying IST.

5.3.5.I Syllabus components considered to be suitable for IST

The results (Table 5.25) are an indication not only of the diversity of topics that are likely to occur in the IST programme, but also the most commonly utilized areas for IST. It is also likely that these results reflect individual interests and areas of teacher expertise, a fact that was demonstrated in the analysis of the subsets (Table 5.26).

The following variations between the group total and the subsets were noteworthy when considering these results:

(i) In the comparison between girls' schools, boys' schools and co-educational schools, teachers at girls' schools indicated more support for a greater variety of areas than their colleagues at boys' schools and at co-educational schools. Teachers at co-educational schools supported climatology and rural geography more than their colleagues at single sex schools, while teachers at girls' schools saw South African topics, economic geography, developed and developing countries, African and population geography being

TABLE 5.25

RANKING OF SYLLABUS UNITS PERCEIVED AS MOST SUITABLE FOR IST

Rank	Mean	% (Rated 3)	Item	Suitability of units in syllabus for IST
1	2,725	77	15	Geomorphology
2	2,667	71	19	Urban Settlement Geography
3	2,588	62	14	Climate and Meteorology
4	2,545	59	17	Economic Geography
5	2,538	60	22	South Africa
6	2,416	56	18	Developed and Developing Countries and
7	2,382	49	20	Rural Settlement Geography
8	2,284	42	21	Population Geography
9	2,228	46	23	Regional Geography of Africa
10	2,216	46	16	Natural Regions
11	2,137	38	13	Map Reading and Interpretation
12	2,071	35	24	Geography Regions outside Africa

TABLE 5.26

SUITABILITY OF AREAS OF SYLLABUS FOR IST GROUP AND SUBSET ANALYSIS (Expressed as percentages)

Rank	Topic		Total	City schools	Other schools	Boys' schools	Girls' schools	Co-ed. schools	Eng. medium	Afr. medium	Dual medium	Day schools	Boarding schools
		N =	103	50	53	11	10	82	38	37	28	42	61
1	Geomorphology		77	72	81	73	90	75	76	76	79	71	80
2	Urban settlement		71	70	72	64	80	70	79	54	82	71	71
3	Climate & Meteorology		62	64	60	36	40	65	55	62	71	57	66
4	Economic		59	54	64	36	80	59	63	59	54	60	59
5	South African		60	60	60	36	60	63	53	62	68	64	57
6	Developed & developing countries		56	64	49	46	80	54	63	54	80	67	49
7	Rural settlement		49	38	58	36	40	57	45	46	57	41	54
8	Population		42	44	40	27	60	41	45	35	46	48	38
9	Regional in Africa		46	40	51	18	60	49	47	43	57	41	49
10	Natural regions		46	36	55	46	50	45	47	32	61	36	52
11	Mapwork		38	24	51	18	40	25	29	41	46	21	49
12	Regional outside Africa		35	30	46	18	30	37	32	30	31	36	34

Listed according to ranked order (3 rating) suitable for IST in contrast to their predominantly male colleagues. Teachers at boys' schools revealed the most limited view of the syllabus with regard to the suitability of IST topics. While it would therefore appear that boys are primarily set topics in IST related to geomorphology and urban geography, this could reflect a greater emphasis on fieldwork in boys' schools, with this aspect being stressed in the IST programme.

(ii) There were fewer differences in the comparison between metropolitan schools and the smaller centres. However, teachers at schools in the smaller centres gave more support to mapwork and economic geography as having potential for IST, than their colleagues in the metropolitan schools.

(iii) In the subset related to the different language groups, only two differences emerged. Afrikaans teachers supported mapwork more strongly than their English colleagues, while the teachers at English medium schools supported natural regions more strongly than their Afrikaans colleagues.

5.3.5.2 Problems encountered in the application of IST

The analysis of question l0.l (Table 5.27) revealed that more than 55% of the respondents considered time, both that of the pupils and the teacher, to be the most pressing problem related to the application of IST, with the length of the syllabus also seen to be a problem by 52% of the teachers. Lack of resources were identified as a major problem by 46% of the respondents. It was noteworthy that 43% of white teachers found the class sizes problem in applying IST, as in relation to pupil-teacher ratio in the other population groups, white teachers are considerably better off than their colleagues in black schools in particular. Examination constraints were identified as a major problem by one-third of the respondents. Few teachers viewed lack of teaching experience as a problem in the development of IST.

In the analysis of the subsets the lack of pupil motivation was seen as more of a problem by teachers in the metropolitan areas than their colleagues in the smaller centres. Teachers at girls' schools indicated that they perceived lack of resources as less of a problem than did their colleagues at other schools.

TABLE 5.27

PROBLEMS ENCOUNTERED IN THE APPLICATION OF IST
(Expressed as percentages)

	Total	City schools	Other schools	Boys' schools	Girls' schools	Co-ed. schools	Eng. medium	Afr. medium	Dual medium	Day schools	Boarding schools
N =	103	50	53	11	10	82	38	37	28	42	61
1 Limited pupils' time	61	56	66	36	70	63	55	62	68	57	64
2 Limited teachers' time	55	56	55	36	70	55	60	51	54	62	51
3 Length of syllabus in each standard	52	54	51	55	30	54	55	51	50	64	44
4 Lack of resources	45	44	45	27	60	46	52	46	32	48	43
5 Size of classes	43	50	36	18	30	44	50	38	39	19	16
6 Pupils' lack of motivation	31	42	21	18	10	35	47	32	7	52	36
7 Constraints of examination system	34	38	30	46	50	35	47	24	29	48	52
8 Lack of previous teacher experience	28	32	25	9	30	30	34	27	21	38	21
9 Diverse abilities of pupils	23	32	15	9	20	25	34	22	11	26	23

Listed according to ranking of most problematic areas

Pupil motivation was seen to be more of a problem by English medium schools than by Afrikaans medium schools.

The final part of this section (question 10.2) gave teachers the opportunity to enlarge on problem areas they had encountered in the application of IST. The following emerged from this section:

(i) The area that received the greatest degree of comment was that of parental help given to pupils in the completion of their assignments. Another problem was seen to be that of pupils copying directly from the printed material.

(ii) Noteworthy too were comments relating to fieldwork as a problem both in view of the time and costs involved and because of rigid timetables which make the planning of fieldwork excursions frustrating.

(iii) The need to find and develop topics which are 'suitable' was identified as a further problem by teachers.

(iv) 78% of the respondents in this section expressed their frustration at lack of pupil-motivation and the effort that is needed to ensure that not only are deadlines met, but to obtain 'neat' work from the pupils.

(v) Teachers complained that the senior certificate geography examination does not take this aspect of the syllabus into account, thereby reducing the value of IST in the perceptions of pupils as it has no bearing on the examination.

5.4 SURVEY RESULTS: THE IMPLICATIONS FOR IST

The results of the three-phase survey, conducted one year after the implementation of the 1985 Revised Geography Syllabus in Cape Education Department schools are a reflection of how teachers interpreted and reacted to a newly introduced approach to learner-centred tasks. The conceptual analysis of IST (chapter two) and the analysis of the theoretical framework upon which the syllabus is based (chapter three) revealed that the term

"Independent Study Topics" cannot be equated with the previously used 'assignments' which appeared in the 1973 syllabus, nor can the approach to IST be the same as that suggested for the two compulsory assignments which pupils had to complete each year in terms of the 1973 syllabus.

There was little evidence that teachers interpreted IST, as Mr Diepeveen, when interviewed, indicated it was intended to be perceived, that is as a 'blanket term' which covers any activities in which the pupils are actively engaged. Teachers in 1986 generally viewed IST whether as an 'assignment', a 'report' or a 'theme', giving no indication that IST should be part of an ongoing learner-centred programme within the geography curriculum.

The analysis of the interviews, panel discussion and questionnaires would seem to indicate that this survey was essentially a reflection of teachers' attitudes to assignments and themes rather than to IST. That this interpretation of IST bears little resemblance to the learner-centred approach identified in chapters two and three is evident from the results. These results were, moreover, a reflection not only of the misconceptions held in terms of IST, but of assignments and themes as learner-centred approaches.

Thus:

(i) While there was a general belief that learner-centred activities have an important or even essential role to play in a geography programme, there was a considerable discrepancy between this view and the perceived value of these activities. The questionnaire analysis revealed that IST was neither regarded as being of great importance in the development of high order skills nor were these activities seen as able to contribute significantly to the pupils' social and personal development. The general impression left by the analysis of teachers' perceptions of the value of IST in terms of the benefits to the pupils was that there was very little consensus of opinion about the purpose of such activities. This was further highlighted by the poor perception of IST as a teaching strategy which could either improve teaching practice or develop pupils' enjoyment of the subject.

The analysis of the various subsets in the questionnaire revealed very few significant variations within the different groups. This would seem to reinforce the fact that IST are not only largely teacher-directed, but that this aspect of geographical education is not perceived as a means to cater for the needs of the school community, the socio-economic background of the pupils or the expectations of the wider community. Although not statistically significant, the only noticeable variation in terms of the value of IST was within single sex schools. Teachers at boys' schools, while generally rating these activities as essential, revealed the lowest regard for their value. Teachers at girls' schools, however, tended to rate IST somewhat higher than their colleagues at boys' schools or at co-educational schools.

The many anomalies which the questionnaire results revealed was an indication of the general lack of uniformity of perception of the role played by learner-centred activity in the development of skills, values and attitudes and perceptual awareness. There was also no consensus as to the way in which these activities could be used to measure pupils' social, formal or academic development. A more serious aspect which emerged from the discrepancies in the questionnaire, as well as from the interviews and panel discussion, was the general lack of understanding about skills in general. There appeared to be confusion as to what skills ought to be developed, the nature of these skills and how to develop them.

The analysis of the open-ended section of the questionnaire relating to the value of IST, although a reflection of only 24% of the sample population, was particularly revealing. The views expressed by teachers ranged from antipathy towards IST to a view which closely coincided with the perception of IST which emerged in the analysis of chapters two and three.

The results of the analysis of teachers' perceptions of the value of IST as a learner-centred activity was an indication not so much of teachers' rejection of learner-centred approaches, but rather of a lack of understanding about such approaches. There appeared to be little understanding of the theoretical framework within which such activities are situated; nor was there evidence of a general understanding of the strategies related to the design and development of these activities.

(ii) An analysis of the organisation and management of IST in schools further underlined the misconceptions held in terms of the purpose of IST and emphasised the general perception of IST as 'assignments' or 'themes'. These tasks are, moreover, structured and controlled by the teacher, with pupils having little freedom in terms of their choice of the study area, the design or development of the tasks.

The method of assessment and the control of the 'marks' for these tasks revealed that they continue to be managed in terms of the 1973 syllabus. The compulsory nature of the assignments and themes in this syllabus and the inclusion of the results in the pupils' year mark led to their moderation by the then circuit inspectors. (This practice is still in operation on the Border.) Teachers revealed that this system places an added burden on the teacher as it becomes a struggle to ensure that the pupils' work is 'neat' and 'presentable' for the inspector's scrutiny. Thus, the educational value of the work becomes of less importance than the 'cosmetic effect' (Marsden, 1976). This may partly explain the somewhat ambivalent attitude teachers have towards tasks of this nature. Teachers interviewed stressed that because of the practice in some circuits of not returning the tasks to the pupils until they had been moderated, or of not returning the tasks to the pupils at all, for fear of their being circulated the following year, pupils' perceptions of these tasks were largely negative. Practices such as the above were revealed by teachers to increase their workload as much of their energy was spent in coercing the pupils. This emerged in the questionnaire as well as in the panel discussion. More serious, however, is that the control and management of IST in this way prevents adequate feedback and the educational value of these activities is reduced. Without the necessary feedback, the pupils are not likely to make any significant progress and nor are teachers able to identify progress which has been made within a year.

(iii) Teachers' frustration with the administration of tasks within the system in operation in 1986 was highlighted in the open-ended questions to the sections on the value of IST and the problems encountered in applying IST. The administration of these tasks was perceived to be unnecessarily time consuming in view of the fact that they were perceived to have little value by either the teachers or the pupils.

The survey results therefore revealed the following trends regarding the nature of IST, their organisation and their implementation:

(i) These activities are largely structured and controlled by the teacher, who determines when they will be completed, the area of study within which they are developed, the length of the tasks and the final form in which they are presented.

(ii) Assignments and themes are likely to be related to tasks set in the geomorphology, urban settlement, climatology, economic geography and South African components of the syllabus.

(iii) While IST may be related to fieldwork, these tasks will largely be associated with the gathering of information rather than with the analysis, synthesis or evaluation of the data.

(iv) Information gathering also characterises the tasks related to 'library research', pupils' use of printed material is likely to be primarily note-taking rather than related to a critical evaluation of the material they use.

(v) A number of IST are related to self-study areas within the syllabus, which teachers identify as 'easy enough' for the pupils to do on their own, leaving the teacher free to concentrate on the more 'difficult' parts of the syllabus.

(vi) IST are related directly to the syllabus and there will be little attempt to adopt an integrated approach to the design and development of these tasks.

(vii) The teacher's role is that of an instructor rather than a facilitator, therefore there are few opportunities to observe the pupils' personal and social development.

(viii) The end product is generally a written report which is easy to administer and to control and provides tangible evidence of the completed work for the 'inspector's' scrutiny.

(ix) The use and development of audio-visual material is rare in such activities and illustrations are likely to be confined to copied maps, sketches and presentation of data collected in the field or obtained from the printed material.

The perceptions of IST held in 1986 and the consequent organisation and administration of these activities help to explain why teachers did not view IST as a valuable learner-centred approach and why it was not regarded as an essential part of the geography programme. The views expressed in this survey reveal that it would not be incorrect to assume that at the time of the survey the teachers had neither analysed nor understood the implications of the preamble to the Revised syllabus of 1985. The poor perceptions that teachers revealed of IST in this survey reduced the possibility of there having been much development in IST over the past four years, unless individual centres have conducted in-service courses through local teachers' centres to develop skills in this and other learner-centred approaches. The 1993 Draft Core Syllabus is structured in much the same way as the 1985 syllabus and appears to be even more prescriptive in relation to the content detail than the 1985 syllabus. Therefore, unless teachers analyse and apply the principles contained in the preamble of the new syllabus it is unlikely that IST will develop beyond the 'assignment' or 'theme'.

The generally poor perception of IST and the way in which it is consequently administered may be ascribed to the following factors:

(i) A lack of understanding of the basic skills, values and attitudes which ought to be developed through geography.

(ii) A poorly developed conceptualisation of learner-centred activities with regard to their specific functions and the techniques necessary for their application.

(iii) The perceived syllabus and examination constraints.

(iv) The problem of time, as many teachers are required to expend a great deal of their energy on extra-mural programmes.

(v) The system of control which still exists in a number of circuits, which results in the function of IST being perceived as a means to satisfy the external moderator.

(vi) The poor status of these activities in terms of the final senior certificate examination.

(vii) The dichotomy (chapter three) which exists between the preamble of both syllabuses and the detailed content as well as the lack of concrete guidance given to teachers in terms of the design, development and implementation of these and other learner-centred activities.

CHAPTER SIX

A FOUNDATION FOR CHANGE: BACKGROUND TO THE DEVELOPMENT OF THE IST PROGRAMME

Classroom research into the development of an IST programme was conducted in a formal sense from 1986 to the end of 1989. This study must, however, be seen against the backdrop of the existing structure of pupil-centred activities in the school at which the researcher was geography subject head from 1973 to 1989.

Research into the changes that have taken place in South African school geography over the past decade and a half has revealed that changes in syllabus content have been relatively successfully effected. The same research has, however, underlined the fact that changes in syllabus content do not necessarily bring about changes in teaching approaches (Ledger, 1977; van der Merwe, 1982; Levy, 1984; Ballantyne, 1986). The dynamics of change in a school situation are such that the only certainty about change is that it rarely occurs in quantum leaps or in a vacuum, but is more likely to be the result of a slow and often complex process.

This chapter examines the fabric of change which provided the framework for the development of an IST programme in geography at a particular school. Accordingly, consideration is given to the following:

1 the school milieu which provided the environment in which the change took place;

2 the tradition of pupil-centred activities which formed the centre of interest in which the change was located;

3 the factors which precipitated the change;

4 the processes of change which led towards the development of the IST programme.

6.I THE SCHOOL ENVIRONMENT

The direction and degree of change, even if confined to one department or subject, is determined by the school community, the school's structure and the ethos of the school. The following factors within the school framework were pertinent to the evolution of learner-centred activities leading to the development of an IST programme for this school.

(i) Located in East London, the school is not affected by zoning regulations and as an all girls' school, the pupils are drawn from a wide cross-section of the population based on the parents' preference for single-sex schools. As the school has boarding facilities, the pupils are drawn from a hinterland which includes the surrounding farming communities, Transkei and Ciskei. The pupils therefore come from a wide variety of socio-economic backgrounds which increases the diversity of experiences upon which to base a learning programme.

(ii) Subject departments, led by a subject head, are an important feature of the school structure. The subject head is responsible for the development of her particular subject area and as such is both directly answerable to the headmistress and has direct access to her. Teachers within the various departments seldom teach one subject exclusively and the composition of the various departments varies according to the subjects offered by the staff and the time-table requirements.

(iii) The school is traditionally feminine rather than feminist. Academic achievement is, however, emphasised and the school has a reputation for excellent academic results. While sport is considered to be important, it is seen as only one part of the extra-mural programme. Therefore, sufficient time and funds are available for a varied cultural and enrichment programme.

The factors mentioned above had a number of positive implications for the development of learner-centred activities at the school.

(i) The diversity of interests and experiences among the pupils emphasised the need for a varied and individualised programme of activities. The differing socio-economic backgrounds of the pupils provided a wealth of human resources which could be utilized in the development of a learner-centred programme, while the extensive hinterland from which the pupils were drawn extended the environment in which activities could be developed; all of which provided an expanded framework of relevance in terms of the structuring of activities.

(ii) The relative autonomy within the subject departments created the possibility for subject development, which was largely dependent on the subject head and the teachers with whom she worked. The direct link between the subject head and the headmistress created an uncluttered channel of communication which considerably reduced the sorts of frustrations which frequently stifle development and initiative.

(iii) The academic emphasis and the balance which exists between the sport and cultural programmes provided staff with a modicum of freedom to develop their own spheres of interest and encouraged the development of projects which were viewed as academically and educationally worthwhile.

It must, however, be emphasised that the framework identified above was neither immediately apparent, nor did it function as a coherent unit. It took time to identify the various strands and to weave them together.

Getting to know the school community both in terms of the interests of the pupils and with respect to identifying the available resources among the parent body, occurred over a period of years. Recognising the human resources and learning how to utilize them developed gradually as the learner-centred activities evolved.

No school is likely to give a teacher carté blanche to institute wide ranging changes without that teacher first having established his or her credentials. Therefore, before the researcher was given the necessary freedom to develop a programme as extensive as that described in chapter eight, the value of learner-centred activities had to be proven; particularly with respect to fieldwork. The range of activities that were ultimately developed for IST could also not have happened without a fairly extensive resource-base of printed material, audio-visual software and the necessary hardware, such as cameras, slide-tape projectors and television equipment. A resource-base such as this had been gradually built up as the geography department at the school had expanded and developed. Therefore, problems which the survey revealed with regard to accessibility of audio-visual equipment did not exist at the school. Although equipment was not initially collected with a view to using it in a learner-centred programme, when its potential was recognised, the material was there.

The particular sphere of interest of the researcher played an important role in determining the changing approach to learner-centred activities and was made possible by the cultural programme of the school. Thus, as a keen hiker and 'excursionist', the researcher frequently accompanied pupils on hikes or on school 'tours', which initially, although labelled 'educational', were either largely recreational or a way to get the pupils to see something of their own country. These early excursions were not field excursions as such and were not intended to be. As the researcher's interest and expertise in fieldwork developed, the potential of such excursions was recognised and their character changed. These extra-mural activities had a strong influence on the way in which learner-centred activities in geography evolved. An additional factor which changed the nature of these "Cook's Tour"-type excursions was the rapidly increasing cost of transport, which made extensive tours to places such as the Eastern Transvaal, Northern Cape, etc., far too expensive. Therefore, shorter excursions to areas which could be reached easily were undertaken. These weekend or long weekend trips of necessity became more focused in terms of their purpose and the activities which were designed for the pupils.

Therefore, while the necessary structure for change in terms of a learner-centred approach to geography existed, it took time to identify and to utilize the potential to bring about the necessary changes. The changes that occurred were resultantly not imposed either by the school hierarchy or by departmental regulations but were generated by a variety of circumstances within the geography department.

6.2 ACTIVITIES RELATED TO THE I973 GEOGRAPHY SYLLABUS

Learner-centred activities in geography prior to this study centred around 'assignments', fieldwork and practical work.

6.2.1 Assignments

Assignments were initially executed according to the 1973 syllabus regulations, with every geography pupil in the school producing the required number of assignments based on the suggested topics contained in the 1973 syllabus. The assignment 'product' was a written report, laboriously illustrated with traced maps or diagrams which had been meticulously coloured in, labelled and framed. Year after year the pupils were highly commended for their 'beautiful' work by the inspectors who moderated the pupils' work. These assignments, while 'cosmetically' exquisite and a great delight to the eye, had essentially no educational value as the text was, by and large, simply copied from a variety of books kept for that purpose in the school library. To maintain this 'high' standard, the teachers concerned with ensuring that the tasks were 'neat' and 'presentable', adopted a teaching approach more suited to the sportsfield than to the classroom, which appealed to the esprit de corps of the girls as their work was open to scrutiny by the inspectors. Year after year the pupils humoured their teachers in much the same way as the survey results revealed pupils to be doing in a number of the Cape Education Department schools.

6.2.2 Fieldwork

The increasing exposure of teachers to fieldwork techniques through the East London Teachers' Centre was largely instrumental in the development of field reports which gradually replaced one of the assignments which pupils were required to do. Unlike the earlier "Cook's Tour" excursions and weekend field excursions, fieldwork was built into the school programme as one school day each year was set aside for each standard from Std 6 to Std 10 for fieldwork at local sites.

Initially, fieldwork excursions were restricted to the smaller groups in the senior secondary classes, but as teachers became more confident and the potential of fieldwork was recognised, the Std 6 and Std 7 pupils were included. The inclusion of the younger pupils, however, meant that groups of between 130-140 pupils, supervised by their teachers, had to be catered for at one site.

Although the fieldwork sites for each standard differed, the actual purpose of the fieldwork was initially the same, whether being undertaken by Std 6 or

Std 10 pupils and was largely based on observation, recording and gathering of data, which formed the basis of the pupils' field reports. There was initially little emphasis on problem solving or hypothesis testing in the field. Fieldwork tended to be centred on physical geography in terms of geomorphology or on urban field studies. This appeared to be a fairly general trend in Cape Education Department schools in terms of the analysis of the 1986 survey.

6.2.3 Practical work

Practical work in the years following the introduction of the 1973 syllabus centred on the development of skills related to the interpretation of 1:50 000 topographical maps, aerial photographs and synoptic maps, and on the development of skills related to the construction and reading of a variety of graphs.

These skills were developed on an ad hoc basis and were directly related to the requirements of the senior certificate examinations, as relatively little guidance was given in the 1973 syllabus. Thus, as the various external examiners introduced different approaches relating to graphicacy, the techniques were added to the pupils' skill repertoire and were filtered down through the school.

6.3 FACTORS WHICH PRECIPITATED CHANGES IN THE APPROACHES TO LEARNER-CENTRED TASKS

The first changes to take place in the approaches to learner-centred activities in geography were related to the system of assignments for the following reasons:

(i) As topics set for the assignments tended to remain the same each year, there was a brisk trade in assignments as pupils either obtained previously completed tasks from their peers in higher standards or from friends or siblings attending other schools in the town.

(ii) The attempt to solve this fairly general problem by not returning the pupils' assignments until after they had been moderated by the inspectors reduced the already eroded motivation on the part of the pupils even further.

(iii) By the time the pupils received their marks for the moderated assignments, they were ready to begin their final examinations for the year and had little interest in the completed work, except as a means to boost their final result.

(iv) Feedback was therefore minimal and resultantly very few, if any, educational benefits occurred from these tasks.

(v) Educationally, a poor system deteriorated even further, with assignments no longer being returned to the pupils. For not only was there little worthwhile feedback, but as the assessment of the work was based on a single impression 'mark', this assessment was largely a reflection of the 'cosmetic effect' of the work (Marsden, l986).

(vi) A number of other reprehensible practices were encouraged by the assignment system, which included extensive parental help (mentioned in the survey results by a number of teachers), and the vandalising of library books as a number of teachers allowed 'pictures' to be used as illustrative material.

These problems notwithstanding, it was the total disillusionment of the teachers rather than of the pupils at the school, which brought about the first changes. For not only were these assignments of little educational value, the researcher and her colleagues were in agreement that the worst aspect of the assignments was that they were so tedious to administer and to assess.

The disillusionment and dissatisfaction with the assignment system was partly the reason for the increased emphasis on fieldwork at the school. Added to which, was the developing expertise among teachers in the use of fieldwork techniques. The more enthusiastic the teachers became about the one day field trips, the more highly motivated the pupils were. The field reports resultingly improved, revealing a greater focus and insight into the area studied. The success of the senior secondary fieldwork led to the development of field excursions for the younger pupils. The introduction of day field trips for the Std 6 and Std 7 pupils, however, imposed a number of problems related to the system of fieldwork hitherto used.

(i) As it was impossible to do 'in the field' teaching with these large groups, they therefore needed far better instructions and guidance than had previously been given to the older, smaller groups of girls.

(ii) These large groups had to learn exactly what was needed in the field and how to apply the necessary techniques before they embarked on the excursion as 'on site' demonstrations were impossible.

(iii) The sites chosen for these large groups had to be such that they could accommodate the girls both from the point of view of the girls' personal safety and with regard to the pressure on the environment.

(iv) The sites chosen for the fieldwork had to be varied as the field reports, unlike the assignments, were discussed with the girls and were returned to them.

6.4 CHANGES IN PROCEDURES WHICH INITIATED A PROCESS OF CHANGE

These problems led to the following changes in the approaches to assignments, fieldwork and practical work.

(i) In an attempt to improve the value of the assignments and to make them less tedious for both the teachers and the pupils, the assignments were structured in the following manner:

* the pupils in Std 8 and Std 9 were allowed to choose any country which interested them and were not restricted to the suggested regions in the syllabus;

* for whichever country they chose, they had to analyse the factors which either had led to the country's development or which had retarded the country's development and had then to evaluate the implications of these factors in terms of the country's economy and population.

The Std 8 and Std 9 themes were extended to include whatever areas of study interested the pupils or the teachers and could be structured as a report, a model or as a poster or chart. This was left to the discretion of the teacher concerned with the teaching of a particular class.

The above factors increased the 'interest' value of the tasks and encouraged a certain amount of originality. The senior assignments, in particular, became far more challenging and stimulating. However, it soon became apparent that to do two such assignments in a year was too time-consuming and somewhat pointless. Therefore, with the development of the fieldwork reports, permission was obtained from the inspectors to include the pupils' field reports in the year mark and to do only one assignment based on a country. The assignments in Std IO were discontinued altogether and these pupils concentrated on urban fieldwork instead.

(ii) The problems encountered with the introduction of fieldwork to the younger pupils led to the following changes to the approach to fieldwork:

* the development of a 'school trail' (Appendix 6A) designed to train the Std 6 and Std 7 pupils in the use of various field techniques they would need to apply in the field. As the school trail could be completed during normal teaching time, teachers could instruct the smaller groups in mapwork techniques; in the use of various types of simple apparatus, such as chronometers; in quadrant analyses, transects, gradient calculation and the correct way to observe and record data. Pupils were therefore able to work on their own in their small groups in the field.

* The field excursions had to be planned and developed so that the pupils knew precisely what to do and when to do it. This led to greater structuring of the worksheets used in the field, which, while having certain disadvantages in terms of 'free discovery', did improve the range of activities pupils were expected to do in order to ensure that they were kept fully occupied in the time allocated.

* Attempts were also made to vary the level of difficulty and degree of complexity of the field excursions between the different standards and to find new sites for the older pupils.

* A further strategy designed to improve the quality of work done in the field was to design field excursions that were directly related to an aspect of the syllabus in Std 6 and Std 7 and to teach this section of the syllabus in depth before undertaking the excursion.

The various attempts to improve the quality of assignments and fieldwork had the following repercussions.

(i) The more problem oriented approach to the assignments meant that pupils needed to use more than the text from the source material they consulted. Thus, pupils were increasingly introduced to the interpretation and evaluation of statistical data. This led to an increase in the use of data in class time as pupils needed instruction in the necessary techniques and skills. Increased use of statistical data and data response also resulted from the attempts to vary the degree of difficulty of the fieldwork. Pupils in the higher standards were therefore expected to do more than gather and present the collated data, they had to attempt to interpret it in order to find explanations for the observed occurrences in the field. Better use of a variety of graphic material was therefore incorporated into all these areas of pupil-centred activities added to a greater interest in these techniques.

(ii) The greater variety of activities in the field and the improved use of the data collected, led to a more problem oriented approach to fieldwork and pupils from Std 7 were expected to write follow-up reports which included a degree of analysis and evaluation (Appendix 6B).

(iii) The increasing complexity and sophistication of field excursions and reports, however, meant that more time was needed to prepare the pupils for their field excursion and to do follow-up work, which would train pupils to:

* process the field data using graphs and tables;

* analyse and evaluate the data in order to find relationships, make comparisons and to relate the area studied to the theoretical background;

* present the material correctly; and to

* relate the illustrative material to the text.

All of which meant that an increasing amount of class time was needed for fieldwork and for the presentation of assignments. While this had relatively little effect on the senior classes, each of which had six geography periods a week, it did create problems in the Std 6 and Std 7 classes with only three geography periods a week. It therefore became increasingly difficult to complete the departmental syllabus in the lower standards. The quality of the field reports and the pupils' reactions to fieldwork were so positive that the time taken for this aspect of geography was considered to be worthwhile. The result was that the syllabus for Std 6 and Std 7 was restructured to give sufficient time for fieldwork. Effectively, this meant that skill development with the younger pupils became an essential part of their geography curriculum and greater emphasis was placed on skills in the senior secondary classes as well.

6.5 AN EVALUATION OF LEARNER-CENTRED APPROACHES PRIOR TO THE INTRODUCTION OF THE I985 REVISED SYLLABUS

The developments in fieldwork and assignments in the decade prior to the introduction of the I985 revised syllabus created the foundation upon which to develop a systematic programme of learner-centred activities in geography. These changes resulted in the following benefits to the teaching of geography and to the pupils.

(i) Improved teaching skills included:

* better design and administration of assignments and fieldwork in terms of their structure, assessment and dissemination as with the discontinuation of the practice of keeping pupils' work, more detailed feedback was possible;

* an increased perception of the skills needed by pupils to research their assignments, to extract the information and to present the material, which led to instruction in these areas and to experimentation with different methods which could be used by pupils to present the final product;

* better utilization of graphics and the development of skills which pupils needed for the analysis of maps, tables, graphs, etc., thereby leading to a greater amount of time being spent on practical work;

* an increased perception of pupils' capabilities and interests;

* improved group work techniques;

* a better understanding of the dynamics involved in the development and organisation of fieldwork and of the skills and techniques needed for fieldwork;

* the identification and development of a resource base through the increased emphasis on weekend excursions, which would be valuable for the project content of IST.

(ii) The pupils benefited in terms of developing skills which enabled them to:

* use printed source material more effectively than just copying;

* use a variety of maps, graphs, tables and other data for the purpose of analysis and evaluation;

* present their work in a more structured and formal manner;

* use illustrative material more effectively;

* develop communication skills in the presentation of their work;

* develop slide-tape presentations, use OHP's, develop transparencies and had begun to experiment with videos;

* utilize a variety of field techniques, which included aspects of measuring, recording, data processing and data analysis;

* use l:50 000 topographic maps in the field;

* work in groups without teacher supervision.

The development of fieldwork, in particular, led to a more dynamic and stimulating approach to geography, which increased the pupils' motivation and revived teachers' interest in the subject development; creating a situation where teachers were prepared to assess the value of the recommended syllabus and to develop their own programmes.

Valuable as these developments were in instituting a process of change, the approaches to the learner-centred activities in existence had a number of limitations.

(i) The assignments, themes, field excursions and the follow-up reports were teacher-directed and highly structured. This meant that pupils had very little input into the design and decisions made regarding their tasks. Other than having freedom of choice as to which country the senior pupils researched for their assignment, or which area to study in the junior secondary phase, the activities were essentially the same for each pupil in the standard. The lack of differentiation placed a heavy burden on the weaker pupils.

(ii) The structure and design of the activities gave pupils few opportunities to develop their own interests and talents. Fieldwork, in particular, took little cognisance of the individual pupil, as each girl had to complete the same exercises and do the same field report. This tended to reduce the effectiveness of the fieldwork for some of the pupils. An analysis of the field report revealed that areas in the field which had appealed to particular pupils were given meticulous attention, with pupils frequently expanding on these sections beyond the set requirements of the assignment.

(iii) Very little emphasis was placed on problem identification and there was no set line of enquiry used in the development of the assignments or the field reports.

(iv) The fieldwork in particular neglected values, attitudes and 'human' issues and was essentially related to the physical aspects of the area studied. Little consideration was given to the effect of man on the environment or of his role and function in the environment. It is therefore questionable whether the fieldwork in fact had much relevance to the pupils, other than to develop field techniques and to increase their understanding of the physical processes and patterns of the area studied. Thus, while the researcher and the teachers concerned with the fieldwork in the school took pride in the fact that the fieldwork which was developed was inter-disciplinary in that it included biological aspects of the environment as well as the geography, or in the case of urban studies, involved history and architecture, the studies remained clinical, 'antiseptic' and 'dispassionate', The field studies were, therefore, reflections of the 1973 syllabus in terms of Earle's criticism of that syllabus (in van der Merwe, 1982). The field excursions, although located in the pupils' own environment, did not necessarily generate an appreciation of the environment in terms of the pupils relating to it as 'theirs'. The studies could have been done along any beach, any river or on any farm or in any country.

(v) In spite of the efforts to vary the degrees of difficulty and complexity of the fieldwork in the different standards, an analysis of the fieldwork done from Std 6 to Std 10 revealed that there was essentially little progress in terms of skill development. Therefore, although the fieldwork sites changed each year and the number of activities increased, there was little growth or development from year to year. Therefore, while progress had been made in terms of skill development, there was still little understanding of what skills were necessary, when they could be developed or how they could be developed, or even how the skills were related to different aspects of the syllabus.

(vi) An unintended outcome of the attempt to make fieldwork and assignments more relevant and meaningful was the increased amount of time pupils were spending on their field reports and assignments and themes. As the complexity and sophistication of these tasks increased over the years, by 1985 pupils from Std 7 and Std 9 were expected to complete two major pieces of work in addition to their normal practical and test programmes in geography. In addition to these assignments in geography, pupils were expected to do similar tasks in history, art and biology. An analysis of two examples of fieldwork in geography for a Std 7 and a Std lO pupil (Appendix 6B) reveals the following:

* The amount of time needed for such work is considerable, particularly in view of the development of the illustrative material and the length of the report.

* The skills represented in the work could have been as effectively utilized in a shorter piece of work as there is an unnecessary repetition of techniques in each of the areas covered in the report.

* There is little real difference in terms of the depth and length expected from the Std 7 pupils' and that of the Std lO pupil.

These tasks were therefore placing a heavy burden on the younger pupils and the weaker pupils. Thus, while the emphasis had shifted somewhat from the 'cosmetic effect' of the pupils' work, the new emphasis to the pupil appeared to be on length. As teachers previously felt that pupils should be credited for the tremendous effort which went into these tasks, pupils' assumptions that "the larger the assignment, the better the mark", was proved to be correct.

6.6 SUMMARY

The developments in assignments, fieldwork and practical work were directly related to a combination of circumstances which existed within a particular school environment. Yet the key factors which precipitated the changes were teacher dissatisfaction with a specific area of the geography programme and the interests of the teachers, rather than the perceived needs of the pupils, the syllabus requirements or a school milieu which was conducive to change.

The dissatisfaction with the assignment system and the emerging interest in fieldwork, having triggered the initial changes, caused a process which, when once set in motion, extended beyond the design of the various learner-centred tasks. A closer analysis of the developments in these areas reveals that the changes were not only related to changes in procedures, but changes in teachers' attitudes. Having questioned one aspect of the syllabus, teachers were led to examine other areas of the geography programme more closely.

Therefore, when the need arose to restructure the recommended coursework to meet the requirements of the assignment and fieldwork programmes, the perceived value of this aspect of geography gave teachers the confidence to develop a programme which met their needs and the needs of the pupils. This initiated the shift in attitude which was more essential for the development of the IST programme than the existing changes which had thus far been effected. The geography teachers at the school were beginning to be less concerned with what they taught than with why it was being taught.

CHAPTER SEVEN

THE PILOT PROGRAMME FOR IST

The decision to reassess and to restructure the existing learner-centred activities was initially the result of teacher and pupil concern about the time involved in the development and completion of the two major tasks set each year from Std 7 to Std 9 and the implications for tasks of this nature in terms of the newly introduced Revised Syllabus of 1985.

This chapter examines:

1 the process which led to the development and implementation of the pilot programme for IST;

2 the purpose, design and structure of the tasks set for the pilot programme;

3 the administration and results of the activities of the pilot programme;

4 the evaluation of the pilot programme and the implications for the development of an IST programme for the school.

7.1 <u>THE PROCESSES LEADING TO THE IMPLEMENTATION OF A PILOT PROGRAMME FOR IST</u>

In view of the lengthy period over which the previous developments described in chapter six occurred, it is pertinent to analyse the decisions leading to the development of what was to be the pilot programme for IST in terms of:

(i) the time-frame in which the developments occurred;

(ii) the identification of the basis upon which an IST programme should be developed and the indentification of the problems and issues with which such a programme was associated;

(iii) the resulting decisions relating to the pilot programme in terms of the target group, the objectives for the programme, the skills which should be developed and the nature of the assessment.

This section concludes with an analysis of the processes involved in the development of the pilot programme.

7.1.1 THE PERIOD OF DECISION-MAKING LEADING TO THE DEVELOPMENT OF THE PILOT PROGRAMME

The question relating to the time pupils needed for assignments and field reports was raised at a geography staff meeting in June 1985, when the progress made in the first of the assignments for the year was reviewed. The decision was taken to review the tasks set for geography at the end of the year in the light of an analysis which teachers agreed to do of the assignments in the third term and in relation to an analysis of the requirements of the newly introduced syllabus (1985 Revised Syllabus). The decisions which resulted in the development of the pilot programme were therefore effectively taken in two geography meetings held in the fourth term of 1985 and at the first meeting of the geography staff in 1986.

7.1.2 PHASE ONE OF THE PILOT PROGRAMME DEVELOPMENT: IDENTIFICATION OF THE LIMITATIONS OF THE EXISTING SYSTEM AND OF THE BASIC REQUIREMENTS FOR A PROGRAMME OF LEARNER-CENTRED ACTIVITIES

The limitations of the existing system of learner-centred activities described in chapter six were identified and discussed, as were the requirements for these activities in relation to the 1985 Revised Syllabus. The syllabus analysis revealed the learner-centred goals and the need to develop skills, attitudes and values through greater pupil involvement and participation. Note was also taken of the suggestion to develop short but frequent pupil-centred activities.

On the basis of this discussion, the following decisions were taken with regard to the nature and purpose of IST.

(i) IST should form part of a programme of activities which reflected the pupils' development in skills, values and attitudes from Std 6 to Std 9, by which time skills necessary for the final senior certificate examination should have been acquired by the pupils.

(ii) The activities planned and developed for IST should aim at the development of personal and social skills as well as cognitive skills.

(iii) The IST programme should attempt to create a balance between activities developed to teach skills and those which allowed the pupils to pursue their own interests, although continuing to incorporate the desired skills.

(iv) The activities should give teachers an insight into the pupils' progress in and potential for geography, as well as their interests in the subject, therefore their work would have to be monitored regularly and the assessment would need more than numerical evaluation.

The identification of these broad goals led to the realisation that:

(i) although teachers were talking about skills, values and attitudes, there was little real understanding about what these skills and values were or how they could be identified or applied, therefore it would be necessary to investigate this area of geographical education more closely than had been done before;

(ii) activities within the programme would have to be related to the achievement of specific aims and that no exercise could be developed simply because it was convenient or expedient. Therefore far more consideration would have to be given to procedures and aims and objectives than had previously been the case in the design and development of activities;

(iii) The assessment of pupils' work would have to be restructured if skills, values, attitudes and personal growth were to be measured;

(iv) the activities designed for IST would need to be evaluated in terms of whether the aims had been achieved, their suitability for pupils' level of development and in terms of the pupils' previous experience.

(v) there would have to be constant and constructive feedback after each activity if pupils were to progress in the desired skill areas.

(vi) the development of a programme of learner-centred activities based on growth and progression would need to be developed by the geography teachers as a team to ensure that there was a logical development from one year to the next;

(vii) while the activities would be shorter and more varied, there would be more to monitor and control, which would place an increased burden on teachers unless there was a way to incorporate at least some of the activities into the normal test programme.

7.I.3 PHASE TWO OF THE PILOT PROGRAMME DEVELOPMENT: IDENTIFICATION OF THE TARGET GROUPS AND THE IDENTIFICATION OF SKILLS FOR THE PILOT STUDY

In terms of the consideration staff had given to the problems and issues previously raised, the decisions made during the second phase of the planning for a restructuring of the learner-centred activities included the following:

(i) No attempt should be made to develop a full programme of learner-centred activities for all the standards in the following year, but that a select programme of activities should be designed, developed and monitored, using the Std 7 and Std 9 pupils;

(ii) The rest of the school would continue with their usual programme of activities;

(iii) The programme of activities decided upon would be developed by the researcher in consultation with the staff concerned with the teaching of the target groups;

(iv) The researcher and the teachers would administer the tasks, but that the researcher would assess them;

(v) The tasks would be evaluated by all of the geography teachers and that additional evaluation would be requested from the senior biology staff;

(vi) The pupils would evaluate each task as it was completed.

These decisions were taken for the reasons given below.

(i) The staff felt that to introduce a full programme of activities based on skill development and the development of values and attitudes was too ambitious in view of the problems related to skill identification, their application and the assessment of tasks which were skill related.

(ii) The choice of the Std 7 and Std 9 pupils as the target groups was made as teachers felt there needed to be some sort of comparison made between the levels of development that could be expected from pupils in the junior secondary and senior secondary phases. The rate at which pupils were able to develop in the course of one year was also felt to be important. The choice of the Std 7 group in preference to the Std 6 pupils and of the Std 9's rather than the Std 8 or Std 10 pupils was based on the following:

* the Std 7 pupils had had one year of high school and as such the programme could start immediately, while the Std 6 pupils needed time to settle and a programme such as this would interfere with their orientation programme in geography;

* the Std 9 pupils had the foundation of one year of senior secondary geography and this, it was felt, would be valuable in the development of the envisaged advanced IST programme; their syllabus is also more flexible than that of the Std 10 pupils;

* the age of both groups was a further consideration as, according to Piagetian theory, they were at the stage of formal operacy and therefore should be capable of the skills which the syllabus identified;

(iii) The role played by the researcher in the design, development and assessment of the tasks was decided upon as she would be on long leave and would have the necessary time, while the role of the rest of the staff as non-participant observers would help to create a better system of evaluation.

(iv) It was felt that pupil evaluation would provide an added dimension to the development of subsequent tasks and that it was necessary to consider the pupils' reactions and responses to the activities.

The second set of decisions taken during this phase concerned the objectives of the pilot programme. The staff felt that the pilot programme should:

(i) attempt to ascertain the pupils' level of development in the skill areas which were identified as important to a learner-centred programme and to monitor the pupils' progress in these areas in the course of the year, while attempting to find ways to help pupils to develop those skills in their practical work;

(ii) examine alternative systems of assessment which would measure pupils' progress more effectively;

(iii) find alternatives to the field reports in order to reduce their length, while still retaining the skills and techniques considered to be important;

(iv) explore alternatives to the thematic studies of the junior secondary phase which would reduce their length while still developing the technique related to the use of printed source material.

Teachers agreed that three tasks set for each of the two standards involved in the pilot programme would be the minimum necessary to achieve the objectives. Four, it was felt, would be unrealistic as their design, development, assessment and evaluation was likely to take longer than usual for such activities. The decision was taken that these classes would continue with their normal practical work.

The second phase of the planning was concluded with the identification of the skills below, which staff felt to be important for a learner-centred programme.

(i) **Language proficiency:** Language proficiency was perceived to be a seriously neglected aspect of learner-centred activities in geography. It was felt that since language permeates every aspect of geography teaching and the pupils' development in geography, this area needed serious consideration in any future IST programme. The pilot programme would therefore attempt to ascertain:

* the degree of clarity with which pupils can be expected to express themselves through the written and the spoken word;

- * the degree of sophistication the pupils have reached at Std 7 and Std 9 level with regard to use of vocabulary, grammar and spelling;

- * the extent to which pupils are able to use geographical terms correctly;

- * the extent to which they are able to express themselves in a formal mode in their written and oral work;

- * the extent to which the pupils are able to formulate a written report or essay based on a systematic analysis of a situation or problem.

(ii) **Comprehension**: The concern in this skill area was primarily related to ascertaining the pupils' "cue consciousness" in interpreting questions and instructions. The aim was to obtain more information:

- * in terms of the design and structuring of activities for the pupils; and

- * whether the pupils' "cue consciousness" was related to the development of higher order skills, such as their ability to make generalisations.

(iii) **Perception**: The teachers were interested to ascertain the levels at which pupils are able to perceive patterns and relationships, to organise data and to solve problems.

(iv) **Graphicacy and numeracy**: Skill development in these areas has become increasingly important and it was felt that there was a need to know about how pupils responded and reacted to graphic data. It was hoped that learner-centred activities could aid teachers in developing these skills and help in understanding the sorts of problems pupils have in these areas.

(v) **Problem solving**: It was necessary to ascertain how the pupils perceived problems and to understand their levels of competence in the solution of problems. Concern was expressed as to whether the pupils could reasonably be expected to:

* identify problems;

* formulate hypotheses;

* use various techniques to test hypotheses;

* present a well reasoned and logical assessment of a situation they had studied and link theory to reality in their search for solutions.

(vi) **Attitudes**: The staff felt it was important to understand at what level pupils were able to verbalise their attitudes concerning specific situations. It was also necessary to understand the depth of their insight into aspects relating to environmental and other topical issues facing their own and other communities.

(vii) **Values**: In the same context, it was considered to be important to understand more about pupils' values and how they develop these values. More information was needed as to how teachers could aid pupils in value development without resorting to indoctrinatory methods.

(viii) **Creativity and originality**: The teachers present believed that IST was a means to encourage and develop these attributes, but that more information was needed about the levels of originality which could be expected and how to develop the pupils' natural abilities in these areas.

7.I.4 THE THIRD PHASE OF THE PLANNING: THE STRUCTURING OF THE PILOT PROGRAMME

The discussions during this phase resulted in decisions relating to the assessment of the activities and the nature of the activities which should be set for the pilot programme.

With respect to the assessment of the tasks set for the pilot programme, teachers felt very strongly that where activities were not differentiated in terms of the content, their structure should be such that while challenging the academically able pupil, the weaker pupil ought not to be seriously disadvantaged. Staff felt that the assessment of the activities should reflect the pupils' strengths as well as their limitations and that pupils should be given credit for performing to the best of their abilities.

In an attempt to achieve the various objectives which had been identified, it was decided that the structure of the pilot programme would be as follows:

(i) The first activity should be some form of diagnostic tool which could create a basis from which to analyse pupils' levels of development and should also give consideration to a variety of assessment methods which could highlight these skills.

(ii) The second task should include an analysis of the skills identified in the first tasks, as well as create additional opportunities for the identification of skills in areas that could not be identified by the first of the tasks. Teachers also felt that the second activity should consider pupils' individual interests.

(iii) The pilot programme would also include a fieldwork assignment as it was felt that this was an opportunity to solve some of the problems identified in relation to fieldwork.

7.1.5 AN ANALYSIS OF THE DECISION MAKING PROCESS WHICH INFLUENCED AND AFFECTED THE DEVELOPMENT OF THE PILOT PROGRAMME

Before considering the design, structure and development of the activities for the pilot programme it is necessary to reflect, albeit with hindsight, on a number of factors relating to this period of development.

The programme of 1986 was based entirely on the teachers' experience in the classroom and on the initial analysis of the syllabus preamble. Literature relating to learner-centred activities and skill development was neither easily available nor was there the time to research this area of geographical development adequately within the time-frame described. The theoretical framework which was to influence the subsequent development of the IST programme evolved during the three years of the study as the researcher and the teachers concerned were exposed to the relevant literature as a result of this research.

The limitations in terms of the necessary theoretical background relating to learner-centred approaches and the lack of real understanding about teaching skills and skills teaching were undoubtedly the cause of many of the errors that were made and the blind alleys that were followed.

Thus, there was little consideration given to:

(i) An examination of a wide variety of learner-centred strategies in terms of the skills they were designed to develop and how they could be best applied to develop those skills. Although the teachers present in the planning stages had used a number of learner-centred activities and techniques which included:

* group work
* role play;
* data processing and data response;
* worksheets;
* pupil seminars;

these activities had not been analysed in relation to their purpose, their outcomes, how they should be structured in terms of the pupils' level of development, or the possible barriers to learning or performance they might contain.

(ii) An analysis of the syllabus in order to develop a progression framework for skills.

(iii) An analysis and understanding of the sorts of procedures that were necessary to develop learner-centred activities both in terms of the teacher's design and development of the activities and in relation to the information pupils needed prior to doing these activities.

Activities tended to be viewed essentially as a product rather than a process.

The limitations which resulted from the lack of theoretical knowledge need to be examined in relation to the factors that triggered the changes and with respect to the processes which created the momentum for the changes to continue. The processes described in chapter six and in this chapter were not initiated because of a belief in a theory or in a recommended approach, but because of an identified need, which was relevant to the teacher, the pupils and the school situation. In attempting to meet this need, experimentation and innovation led to a search for a theory and new approaches. While this may be placing the cart before the horse, it may help to explain the nature of change in a classroom situation which is initiated by teachers.

7.2 THE PURPOSE, DESIGN AND STRUCTURE OF THE ACTIVITIES DEVELOPED FOR THE PILOT PROGRAMME

While the Std 7 programme progressed as planned, the Std 9 group were able to complete two out of the three activities originally decided upon; the second activity of the programme being abandoned at the request of the teacher substituting for the researcher while she was on leave. The programme of activities was therefore as follows:

Task I: A structured teacher-directed activity designed to illuminate the skills identified by the researcher and the staff concerned with the programme development.

Task 2: A written report based on a choice of topics with a set theme. (Completed by the Std 7 group only.)

Task 3: A fieldwork activity.

This section of the chapter examines each of the activities with regard to the way in which the design and structure of each task attempted to reflect the purpose for which the activity was designed.

7.2.I THE FIRST ACTIVITY FOR STD 7 AND STD 9

The initial task set for these two classes attempted to identify the pupils' levels of development in the skill areas which had been determined. A worksheet format was chosen for this activity as it allows for a variety of short activities to be developed within a particular framework, which can be based on a theme or on a specific area of study. As each separate section of a worksheet can be developed to meet a particular need, this format was considered to be the most appropriate means to meet the required objectives.

Each of the worksheets concentrated on the development of tasks which would:

(i) analyse language proficiency, comprehension, perception, graphicacy and problem solving skills;

(ii) assess the degree of insight and innovation which pupils applied to specific problems;

(iii) analyse the pupils' 'reactions' to specific methods of assessment.

While each of the worksheets aimed at achieving the same purpose, they were designed within the context of the geography course-work scheduled for the first term, as the researcher attempted to avoid disrupting the normal geography teaching programme. The Std 7 activity, which was called 'Ecocide', was designed to fit into the environmental and ecological component used by the school to introduce the pupils to the geomorphology and settlement component of the syllabus and as a foundation for fieldwork later in the year. The Std 9 exercise: "Rain: the exception rather than the rule in Southern Africa" was related to the Std 9 climatology component. (Appendices 7A and 7B).

Both the Std 7 and Std 9 worksheets were primarily based on data response activities. The younger pupils were given pictorial stimulus material, having had no previous experience with numerical data in geography; while the Std 9 activities were related to two synoptic maps and rainfall data for three South African towns. Data response questions were chosen as the activities can vary from simple transference of information to analysis and evaluation. Whatever the degree of complexity, however, all data response requires comprehension and perception.

Attempts were made in the design of the worksheets to avoid distractions such as verbalism and ambiguity. While instructions were kept short, a number of 'cue' words were included. All written information on the worksheets had a definite purpose, either to guide the pupils or to provide indicators necessary for the answering of the questions. This was done to ascertain pupils' understanding of the instruction words and how 'cue conscious' they were. Staff were also interested to ascertain how pupils' interpretation of questions affected performance. Pupils were also requested to underline words with which they were unfamiliar.

Most of the sections of the worksheets were allocated a numerical value. A section of the Std 9 worksheets was, however, based entirely on a set of criteria using a rated scale, which the pupils were given. Three short sections of the Std 7 worksheet were assessed according to a criterion assessment based on clarity of expression, the aptness of the answers to the question and the logical development of the answers.

In addition to the criterion assessment of these sections, the Std 7 worksheet used criterion marking for the measurement of language proficiency, the use of illustrative material and general presentation.

The criteria used for the Std 9 worksheet included an analysis of the answers in terms of their content, language and the use of illustrative material. The main criteria were subdivided as set out in Table 7.I, for both Std 7 and Std 9.

TABLE 7.I

CRITERIA USED IN THE ANALYSIS OF THE WORKSHEETS

Content:	Clarity, aptness to question, logical development.
Language:	Style (competence in terms of expression, use of formal mode, use of geographical terms), grammar, spelling.
Illustrative Techniques:	Presentation, techniques used (correct use of conventions, aptness (suitability of the illustration to the question).
Presentation (Std 7):	Neatness and general care, suitability to the type of activity, originality and insight

Each of the individual criteria was assessed according to a rated scale of l-5. The pupils were told that:

* one on the scale meant that they had performed poorly and would be given remedial help in those particular areas;

* three indicated that while their performance was satisfactory, they would need to take note of the comments which would give them guidance in terms of developing further in the areas indicated;

* five indicated an excellent answer.

The criteria related to clarity, aptness and logical development were given a numerical evaluation in the assessment of the content of the open-ended questions of the worksheets as it was necessary to compare skill development in these questions with the questions which had been given a numerical assessment. Therefore:

* a one was the equivalent to a symbol of less than an E or below 40%;

* a three was the equivalent of a D or C symbol, therefore between 50% and 69%;

* a five was given the equivalent of an A symbol, or 80%.

7.2.2 THE SECOND ACTIVITY - STD 7

The development of the second activity for the Std 7 group was influenced by the results of the worksheet. The original intention had been to develop this activity as a means to stimulate pupils' interest in geography and to allow them to use their individual talents, by providing both freedom of choice regarding the area of study and with respect to the way in which the final product was presented. On the basis of the worksheet results of the first activity, however, the teachers concerned with the group, in consultation with the researcher, felt that it would be of greater benefit to the pupils to develop a more structured activity. The staff felt that an activity which emphasised the same skill areas as the worksheets would give a better indication of the effectiveness of the feedback and consolidation done as a result of the worksheet.

The second task was therefore based on a written report. Pupils were given a choice of topic within the general theme of 'comets', as Halley's comet was topical at the time of the development of this activity (Appendix 7C). While this was a fairly typical assignment in terms of the survey results, an attempt was made to provide a wide range of topics and to vary the emphasis of the topics. An analysis of the topic choices reveals that they included a number of prosaic 'read and report' type suggestions to more imaginative choices. Teachers were interested to ascertain which type of topics in an assignment appealed to the pupils and which factors affected the pupils' choices. To reduce the amount of time spent on the activity, the length was stipulated and the topics were structured in order to facilitate a shorter report.

This assignment was also developed as an opportunity for the teachers to develop pupils' techniques in searching for information and extracting relevant material from a variety of prescribed sources. One of the key features of this task was an attempt to prevent pupils copying directly from the text and teaching them how to acknowledge their sources and to select material rather than to rely on one source. The teacher-librarian at the school gave assistance to the geography teachers in the development of essential library skills needed for activities of this nature.

Assessment of this shorter assignment was based on the criterion marking shown in Table 7.2. This schema was given to the pupils as a 'checklist' in an attempt to explain to them what was expected. The system was used as a means to ascertain how successfully the pupils' progress could be measured in areas such as language development, their use of illustrative material and with regard to skills such as interpretation of printed material, its analysis and evaluation.

TABLE 7.2

ASSESSMENT SCHEMA FOR THE SECOND ACTIVITY

Std 7 mark allocation for comet assignment

N.B. use the table below as a 'checklist' as you write your report.

Introduction	(5)	*Is your introduction relevant to the topic you have chosen? Does it 'catch' the reader's attention?
Conclusion:	(5)	*Is your conclusion a conclusion or have you added some new information? Have you drawn the key points together?
Body of the report:	(20)	*Have you attempted to make this as interesting as possible for the reader? *Have you emphasised the key aspects which the topic requires? *Have you avoided unnecessary 'wordiness'? *Have you kept to 'the point'? **N.B.** Remember, do not copy directly from texts. If you have to use a quotation acknowledge it.
References:	(5)	*Check to make sure your referencing is correctly done. *Have you acknowledged all your sources?
Presentation and illustrative material:	(IO)	*Remember NO PICTURES *Check to make sure that any tables, diagrams or sketches which you have used are relevant to the text and that you have referred to these in your report. *NO UNNECESSARY DECORATION.
Language:	(IO)	*Check your spelling and grammar. *Check that you have used geographical or other terms correctly. *Make sure that you use paragraphs correctly. *Remember what you have been told about style in this type of report.

7.2.3 THE FIELD ACTIVITIY

The fieldwork developed for the Std 7 and Std 9 groups was designed, developed, administered and controlled by the teachers of those standards. The staff concerned had elected to control this activity and had requested that the researcher act as a non-participant observer. Both field activities were based on a beach study using a worksheet format which outlined the various activities the teachers had designed. The Std 7 and Std 9 pupils, while having to do the general activities, were allowed to choose one area of the beach which interested them for their field report. This was done in an attempt to reduce the length of time the Std 7 pupils spent on their reports and to increase the depth of the Std 9 pupils' presentations.

The researcher negotiated with the Std 9 teachers to have a group of volunteers from this standard who would do a field research project based on the area studied. Thus, while these pupils would do the general field excursion, they would work with the researcher during the period allocated for the development of their reports. The researcher wished to investigate the possibility of using a problem-orientated approach which would incorporate the use of a systematic scientific line of enquiry in future fieldwork activities for this age group.

An analysis of these field excursions (Appendix 7D and 7E) reveals that the activities were largely the same for each of the standards. The purpose of both field excursions was to develop a better understanding of the geomorphology and ecology of a beach area and were related to the study of coastal geomorphology in the Std 7 and Std 9 syllabus. The worksheets, therefore, concentrated on the collection of information relating to the theory of coastal processes and encouraged pupils to look for evidence which would explain the observed features and processes. The activities which were designed for the field were related to the collection of data which could be used to interpret the relationships and patterns which exist in this environment and to analyse the various processes which occur in a coastal area.

In addition to the worksheets, the pupils were provided with a variety of additional material which could help them in the analysis of the beach area. This included l:50 000 maps of the area, topocadastral maps, air photos and orthophoto maps, as well as field guides relating to the animal and plant life of the rock pools, sandy shore and dune areas.

The assessment schemas for the Std 7 and Std 9 field reports were developed by the teachers concerned with these groups and the researcher (Table 7.3). The assessment for the research projects was negotiated between the pupils who had volunteered for the project and the researcher (Table 7.4).

The Std 7 excursion was analysed and evaluated as a group. However, the Std 9 general excursion was not analysed, as the researcher concentrated on the research project which was developed with the group of Std 9 volunteers.

TABLE 7.3

STANDARD 7 AND STANDARD 9 MARK ALLOCATION FOR FIELD TRIP REPORT BACK

Name: ____________________		TOTAL MARKS ALLOCATED	YOUR MARK
CATEGORY AND CRITERIA			
I	LANGUAGE (spelling, grammar and geographical competence)	10	
2	PRESENTATION		
	(a) Aptness regarding the topic	5	
	(b) Overall neatness and care	5	
	)c) Use of assignment conventions	5	
4	ILLUSTRATIVE MATERIAL		
	(a) Neatness	5	
	(b) Techniques used	10	
	(c) Relevance of illustrations	10	
4	CONTENT		
	(a) Relevance to topic	10	
	(b) Logical development	10	
	(c) Insight	20	
5	ORIGINALITY OF APPROACH	10	
GENERAL COMMENT BY GEOGRAPHY TEACHER		/100/	

____

TABLE 7.4

FIELD RESEARCH ASSESSMENT SYSTEM

			TOTAL MARKS ALLOCATED	YOUR MARK
I	LANGUAGE (spelling, grammar and geographical competence)		10	
2	PRESENTATION			
	(a)	Aptness regarding the topic	5	
	(b)	Overall neatness and care	5	
	(c)	Use of enquiry conventions	5	
3	ILLUSTRATIVE MATERIAL			
	(a)	Techniques used	5	
	(b)	Relevance of illustrations	5	
	(c)	Processing and analysis of data	10	
4	CONTENT			
	(a)	Identification of the problem	5	
	(b)	Identification of possible solutions	5	
	(c)	Formulation of hypotheses	5	
	(d)	Relevance of evidence used in testing the hypotheses	10	
	(e)	Logical development	20	
	(f)	Insight	5	
	(g)	Conclusion	5	

<u>GENERAL COMMENT BY GEOGRAPHY TEACHER</u>

7.3 THE ADMINISTRATION, RESULTS AND EVALUATION OF THE INDIVIDUAL ACTIVITIES OF THE PILOT PROGRAMME.

This section of the chapter analyses each of the activities for the pilot programme in relation to their administration and the results of each activity. The first of the activities, the diagnostic worksheets, proved to be important in terms of the development and structure of the later assignments set for the pupils. This activity is therefore analysed in the greatest detail, both as a means to highlight the results relating to skill development and with respect to the method of analysis used in the assessment of these activities.

7.3.1 THE ANALYSIS OF THE DIAGNOSTIC WORKSHEETS

The Std 7 task was completed by the middle of the first term, while the Std 9 activity could only be completed in the second term as a result of problems experienced regarding the completion of the necessary syllabus content. This first activity was designed by the researcher after consultation with the teachers concerned with the groups. The completed worksheets were given to the teachers before the pupils were to do the activity, for comment and revision. The teachers administered each of the tasks in the allocated time negotiated by the researcher and the staff. The completed tasks were assessed by the researcher and moderated by the geography staff. Pupils evaluated the worksheets as they completed them. Additional comment relating to the design of the worksheets and their assessment was obtained from the senior biology staff at the school.

7.3.1.1 The assessment and results of the Std 7 worksheet: 'Ecocide'

The Std 7 task was allocated two class periods, which were used to complete the experiment related to soil erosion (Table 7.7), while the rest of the worksheet was completed as homework. The pupils were given one week to complete the worksheet and no additional geography homework was set during this time. One hundred and thirty two pupils completed this activity.

The worksheet was analysed according to the following criteria:

(i) skill analysis in terms of the identified cognitive skills;

(ii) language proficiency;

(iii) use of illustrative material;

(v) general presentation of the completed activity.

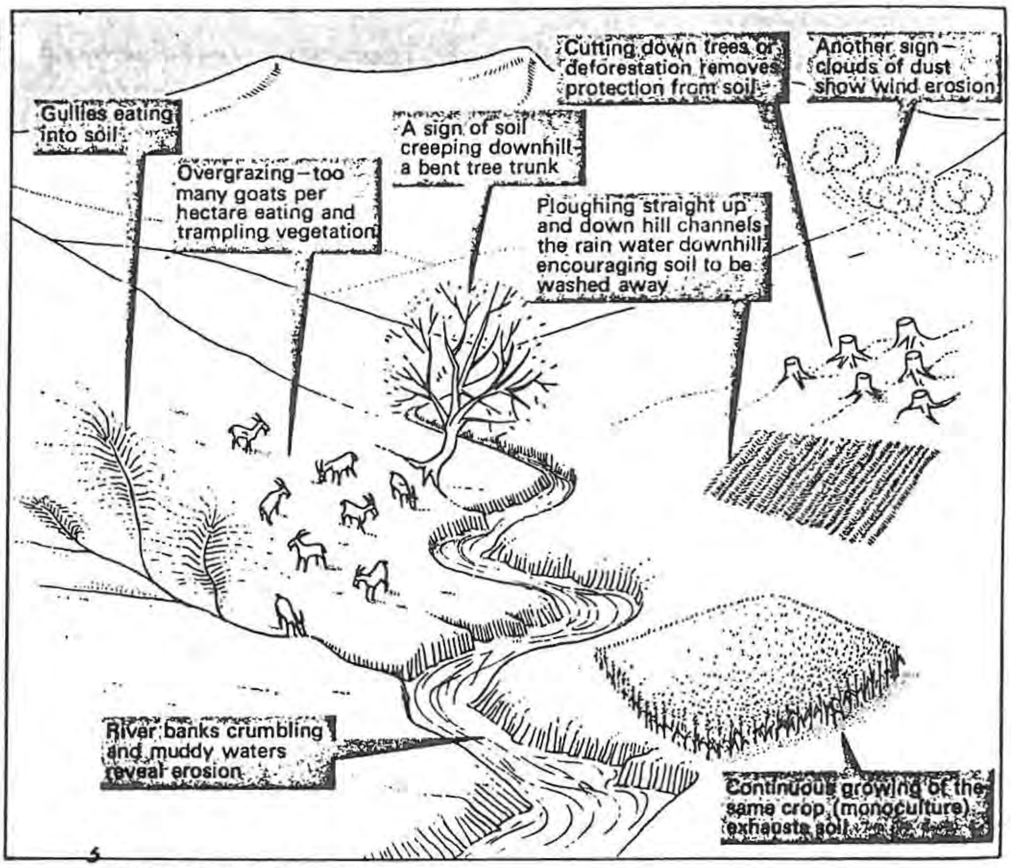
A global assessment of the worksheet was done to compare these results with previous results of assignments and the examinations in order to evaluate the assessment system used.

(i) **Skill analysis**

Based on the diagrams provided with the worksheet (Figures 7.1 and 7.2) the

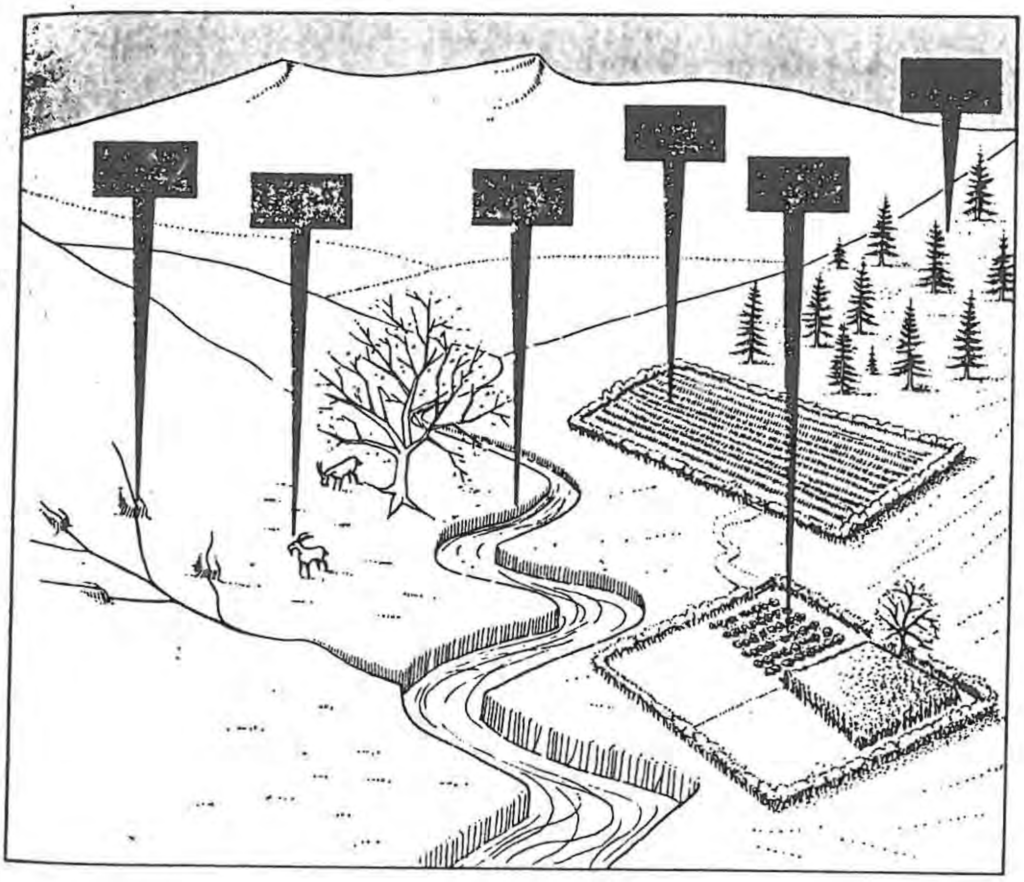
An area suffering heavily from soil erosion

1.



Soil conservation measures

2.

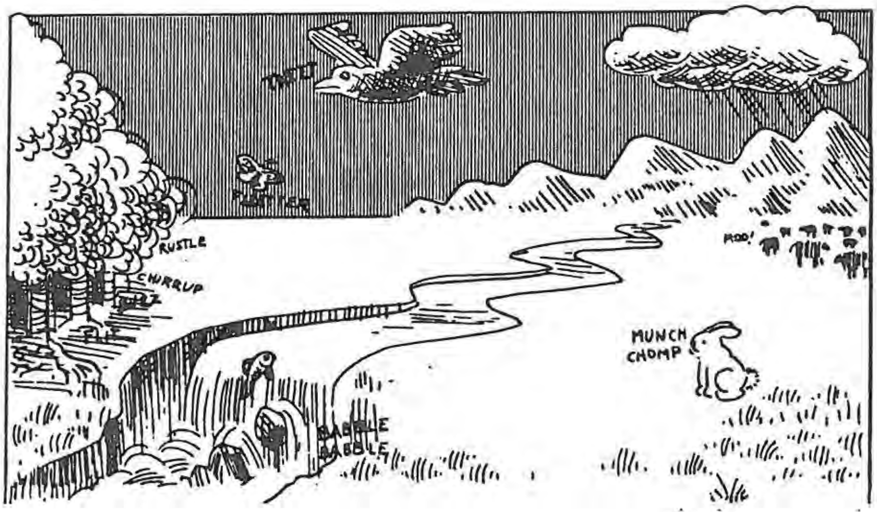


Key
A Crop rotation
B Controlled grazin
C Reforestation
D Small earth dams
E Reinforced river b
F Contour ploughin

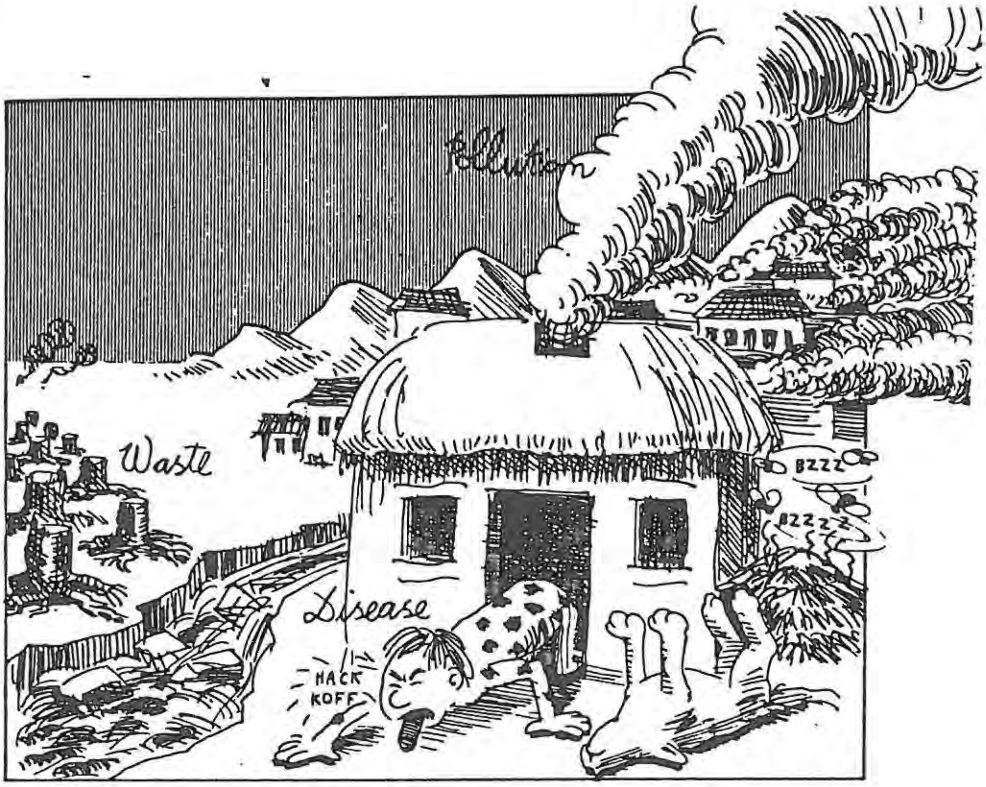
(Grenyer, 1978, p. 56 and 57)

FIGURE 7.1
DIAGRAMS 'ECOCIDE' WORKSHEET: STD 7
DIAGRAMS 1 & 2

3.



4.



(after Rankin, in Croall, 1986, pp. 16 and 18)

FIGURE 7.2

DIAGRAMS 'ECOCIDE' WORKSHEET: STD 7
DIAGRAMS 3 & 4

various questions set were designed to illuminate specific areas of skill development. Thus, the questions in Table 7.5 attempted to ascertain the pupils' ability to comprehend the question and the visual stimulus material and their ability to transfer the pictorial information into a verbalised answer. The set of questions in Table 7.6 required pupils to analyse and evaluate the information presented by the visual material, to select what was relevant and to apply it to the given question. The question contained in Table 7.7 added a further problem-solving dimension, either with regard to finding alternatives, or having to make value judgements, or having to test an hypothesis.

The analysis of the worksheet revealed the following:

(i) This particular group of pupils experienced no difficulties in answering questions which required the transference of pictorial information into a verbal answer. The questions reflected in Table 7.5 were therefore answered correctly by all the pupils.

(ii) The questions which required analysis and evaluation (Table 7.6), however, presented the pupils with a variety of problems with only I0,7% of the group able to score full marks in all four of these questions, while 60,6% of the pupils were unable to score full marks in any of the four questions (Table 7.8). An analysis of these questions revealed that pupils were generally unable to perceive relationships or to select and synthesise the given information in order to draw the desired conclusion. Common mistakes therefore included:

* pupils repeating the information given on the diagrams and not answering the questions;

* answering the question B.Q 3 (Table 7.6) by attempting to create a food chain rather than to identify the biotic and abiotic components of the ecosystem;

* repeating the answers given to the questions which required a simple transference of information.

When questioned about their responses, the most frequent reason for not answering the questions as required was that the questions had not been

TABLE 7.5

QUESTIONS REQUIRING SIMPLE TRANSFERENCE OF INFORMATION

* **Section A. Q. 2.**
  By comparing the two diagrams (Figure 7.1), show how
  these malpractices have been corrected on the second diagram.

* **Section B. Q. 5a.**
  Name three ways in which the area is being polluted. (Figure 7.2b).

TABLE 7.6

QUESTIONS REQUIRING ANALYSIS AND EVALUATION

* **Section A. Q. l**
  Identify the farming malpractices that are shown on the diagram (Figure 7.la)

* **Section B. Q. 3.**
  Identify the six elements which make up the biosphere (Figure 7.2a).

* **Section B. Q. 4.**
  Explain how these six elements could be linked together to form an ecosystem (Figure 7.2a)

* **Section B. Q. 5c.**
  Explain how each of these forms of pollution can upset the ecological balance of the ecosystem by destroying certain elements of the biosphere.

TABLE 7.7

QUESTIONS RELATING TO PROBLEM SOLVING (VALUE JUDGEMENTS)

* **Section 5c**

Describe how you feel this destruction is affecting the quality of life of the human inhabitants of the area shown.

5(d)

Choose any ONE of the causes of pollution and explain how you would eradicate it.

Section C. Q. 6.

Give a detailed description of the experiment you have done to test the following hypothesis and assumptions:

Hypothesis: "Soils which have been compacted are more prone to soil erosion than soils in well grassed or cultivated areas".

Assumptions:

(i) Compacted soils retard the free passage of water in the soil, causing rapid saturation.

(ii) Compacted soils have a higher surface run-off than soils in well grassed or cultivated areas.

Show your aims, indicate what apparatus was used, the method, observations made and the conclusions reached. Also include the graph you made and illustrate the results.

Q. 7.

Using the above experiment, explain to a farmer why it is wrong to allow his cattle to return to the kraal each night after grazing in the veld. Suggest alternative solutions.

understood. This highlighted the difficulties which pupils have with the instruction or 'cue' words used in questions of this nature. This was reinforced by the fact that in their evaluation, 58% of the pupils identified these particular questions as being 'easy'. Closer probing of the responses revealed that the pupils who had scored lowest experienced difficulties in the identification of patterns and were unable to make associations of the type required by the question.

The analysis of these particular questions emphasised the need to:

* give consideration to the explanation of the various instructions or 'cue' words and to provide pupils with opportunities to familiarise themselves with the different approaches to problem solving of this nature by varying questioning techniques and tasks;

* to pay more attention to spatial perception in terms of patterns and relationships by giving pupils opportunities to observe these in 'real world' situations through fieldwork, the use of maps, photographs, schematic diagrams and models.

(iii) The analysis of the final set of questions (Table 7.7) based on a rated scale according to the clarity of the answer, its aptness in terms of the question and the logical development of the answer, revealed that:

* the question relating to the experiment (C.Q 6) was answered best, primarily because the teachers of the various classes had worked with the pupils in completing this task;

* the other questions in this section were generally answered on an unsophisticated level with pupils giving very little indication of having given much thought to the problems. Answers were generally stereotyped and simplistic. While this may have reflected the pupils' reactions to questions without a specific numerical assessment, it also reflected the general concern of the pupils who had no previous experience of questions which allowed them to express their own opinions or which expected answers which could not be found in some or other text and then copied. Table 7.9 reflects the results for this section of the worksheet.

TABLE 7.8

COMPARISON OF RESULTS RELATING TO SPECIFIC SKILL ANALYSIS (Expressed in percentages)
(N = 132)

		A. Pupils scoring 4+	B. Pupils scoring 3	C. Pupils scoring below 3
1	Transferring information from pictorial data to verbal answers	100	0	0
2	Analysis and evaluation of data for selection in order to apply to the concepts	10,7	28,7	60,6
3	Problem solving in relation to value judgements	10,6	33,51	55,9

TABLE 7.9

RESULTS OF OPEN-ENDED QUESTIONS (Expressed as percentages)
(N = 132)

		A. Pupils scoring 4+	B. Pupils scoring 3	C. Pupils scoring below 3
1	Clarity	11,5	45,9	42,6
2	Aptness	9,8	34,6	55,6
3	Logical development	9,8	32,2	58,0

(ii) **Language proficiencey**

The pupils' use of language was assessed in relation to their ability to express themselves coherently; with respect to the sophistication of the language used; in relation to the number of spelling mistakes they made and the number of grammatical errors. This assessment used a five point scale for each of the three criteria. Thus:

'Style': one mark was given if the pupil's work was either exceptionally unsophisticated or incomprehensible; while a 3 was considered to be satisfactory or adequate, and a 5, excellent.

Grammar: if pupils consistently made grammatical errors they were given a I, fewer than 5 errors was given a 3 and no errors meant the pupil scored 5.

Spelling: if pupils made more than IO spelling mistakes, they were given a I, five errors meant a 3, while pupils who made no spelling errors were awarded a 5.

Table 7.IO is a summary of the results of this aspect of the analysis of the worksheet for the Std 7 group.

TABLE 7.10

LANGUAGE PROFICIENCEY (Expressed as percentages)
(N = I32)

		A. Pupils scoring 4+	B. Pupils scoring 3	C. Pupils scoring below 3
I	Style	18,2	50,8	31
2	Grammar	49,9	37,2	12,9
3	Spelling	40,9	45,5	13,6

The relative lack of sophistication in language referred to earlier is highlighted by the following two examples:

* four pupils referred to a rabbit as a bunny;

* a pupil identified the word "chirrup" on the diagram as an animal and thus wrote: "the chirrup eats the rabbits."

The above results emphasise the link, particularly in the younger classes, between language proficiency and the pupils' performance in activities of this nature. Where pupils were unable either to express themselves or had a poor command of English, they were unable to perform competently in those areas that required a high degree of verbal fluency. Their command of English also affected their 'cue consciousness', thereby affecting their ability to interpret questions or tasks.

(iii) **Use of illustrative techniques**

The pupils' use of illustrations was assessed on the basis of their ability to apply graphic techniques correctly, the relevance of the illustrative material to the answers and whether they made reference to the illustrations used in their text. The assessment was based on the same system of a five point scale used in the previous three areas. Thus, the illustrations were analysed according to the following criteria:

* the care taken with the illustrative material;
* the techniques used;
* the aptness of the illustrations to the answers.

The results for this aspect of the pupils' work is shown in Table 7.II

TABLE 7.11

USE OF ILLUSTRATIVE TECHNIQUES (Expressed as percentages)
(N = 132)

		A. Pupils scoring 4+	B. Pupils scoring 3	C. Pupils scoring below 3
I	Care	49,7	33,6	16,7
2	Techniques	15,2	57,5	27,3
3	Aptness	19,7	62,1	18,2

A particularly significant feature of the Std 7's use of illustrative material was its tendency to decorativeness rather than aptness. Thus, while beautifully presented, as indicated by the above results, the illustrations were 'pictures' and had little relevance to the answers., Pupils in this standard also spent an inordinate amount of time on creating decorative friezes, borders and frames. Pupils' responses to this aspect of the activity was a reflection of the weight which 'cosmetic' devices carried in the assessment of assignments.

Pupils in this group also had problems in relating their data to graphs or to schematic diagrams and those who presented the apparatus used in the experiment generally labelled and developed the diagrams poorly, albeit decoratively.

(iv) **General presentation of work**

Pupils spent a great deal of time and effort in ensuring that their work was neat and attractive. The general impression of these worksheets in terms of both the 'illustrative' attempts and the presentation was that pupils were confused by the format of this activity as an 'assignment'. Their attempts to decorate their work and to make it attractive, bordered on the ridiculous as many of the pupils' answers took on the appearance of illuminated manuscripts and revealed a great deal about pupils' perceptions of what teachers expected for assignments. The results (Table 7.I2) reveal that while pupils scored highly in terms of the care taken with the presentation, few of the presentations were in actual fact appropriate to this particular activity. 'Originality' was interpreted not with regard to the approach taken to the answers or related to content, but to the appearance of the work.

TABLE 7.12

PRESENTATION (Expressed as percentages)
(N = I32)

		Pupils scoring 4+	**Pupils scoring 3**	**Pupils scoring below 3**
I	Care	48	42	I0
2	Aptness and presentation	20	3I	49

(v) **Global results**

The global assessment of the worksheets was calculated by adding the numerical assessment of the questions to the rated assessment given to the various criteria. Teachers hoped that this assessment system would provide a more realistic picture of the pupils' capabilities in geography than it was belived previous assessment systems had given. Teachers felt that in relation to the pupils' examination results, assessment of assignments in previous years had given an 'inflated' impression of the pupils' actual abilities. This total was therefore compared to both the assessment for assignment work of previous years (between 1980 and 1985), and to previous June examination results in the Std 7 group. The table below indicates the results of this analysis.

TABLE 7.13

GLOBAL ASSESSMENT (Expressed as percentages)
(N = 132) (1986)

(a) **According to group averages** (1980-1985 represents the average over that period.)

1	'Ecocide' results - 1986	60%
2	Previous assignments - 1980-1985	66%
3	June examination results for Std 7 - (1980-1985)	64%

(b) **According to symbol distribution**

	A 80%+	B 70-79%	C 60-69%	D 50-59%	E 40-49%	Less than 39%
1 Ecodide	5	23	38	24	10	-
2 Previous assignments 1980-1985	27	27	23	14	7	2
3 Previous June results 1980-1985	10	22	23	30	12	3

The initial staff reaction to this analysis was that the assessment system used for the first activity appeared to provide a truer reflection of the pupils' performances in terms of their June examination results and that there was less 'inflation' in the symbol distribution in the 'A' and 'B' symbol categories.

7.3.l.2 **The assessment and results of the Std 9 worksheet: "Rain, the exception rather than the rule in South Africa"**

The Std 9 pupils were allocated a double period (one hour and ten minutes) for the worksheet, after which it had to be completed as homework. This group was also given a week in which to complete the task. The sections of the worksheet relating to the interpretation of the two synoptic maps [Figure 7.3(a) and (b)] were differentiated, with certain questions set for higher grade pupils only. While these sections were directly linked to the climatology coursework, the emphasis of the questions was on the interpretation of the maps and the application of the theory rather than on the reading of the maps or regurgitation of the theory.

The section relating to the rainfall data [Figure 7.4(a), (b) and (c)] was undifferentiated and less directly related to specific sections of the coursework. Pupils could not make use of notes or textbooks as their notes would be of little help in the interpretation of the data. A total of 5l pupils completed this activity. The group was composed of 9 standard grade pupils and 42 higher grade pupils.

The Std 9 worksheet was analysed in the same manner as that developed for the Std 7 group. Consideration was given to the following aspects:

(i) the pupils' proficiency in specific skill areas;

(ii) their language proficiency;

(iii) their use of illustrative techniques;

(iv) the general presentation techniques used.

A global analysis of those pupils' work was also done for the same reason as the Std 7 global assessment.

(i) **Skill analysis**

The set of questions in Table 7.l4 required pupils to transfer information from the synoptic maps and the rainfall data into verbal answers. As was the case with the Std 7 group, the Std 9 pupils experienced no difficulties with

(1)

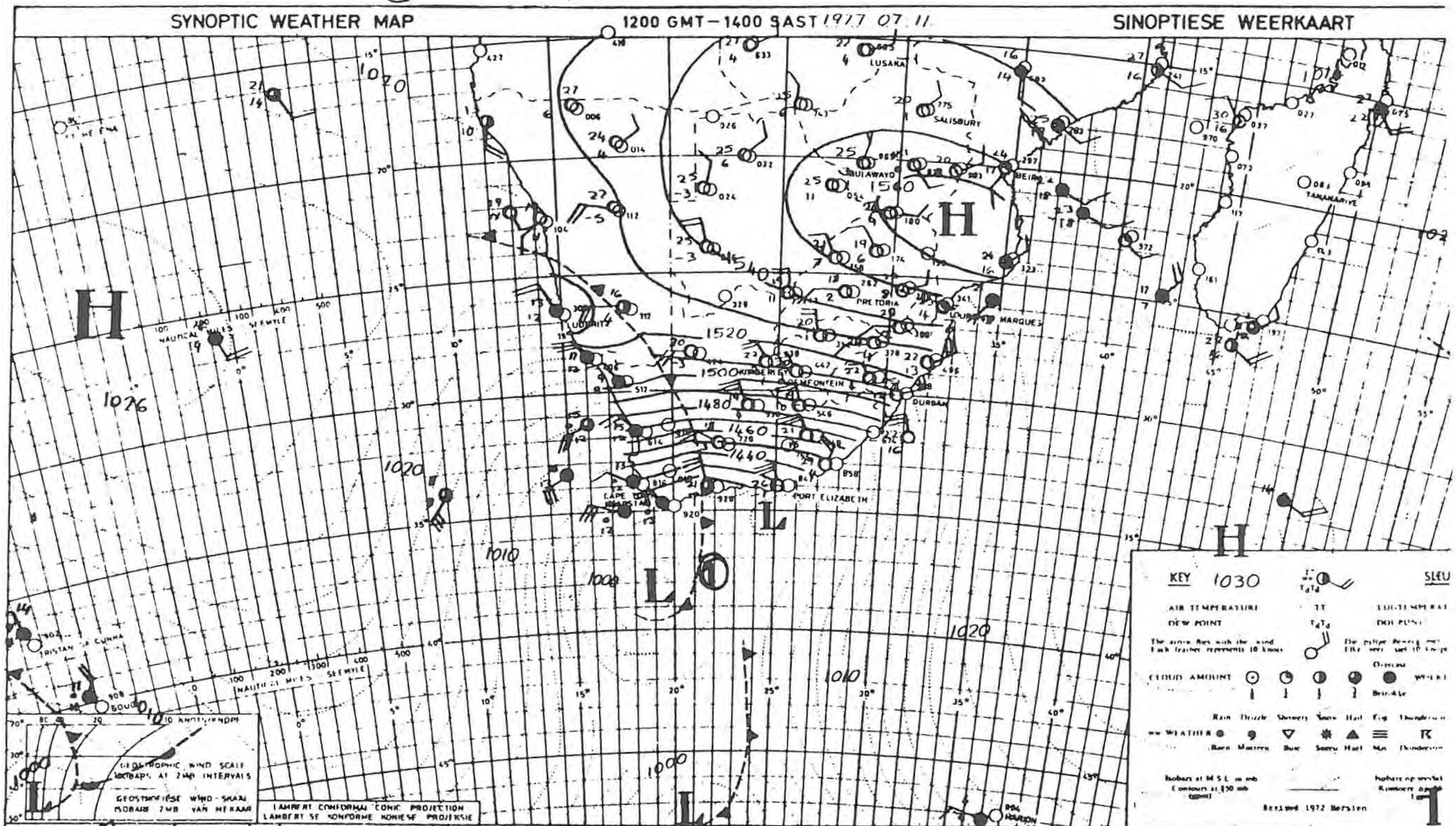


FIGURE 7.3a
SYNOPTIC MAP I : STD 9 WORKSHEET

INFERENCE	AFLEIDING
The strong high over the Atlantic ocean is moving rapidly eastwards. Cold air will spread over most parts of the country overnight and during tomorrow with showers and snowfalls over the southern half of the Cape Province.	Die sterk hoog oor die Atlantiese oceaan beweeg vinnig ooswaarts. Koue lug sal oornag en môre oor die meeste dele van die land instoot m buie en sneeneerslae oor die suidelike helfte van die Kaapprovinsie.

GRIFF-STAN EL

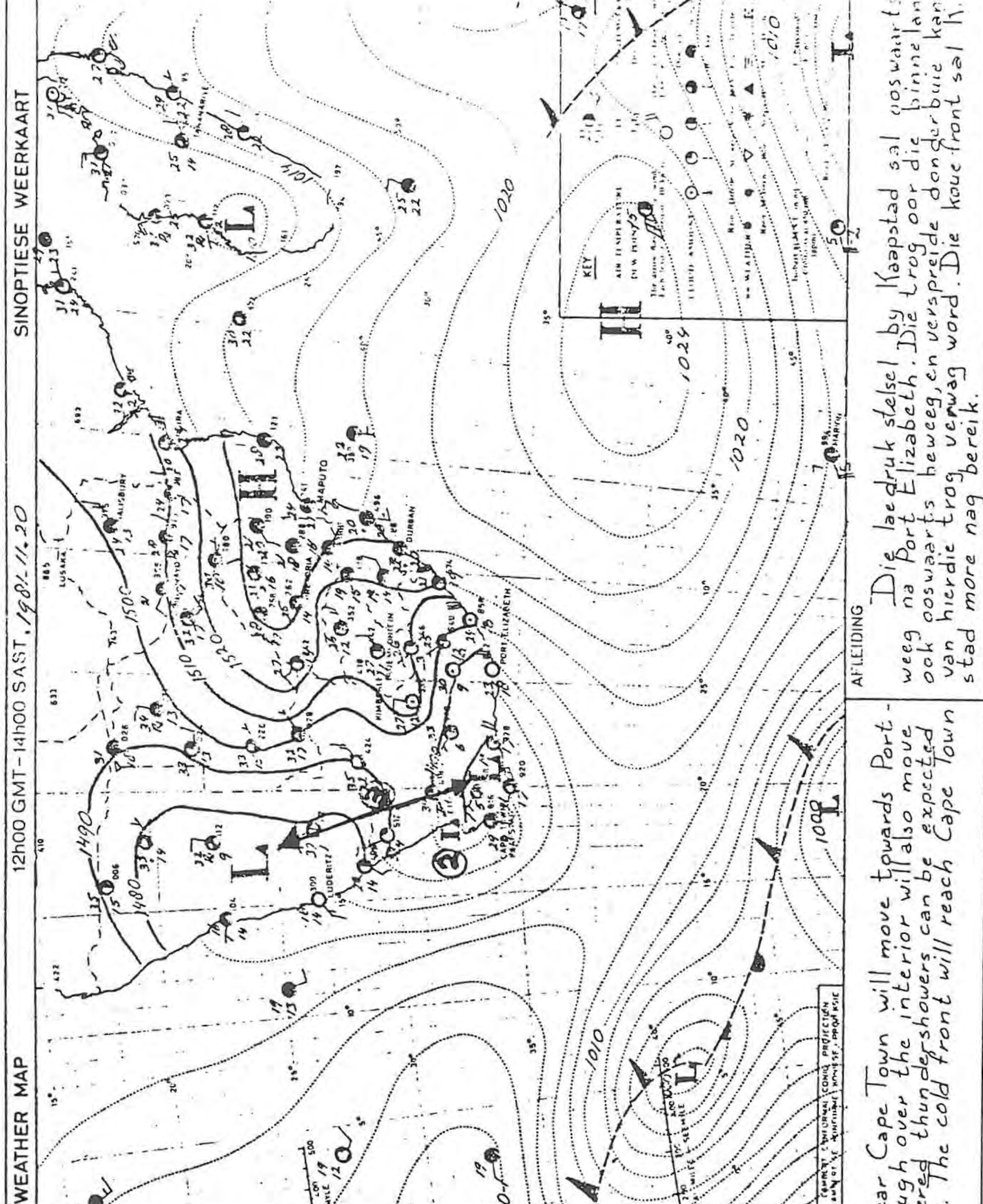


FIGURE 7.3b

SYNOPTIC MAP 2 : STD 9 WORKSHEET

RAINFALL IN MM. : EAST LONDON

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTALS
MEAN	73,1	87,1	106,4	82,5	53,7	37,4	38,1	49,3	85,2	99,1	94,3	73,7	879,5
1940	57,2	167,4	88,6	25,9	61,5	0,3	36,1	33,3	59,9	33,3	80,5	87,1	731,1
1941	39,4	84,1	47,0	239,5	9,9	51,8	1,5	22,4	21,6	216,2	85,9	103,6	922,9
1942	109,5	75,7	32,0	24,6	94,5	4,6	13,5	64,0	30,5	76,5	171,7	55,4	752,5
1943	75,7	28,5	20,3	158,0	13,0	135,6	0,8	100,6	21,1	47,5	187,2	88,1	876,4
1944	86,6	44,7	155,7	48,8	63,8	381,	21,1	20,1	166,9	79,5	18,3	73,2	816,8
1945	58,7	41,7	45,2	17,5	17,0	19,3	9,9	14,7	51,6	189,5	19,1	16,3	500,5
1946	76,0	44,2	243,3	13,7	32,0	22,9	6,6	22,6	56,6	89,9	118,4	52,1	778,3
1947	86,6	36,3	219,5	57,2	49,5	115,3	70,4	28,5	53,6	75,4	133,4	94,2	1019,9
1948	54,4	45,0	111,0	241,6	10,9	1,5	18,5	3,8	73,2	210,6	66,0	63,2	899,7
1949	64,0	88,4	49,0	42,7	9,1	0,8	0,0	33,8	83,6	104,4	226,8	67,3	769,9
1950	32,5	54,9	43,2	33,5	131,6	10,2	3,6	70,4	16,0	88,6	49,5	224,3	758,3
1951	159,1	36,9	164,5	9,0	9,5	27,2	64,8	31,6	291,7	47,6	0,6	75,6	918,1
1952	128,0	65,9	31,1	57,6	46,8	5,0	4,0	66,1	281,1	35,5	75,0	119,0	915,1
1953	177,5	1031,	37,9	37,2	6,5	85,9	3,9	74,1	119,2	465,0	182,1	56,2	1348,6
1954	34,3	100,3	196,9	27,7	60,6	68,6	34,6	76,9	97,2	117,4	85,4	29,5	929,4
1955	65,6	145,8	92,6	21,2	13,3	70,6	0,4	18,8	87,8	56,1	75,3	57,6	705,1
1956	20,1	182,7	117,7	38,0	48,8	1,3	39,8	38,6	146,5	65,8	191,5	41,4	932,2
1957	17,0	89,9	163,7	82,7	28,8	66,4	4,4	40,6	157,3	62,8	20,0	41,0	774,6
1958	99,0	108,5	74,2	84,4	21,7	4,3	60,9	56,7	111,2	52,6	90,8	189,0	953,3
1959	66,3	46,9	55,0	112,7	152,3	5,5	199,4	33,1	56,9	80,2	30,7	84,6	923,6
1960	83,0	37,8	93,7	70,7	119,1	2,0	11,8	20,4	61,2	136,6	71,9	54,9	763,1
1961	57,3	31,5	153,1	202,5	69,8	18,1	150,9	17,9	27,7	41,7	82,7	51,4	904,6
1962	76,8	91,4	229,4	113,8	33,6	2,9	9,0	29,1	36,6	145,6	60,7	38,2	867,1
1963	145,1	90,3	585,4	86,8	45,1	9,5	91,6	11,5	27,9	63,9	121,6	52,6	1331,3
1964	93,5	160,1	77,5	110,9	25,9	192,7	1,4	54,4	91,3	57,1	32,3	40,1	937,2
1965	47,0	30,9	22,0	22,0	125,4	45,3	24,9	18,1	153,9	155,2	128,8	31,1	804,6
1966	136,3	32,6	31,7	33,8	120,9	25,8	13,7	43,9	42,7	13,7	170,0	43,4	713,5
1967	79,3	85,0	109,3	325,0	159,3	29,7	68,9	16,9	38,1	35,4	59,8	22,9	1029,6
1968	21,8	17,3	63,3	72,0	8,0	88,6	8,7	38,0	155,8	74,1	45,9	67,6	661,1
1969	24,2	112,1	119,6	39,7	45,7	32,7	47,2	39,0	61,1	79,4	105,4	30,3	736,4
1970	29,3	44,0	47,2	33,1	11,0	77,4	4,3	858,6	87,0	199,5	49,1	167,5	1608,0
1971	54,9	116,3	61,4	147,3	84,3	9,2	98,7	100,7	22,0	115,3	87,8	84,1	982,0
1972	73,2	228,7	47,7	15,1	6,5	33,4	24,7	36,8	46,7	30,6	120,7	37,4	701,5
1973	38,8	113,4	112,4	130,3	14,1	6,5	11,4	88,2	15,8	102,2	221,2	92,6	946,9
1974	130,4	127,2	187,1	63,5	137,7	46,2	1,7	1071,	95,1	36,1	123,0	37,4	1092,5
1975	41,4	63,7	41,1	41,8	5,9	29,0	22,5	120,9	257,8	5,0	53,0	110,9	793,0
1976	51,1	221,1	214,6	35,9	37,4	10,4	110,5	21,7	75,7	210,0	93,7	66,7	1148,8
1977	441,	146,4	12,2	143,7	128,4	36,8	9,9	81,1	112,5	34,8	196,1	177,6	1123,6
1978	73,0	60,3	54,6	233,1	55,0	55,9	24,0	13,5	35,1	193,0	114,7	193,2	1105,4
1979	57,1	61,7	62,2	19,3	77,8	15,3	218,1	224,4	71,7	56,8	21,8	33,4	919,6
1980	22,9	35,6	32,1	30,7	8,9	20,5	13,7	25,6	87,5	117,7	116,4	51,5	563,1

FIGURE 7.4(a)

RAINFALL DATA : STD 9 WORKSHEET

RAINFALL IN MM. : STATION 644, PORT NOLLOTH

MEAN

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTALS
1960	0000	003,1	011,9	02,5	003,5	004,4	000,2	000,2	002,2	001,0	000,6	0000	
1961	001,0	0000	002,0	032,7	010,8	017,9	010,9	009,3	006,5	003,5	000,4	003,1	
1962	000,5	0000	0000	003,2	002,5	015,3	010,4	026,5	004,5	001,0	011,8	001,7	
1963	003,3	000,2	0000	036,8	003,3	031,1	001,8	027,7	001,8	000,7	000,5	0000	
1964	0000	000,3	001,5	001,1	020,4	082,8	006,2	008,5	006,8	001,1	010,6	0000	
1965	0000	001,1	000,1	003,3	000,1	000,4	004,6	006,2	010,9	011,9	000,7	008,7	
1966	000,7	003,5	002,5	003,3	0000	001,2	004,0	001,1	004,0	000,6	0000	000,3	
1967	001,1	000,3	008,2	025,2	008,2	018,3	002,4	000,3	000,7	006,4	001,3	000,1	
1968	0000	000,2	003,0	000,2	004,2	007,8	005,5	010,7	0000	006,6	0000	000,4	
1969	0000	019,2	002,4	002,2	0000	013,0	001,2	002,0	002,1	001,9	00 0	000,5	
1970	000,2	003,5	000,1	000,2	007,3	002,7	007,7	015,7	0000	0000	0000	006,0	
1971	000,5	000,4	0000	0000	000,5	001,1	010,7	010,2	0000	0000	000,7	0000	
1972	003,1	001,7	004,3	001,7	001,4	005,9	005,9	013,5	002,9	003,0	0000	001,0	
1973	0000	001,1	000,8	001,7	001,0	0000	014,9	002,1	001,1	003,0	0000	009,6	
1974	0000	009,6	0000	0000	oo1,5	005,1	003,2	031,1	005,3	001,5	003,5	0000	
1975	008,0	0000	002,3	000,7	024,9	0000	oo7,2	0000	oo1,9	001,8	005,2	0000	
1976	0000	005,3	000,9	010,2	001,0	o04,5	016,2	002,0	002,4	023,6	005,2	002,2	
1977	000,4	008,9	0000	005,6	009,0	010,5	033,3	006,7	004,0	005,3	001,7	002,0	
1978	0000	000,7	007,4	001,2	0000	001,0	000,2	006,3	0000	001,1	001,7	000,7	
1979	000,6	0000	000,4	0000	010,0	001,7	002,7	004,9	020,1	001,4	0000	008,0	
1980	0000	009,8	0000	004,0	003,2	015,6	0000	029,9	090,0	0000	004,5	0000	
1981	0000	0000	002,5	000,1	000,8	003,9	010,8	014,9	004,7	032,5	0000	0000	
1982	0000	0000	018,5	026,3	006,7	023,3	018,8	008,3	001,5	013,5	000,4	000,2	
1983	0000	002,9	0004,9	000,0	045,2	001,5	002,7	004,9	020,1	001,4	001,5	000,5	
1984	001,5	002,5	014,0	002,3	016,0	0000	000,1	002,5	000,7	014,9	000,4	010,9	

FIGURE 7.4(b)

RAINFALL DATA : STD 9 WORKSHEET

RAINFALL IN MM. : STATION NO. 17, CAPE TOWN

MEAN

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTALS
1963	0071	0040	0039	0062	0873	-	-	0873	0236	0110	0372	0129	
1964	0022	0488	-	-	-	-	0843	0836	0336	0376	0207	0064	
1965	0164	0255	0366	-	-	-	0140	0699	0195	-	-	-	
1966	-	-	-	-	-	-	-	-	-	-	-	-	
1967	0183	0002	0056	0669	0402	-	0618	0422	0294	0505	0354	-	
1968	0166	0109	0006	0436	1053	1162	1136	0377	0222	0800	0019	0191	
1969	0310	0107	0192	0515	1785	0478	0624	0428	0624	0029	0037		
1970	0062	0134	0027	0860	0843	1091	1109	0818	0470	0487	0175	0340	
1971	0091	0009	0102	0180	0474	0579	0603	0858	0294	0234	0034	0155	
1972	0252	0076	0174	0461	0767	0685	0385	0555	0349	0184	0001	0352	
1973	5018	0136	0172	0084	2390	0331	0817	0504	0907	0107	0057	0224	
1974	0089	0046	0072	0046	1264	1300	0828	2148	0383	0401	0192	0057	
1975	0202	0009	0105	0459	1437	0511	1555	0614	0093	0329	0310	0018	
1976	0200	0049	0180	0404	0487	1846	0617	0742	0473	0054	0567	0532	
1977	0144	0532	0127	0783	1306	1664	1089	1254	0280	0110	0144	0069	
1978	0129	0772	0370	0597	0408	0823	0182	0823	0630	0231	0069	0184	
1979	0179	0760	0566	0092	0631	0764	0459	0403	0214	0808	0021	0024	
1980	0127	0159	0006	0523	1134	0759	0296	0396	0239	0212	0627	0293	
1981	0584	0203	0713	0525	0138	0525	1096	0008	0878	0097	0149	0125	
1982	0213	0060	0122	0447	0484	0656	0583	0812	0137	0290	0299	0278	
1983	0107	0486	0386	0078	0959	1659	0594	0141	0430	0105	0035	0075	
1984	0140	0055	0319	0224	1333	0455	0483	0307	0859	2800	2022	0705	
1985	0254	0143	0725	0496	0446	1103	1323	-	-	-	-	-	

FIGURE 7.4(c)

RAINFALL DATA : STD 9 WORKSHEET

questions of this nature. The set of questions in Table 7.15, which were related to the synoptic maps, and those in Table 7.16, which were concenred with the rainfall data, required pupils to analyse and evaluate the information, select relevant information and to apply it to the problems posed by the questions. Questions pertaining to the rainfall data also required pupils to analyse and to process the information imaginatively to substantiate their arguments.

The results of the questions set in Table 7.16 revealed that pupils both on the higher grade and standard grade experienced a number of problems in dealing with questions related to the synoptic maps.

TABLE 7.14

QUESTIONS RELATING TO TRANSFERENCE OF INFORMATION

Figure 7.3a (Section C)

C. Q. I. (a)

i Identify the phenomena marked from I-3 on the two synoptic maps.

ii With which weather system is I associated?

iii Name the high pressure system which dominates the interior of Southern Africa on both maps.

Figure 7.3(a)

D. Carefully study the feature No I on synoptic map I. Then answer the questions which follow.

I By means of a cross-sectional diagram, indicate how this feature will affect the weather of the area over which it passes.

Section D. Figure 7(a)

2 These questions pertain to the figures for East London.

I What is generally the wettest month in East London?

2 What is generally the driest month in East London?

3 In which month and year was the HIGHEST rainfall recorded in East London?

4 In which month and year was the LOWEST rainfall recorded?

TABLE 7.15

SYNOPTIC MAP QUESTIONS - INTERPRETATION OF MAPS

Section C. Q. 1.

(b) What evidence is there on EACH of the synoptic maps to substantiate that 1 is depicting winter conditions, while 2 is depicting conditions common to summer?

(c) With the aid of clear diagrams, indicate the situation of the upper air inversion layer as it would appear on each of the maps, then:

i explain how this inversion layer is affecting the circulation of air in each case.

ii explain how this circulation of air will influence the rainfall over the Republic.

iii HG only. Consider your previous answers and then explain the apparent anomaly of cloud cover along the Mozambique coast and in the Mozambique channel.

Section D.

2 Explain the effect this system is having on the P.G. and the wind speed of the Republic south of the Transvaal.

3 HG only. Account for the absence of a warm front in system No 1.

4 HG only. Explain why such a system (No 1) does not bring GENERAL rain to all parts of the country but confines it to the SW Cape and the adjacent coastline.

(A study of the rainfall figures of Port Nolloth and Cape Town will help to confirm this factor.)

5 On map 1, Port Elizabeth is experiencing a berg wind. From the map, quote evidence to substantiate this statement.

6 Describe the link between berg winds and feature No 1.

Section E

The following section refers particularly to Map 2 (Figure 7.3b)

1 Thunderstorms are recorded at Bulawayo and are likely to develop east of the line nmarked 3, and in the areas of Lesotho. For each of these three areas, explain the TYPE of thunderstorm which will develop.

2 Explain the EXTENSIVE cloud cover over the Republic as shown on the map.

3 HG only. Cloud cover in the SW Cape is an anomalous situation at this time of year. Explain the presence of cloud cover here.

4 HG only. Consider the following 3 areas: Bulawayo, Lesotho, Kimberley, by studying the conditions depicted on the map.

(a) Which of these three places would have the greatest intensity of thunderstorm should they develop on this day?

(b) Motivate your answer in I by applying your theoretical knowledge of thunderstorms to the actual conditions depicted.

TABLE 7.I6

ANALYSIS OF SECTION D-F - THE INTERPRETATION AND ANALYSIS OF RAINFALL DATA (Figure 7.4a, b and c)

SECTION D : RAINFALL - PATTERNS AND VAGARIES

This section applies to the three sets of rainfall figures you have been given and to the two synoptic maps.

(a) I "East London has a summer rainfall maximum, Cape Town has a winter rainfall maximum."

Study the figures and quote evidence to either prove or disprove this hypothesis.

2 What other factor or factors can be used to test this statement?

(b) If you wish to visit Cape Town for sea, sun and fun, which month of the year would you choose? Explain by quoting evidence from the figures provided why you would visit at this time.

(c) "Good rain in the South West Cape means dry conditions for the eastern half of the country."

Do the figures you have substantiate this hypothesis? Explain.

(d) "Rainfall in South Africa has a cyclic pattern."

Study the figures you have and explain your findings in this respect.

(e) Compare the figures you have for Port Nolloth with those of East London.

I In spite of the uniformly low rainfall of Port Nolloth, can it be said that the town has a "rainy season"? Motivate your answer.

2 The differences in the amount of rainfall between these two towns is dramatic. Explain the factors that are responsible for this.

3 Using these figures from I970-I986, plot a graph to compare the rainfall of October with that of March and July.

An examination of these results (Table 7.17) indicates that only 12,2% of the higher grade pupils were able to score above 70% for this section, with none of the standard grade girls scoring 70% or higher.

TABLE 7.17

INTERPRETATION, ANALYSIS AND EVALUATION OF SYNOPTIC MAPS (Expressed as percentages)

	A 80%	B 70-79%	C 60-69%	D 50-59%	E 40-49%	F Less than 39%
H.G.(N=42)	2,4	9,5	16,0	26,0	35,7	10,4
S.G.(N=9)	0	0	11,0	44,4	33,3	11,3

An analysis of the pupils' responses to these questions indicated that pupils were unable to manipulate the data on the maps in order to solve the problems posed by the questions. As had been the case of the Std 7 pupils, the Std 9 pupils appeared to have difficulty in either perceiving or analysing patterns and were unable to make the necessary conceptual links between the information given on the maps and the questions. These pupils, when questioned about their responses to this section of the worksheet, revealed that not only did they have a poor grasp of what the questions required of them, but that their understanding of this section of climatology was extremely poor. It was therefore difficult to determine to what extent these questions reflected their actual level of skill development.

The results of the section relating to the analysis of the rainfall data (Table 7.18) reveal that pupils generally performed better in this section, which was less directly related to an understanding of their coursework in climatology.

TABLE 7.18

INTERPRETATION AND ANALYSIS OF RAINFALL DATA]
(Expressed as percentages)

	A 80%	B 70-79%	C 60-69%	D 50-59%	E 40-49%
H.G. (N = 42)	2,5	19	26,1	47,6	4,8
S.G. (N = 9)	0	11,2	22,2	56,6	10,0

An analysis of the pupils' responses to this section of the worksheet revealed that pupils were generally able to answer the questions aptly and logically. However, only the top 2,5% of the pupils were able to use the data given in an innovative manner to substantiate their answers. Those pupils were also the only ones who attempted to use graphs to highlight or to illustrate their answers.

The generally poor performance by the pupils in Std 9, however, was largely ascribed by the pupils to the fact that they had considerable difficulties with this section of the coursework and this was reflected in the June examination results for this section of the syllabus. The researcher, therefore, felt that while the worksheets' value lay in identifying specific problems related to the concepts, principles, propositional knowledge and skills contained within this area of climatology, it was difficult to determine the degree to which the Std 9 pupils could apply high order skills of analysis, synthesis and evaluation in general geographical terms.

The Std 9 tasks did, however, highlight the following.

(i) These pupils had not had a sufficiently broad exposure to the variety of instruction approaches used in questions of this nature. As preparation for future IST and for the senior certificate examination, more emphasis would have to be placed on question analysis techniques.

(ii) The mastery of aspects of the syllabus is closely linked to the Rylian notion which emphasises that the presentation of facts, concepts and principles is not enough, but that pupils need to be engaged in activities which require reflection and understanding and the application of skills (Griffiths, 1987). The pupils, in their evaluation of this activity, emphasised the need to do frequent, but shorter exercises of this nature as each section of the syllabus is presented. This emphasised the need to perceive IST as an integral rather than a separate component of the geography curriculum.

(iii) The pupils in Std 9 needed the same sorts of opportunities identified for the Std 7 girls in order to develop perception of patterns and relationships. A key question raised by these results was whether it was possible to develop perceptual understanding within a progression framework from Std 6 to Std 10. This, therefore, became a primary objective of the subsequent development of the IST programme.

(iv) The need to identify specific problems early in the presentation of aspects of the syllabus so that these could be attended to promptly. Problem oriented activities such as were contained in the worksheet were perceived as a means through which this could be done.

(v) The need for specific instruction in and practice of techniques related to the interpretation of graphs and tables.

(vi) The differences that exist between pupils in the same group with regard to their ability to apply high order skills and with regard to their development in this aspect. This, implies that greater emphasis needs to be placed on skill identification and skill teaching, in order to ensure that all the pupils have a basic grasp of the skills and the propositional knowledge associated with their application.

(ii) **Language proficiency**

Pupils in Std 9 were assessed on the same basis as the Std 7 group in terms of language proficiency. The results are indicated in Table 7.19. No distinction was made in terms of higher grade or standard grade pupils.

TABLE 7.I9

LANGUAGE PROFICIENCY (Expressed as percentages)
(N = 5I)

		A Pupils scoring 4+	B Pupils scoring 3	C. Pupils scoring below 3
I	Style	66,6	29,5	3,9
2	Grammar	68,6	15,7	15,7
3	Spelling	94,I	3,9	2,0

These pupils made relatively few spelling mistakes and the errors in grammar were primarily related to the wrong use of tenses and incorrect use of the apostrophe. Further analysis revealed that the pupils who performed exceptionally poorly in terms of language were the same pupils who had performed particularly poorly in answering the questions related to the synoptic maps. Further investigation revealed that while these pupils were not strong English candidates, they had passed the subject on the higher grade in Std 8. When questioned, these pupils indicated that they had great difficulty in understanding this section of the curriculum and had not understood the questions.

(iii) **Illustrative techniques and presentation**

The Std 9 worksheet did not assess presentation as a separate criterion, but concentrated on the illustrative techniques used and their presentation. A rated scale was used for the three criteria: presentation techniques used and originality of interpretation. The results are shown in Table 7.20. No differentiation was made between higher grade and standard grade.

TABLE 7.20

ILLUSTRATIVE TECHNIQUES (Expressed as percentages)
(N = 5l)

		A. Pupils scoring 4+	B. Pupils scoring 3	C. Pupils scoring below 3
l	Presentation	68,6	17,7	13,7
2	Techniques	66,7	3,9	29,4
3	Originality	27,5	64,7	7,8

Where instructions specified the construction of a graph, the pupils generally proved to be competent in the extraction and processing of the data. These graphs were correctly constructed and presented with care. Very little real innovation, however, was demonstrated in the use of the data provided. Only eight of the 5l pupils made an attempt to develop graphs either as a means to illustrate their answers or to provide evidence for their argument, unless so specified. Therefore, while this group was able to construct graphs using data, they did not show an understanding of the role of graphicacy in geography. They were not able to conceptualise where graphs or sketch maps would have created an effective means to substantiate their arguments or would highlight their answers. These pupils were unable to perceive the need for graphicacy in the 'cues' provided in the questions unless specified.

(iv) **Global analysis of Std 9 results**

The global assessment of the Std 9 activity was obtained by adding the numerical evaluation of the synoptic map section to the rated assessment of the rainfall data and the scores obtained by the pupils for language and illustrative techniques. These results were compared with the previous assessment of assignment work in Std 9 between l980 and l985, and with these pupils' June results.

TABLE 7.2I

GLOBAL RESULTS (Expressed as percentages)
HG (N = 42); SG (N = 2)

A. Group averages

		HG	SG
1	First activity 1986	58	49
2	Previous assessment of Std 9 assignments 1980-1985	63	60
3	June examination - 1986 : Std 9 gorup	50	46

B. Symbol distributions

			(A)80%	(B)70-79%	(C)60-69%	(D)50-59%	(E)40-49%	(F)Less than 39%
1	First activity	HG	2	12	32	32	17	5
		SG	0	0	12	44	33	11
2	Previous assignments	HG	12	33	20	25	10	-
		SG	7	20	26	27	13	7
3	June examination	HG	-	13,7	23,5	41,1	17,8	3,9
		SG	-	-	24,0	37,6	35,4	3,0

Once again, staff felt that this assessment provided the teacher and the pupil with a more realistic analysis of pupils' potential in geography, particularly in relation to the symbol distribution of the group.

7.3.1.3 General evaluation of the first IST exercise

Evaluation

The pupils' evaluation of their respective exercises (Appendix 7F) revealed the following pertinent facts:

(i) Both groups exceeded the time allocation for this exercise.

Reasons for the undue amount of time spent on the exercises included:

(a) time spent on unnecessary decoration and irrelevant illustrations;

(b) a poor grasp of the theory upon which the questions were based;

(c) poor time budgeting and poor organisation.

(ii) Pupils were asked to indicate those questions which they found to be difficult and those questions which they found interesting. The Std 9 pupils were also asked to indicate the questions they found difficult to understand. The questions were grouped according to (a) deductive questions which, while challenging, provide sufficient structure within which the pupils are able to work; (b) inductive questions, which related simply to a repetition of factual information' and (c) innovative questions. The latter questions depended on the pupils expressing their own opinions, solving problems or analysing a situation. These questions were also open-ended and gave the pupils freedom of interpretation.

An analysis of the results reveals the following:

TABLE 7.22

PUPIL EVALUATION OF QUESTIONS

	A. DEDUCTIVE		B. INDUCTIVE		C. INNOVATIVE	
	Difficult	Interesting	Difficult	Interesting	Difficult	Interesting
Std 7	27,1%	51,9%	0%	21%	72,9%	28%
Std 9	45,2%	34,8%	-	-	54,8%	65,2%

Both groups generally found the innovative type questions to be most difficult. The Std 7 group indicated that these questions were also less interesting than the deductive type questions, but more interesting than the inductive questions. The Std 9 group tended to find the innovative questions most interesting to do. When these results were assessed by the staff concerned, it was felt that the Std 7 pupils were threatened by questions which did not have a structure within which to work, as they had no prior experience of this type of activity. In Std 9, however, the pupils had sufficient understanding of this system of questioning through previous assignments.

It must be noted, however, that the innovative questions were also those sections not directly related to the Std 9 coursework. These sections were, therefore, not affected by the problems which a number of the girls were experiencing with the climatology syllabus material.

(iii) Assignments are frequently perceived by pupils as having little relevance and as a waste of time. In an attempt to assess to what degree pupils were able to identify the purpose of an activity, pupils were asked to interpret the value they perceived the exercise to have. The results indicate that the Std 7 pupils felt that the exercise had achieved various stated aims, and 58,2% were able to identify the primary thrust of the exercise. The Std 9 evaluation revealed that 81,3% of the pupils found the exercise to have value.

In the general comments made by the Std 9 group, the pupils indicated that this exercise had illuminated the way in which this section of the syllabus should be approached in relation to their preparation for the examinations.

(iv) In earlier discussions between the researcher and the four geography teachers at the school, the suggestion was made that IST make increasing use of group projects. This, the teachers felt, would be beneficial, both in terms of being able to reduce the time spent on IST by the individual pupils and in terms of developing social skills such as teamwork, tolerance, leadership and organisational skills. The pupils, in their evaluation of this suggestion, revealed that at Std 7 level they preferred to work on their own as "in groups there are some people who do all the work and others who do nothing. It is therefore not fair." At Std 9 level the pupils indicated that they envisaged working as a team to collect data and to develop the assignment or project, but that they preferred to present the final product as a piece of independent and individual work, giving the same reason as the Std 7 pupils for this preference.

Staff evaluation

The exercise was evaluated at its conclusion by the four geography teachers at the school and by the two senior biology teachers, who were asked to comment as 'non participant observers'. The following emerged from this evaluation.

(i) All the teachers concerned with the evaluation felt that the Std 9 exercise was too time consuming. The teachers felt that this exercise should have been set as three separate exercices.

(ii) The biology teachers as well as the geography teachers felt that this type of activity had more value than a worksheet which relied on the repetition of material from textbooks. The senior biology teacher considered the Std 9 task to be relevant in terms of the standards set by the senior certificate examination and to be "challenging yet not beyond the scope of the weakest pupils."

(iii) The staff also saw great merit in the type of stimulus material which was included.

(iv) Concern had been voiced by the staff who moderated the assessment in relation to the length of time needed for the assessment of each criterion for each of the open-ended questions. The biology teachers were also of the opinion that a general assessment for each of these criteria would achieve the same results. These teachers noted the bunching effect of the marks caused by the rated scale and while seeing merit in the ensuing profile, felt that it would be better to allocate specific marks to each criterion. The use of constructive comments in each criterion was perceived to have particular merit.

The researcher, however, identified the following limitations:

(i) It had not been possible to make any real comparison between the Std 7 and Std 9 pupils in terms of their development and application of high order skills, as the Std 9 pupils' performances were affected by the problems they experienced in understanding the coursework upon which the worksheet was based.

(ii) While the worksheets had been designed to give an indication or a guide to various proficiencies, the analysis of aspects related to language, presentation, illustrative techniques and general originality of approach was more easily done than the analysis related to cognitive and affective skills. All that could be effectively determined was that pupils either did nor did not have difficulty in identifying patterns. Thus, the only generalisations that could be made were that pupils needed more instruction in specific skill techniques and more practice in their application. The danger in such an assessment lies in teachers using this type of exercise or activity as an absolute measure of specific skills, which, of course, it is not meant to be.

(iii) The diagnostic function of these worksheets was also limited to these pupils in this particular year and no broad generalisations could be made in relation to Std 7 or Std 9 pupils per se. Therefore, the researcher felt that it was important to repeat this type of activity each year at the start of the IST programme.

(iv) The numerical value given to the criterion assessment tended to be not only clumsy but somewhat contrived in terms of the rated scale.

7.3.l.4 Implications of the first activity for subsequent IST development

Notwithstanding the identified limitations, the worksheets for the Std 7 and Std 9 pupils provided a useful starting point from which to proceed in developing subsequent activities for the IST programme. The following aspects were considered to be particularly significant.

(I) The worksheets emphasised the relationship between pupils' levels of understanding of the coursework and their ability to apply specific skills in order to solve problems, make associations or to generalise. This underlined the need to provide pupils with sufficient opportunities to expand their understanding of the coursework through regular exposure to activities which emphasised reflection, analysis and evaluation. Essentially, this meant that IST would need to be perceived as an integral part of the day-to-day geography teaching if pupils were to develop the sorts of skills which the preamble to the l985 Revised Syllabus identified as important to geographical education.

(ii) The data response questions in both worksheets revealed that a wide range of perceptual understanding exists among pupils of the same age group. Thus, while all of the pupils were able to select isolated information from the pictorial data, maps or tables, their ability to make associations, to perceive patterns or to manipulate data in other ways varied considerably. Using data such as these added a further dimension, which, when associated with the pupils' levels of understanding of the relevant coursework, created a complex skill-web which many of the pupils found overwhelming. At the time of the development of the worksheets, the complexity of the skills and their interaction was not fully understood either by the researcher or by the other teachers concerned. The pupils' responses to these activities and their evaluation of the worksheets, emphasised the need for wider analysis of the skills involved in such activities and for teachers to be aware of the graphic data used in questions of this nature as a possible 'distractor' affecting pupils' performances. A further implication of the pupils' responses to these sections of the worksheets was that teachers would need to be more alert to what they intended to test when providing stimulus material.

(iii) The links between pupils' 'cue consciousness', their understanding of language and the ability to apply skills was another aspect which was highlighted. The correct interpretation of questions required more than a knowledge of the vocabulary used. The pupils needed, in a number of the questions, to be able to pick up more subtle nuances and shading in the language, which is of itself related to skill development in terms of analysis. Future tasks of this nature would, therefore, need to take this aspect into account, as the younger pupils in particular revealed that they had as yet not reached this level of competence with respect to language usage.

It was interesting to note the way in which a number of the pupils' language deteriorated to the point of incomprehensibility when they were confused by a particular question, in that grammar, spelling and syntax became non-existent. A further point of interest with respect to language was the problem a number of pupils experienced with logical sequencing of ideas. Thus, while many of the answers contained the necessary information, the various sections were not drawn together to form a coherent whole. This aspect emphasised the need to expose pupils to a variety of different techniques in the practical component of

IST which would provide them with both spoken and written opportunities to develop their language skills in geography and for geography.

(iv) While pupils generally executed graphs and diagrams with care, too many of the pupils at Std 7 level interpreted illustrative material in geography in terms of 'decoration'. Far too much energy was expended on this type of presentation and teachers and pupils would have to be weaned from the view which emphasises the 'cosmetic' effect of work of this nature (Marsden, l976).

The Std 9 pupils, although less prone to creating time wasting visual 'effects', were often not aware of the role of graphs and diagrams in geographical analysis. Future activities designed for IST would need to emphasise this skill far more. Pupils needed not only to construct graphs from given data, but also had to understand where graphs would be appropriate tools for analysing data or for solving problems.

Few of the Std 9 pupils attempted any innovative development of graphs and this emphasised the need to introduce pupils to a greater variety of techniques. Graphic 'literacy' in terms of the use of graphs, diagrams and tables or maps would therefore need to be incorporated into the practical component of IST.

The design and response to the worksheets generally emphasised the role of the practical component in IST as a means to develop skills and to introduce pupils to techniques which they would need, both in terms of the l985 Revised Syllabus requirements and for more sophisticated individualised or group projects.

7.3.2 RESULTS AND EVALUATION OF THE SECOND ACTIVITY FOR THE STD 7 GROUP - REPORT ON THE THEME 'COMETS'

The second task designed for the Std 7 pupils, based on the general theme 'comets', (Appendix 7C) was presented to the pupils towards the end of the first term while comet fever was still high. Prior to the presentation of this task, the Std 7 pupils had, by way of feedback after the worksheet, been given instructions on the use of illustrative material in assignments of this nature and had been given various homework assignments involving the use of graphs and schematic diagrams.

The pupils were given guidance relating to the use of resource material and the conventions which were relevant to a report of this nature. The Std 7 teachers concentrated on the use of the introduction and the conclusion in assignments as well as on the correct use of referencing. The teacher-librarian used two of the Std 7's normal book-education periods to assist them in the correct use of note-making and note-taking, as a prime objective in the development of this task was to aid pupils in developing skills necessary for the extraction of material from printed sources.

The results of this activity are shown in Table 7.23. These results are compared to the results of the worksheets, shown in brackets.

TABLE 7.23

ANALYSIS OF 'COMET' REPORTS
(N = 126)

A. GLOBAL RESULTS: EXPRESSED AS PERCENTATES
(Figures in brackets indicate worksheet results)

A. 80%+	B. 70-79%	C. 60-69%	D. 50-59%	E. 40-49%	F. below 40%
7,5 (5)	26,5 (23)	42,5 (38)	20,2 (24)	3,3 (10)	-

B. ANALYSIS AND EVALUATION OF RESOURCES USED AS REVEALED BY THE REPORTS : EXPRESSED AS PERCENTAGES
(Figures in brackets indicate worksheet results for 'analysis' and evaluation)

Total scores:	1	2	3	4	5
	14,8 (8,7)	14,0 (35,3)	28 (45)	39 (9)	4,2 (1,9)

C. LANGUAGE AND ILLUSTRATIVE TECHNIQUES : EXPRESSED AS PERCENTAGES
(Figures in brackets indicate worksheet results)

	Pupils scoring 4+		Pupils scoring 3		Pupils scoring below 3	
Language	43	(18,2)	51,5	(50,8)	5,5	(31)
Illustrative material	36,2	(18)	60,8	(59,2)	3	(22,8)

The global results for this activity reflected the higher scores obtained by the pupils in those areas in which they had received specific guidance and instruction. Pupils, therefore, generally performed well in terms of language usage, use of illustrative material, general presentation of work and use of referencing.

The general fluency of expression in this assignment was higher than for the first task and, while the level of sophistication of the language was not exceptional, it was, according to the Std 7 English teachers who were asked for comment, within the range of this groups' general English ability. Few of the pupils' work showed evidence of direct copying from the source material, although a number of them made extensive use of quotations. This latter aspect revealed the difficulties that pupils experience with using secondary sources. Pupils made very few spelling errors and while a number of them continued to have problems with tenses, there were generally few grammatical errors.

The illustrative material used was generally relevant to the theme and pupils made good use of schematic diagrams and simple graphs. It was obvious, though, that pupils found it very hard not to attempt some 'decorative' effects and while there were no unnecessary borders, etc., a number of the pupils continued to use decorative headings and elaborate sketches. The history, biology and art teachers were asked to comment on the use of illustrative material of this nature and there was little consensus as to what guidelines to give the pupils, as a number of these teachers felt that this type of 'illustration' allowed the pupils to express their creativity and if stifled, would reduce the pupils' motivation. This presented something of a problem as it was evident that staff who used the assignment system with the younger pupils would not be prepared to agree to a uniform policy regarding the use and weighting of purely 'cosmetic' effects in assignments. Therefore, while older pupils could understand the notion of what was appropriate to the particular subject, the younger pupils would have to be convinced that work could be presented neatly and with care, without spending time on cosmetic effects for geography and that there were other ways in which to be 'creative'.

An analysis of the pupils' reports revealed that the correct use of a conclusion presented the greatest difficulty, as 56% of the pupils had not fully grasped the principles related to conclusions for reports of this nature. The enjoyed collecting the material, but not the actual writing up of their information in the prescribed manner.

(ii) The essentially descriptive nature of the topics gave pupils little opportunity to develop propositional knowledge related to the theme or to manipulate the factual information in order to make associations or generalisations. The value of the information contained in the assignments to the pupils is therefore questionable.

(iii) The pupils were introduced to too great a variety of skills in too short a time. While all of the Std 7 pupils were familiar with the library, very few of them had been exposed to the specific skills related to a comprehensive search for information, knew how to extract material in a systematic manner, or were able to make and take notes, which would avoid plagiarism. These skills, when related to the skills associated with the presentation of a formal essay or report, tended to overwhelm the weaker pupils in particular.

(iv) It was not possible to guage the extent to which pupils had received help in the completion of the final product, in spite of the various attempts made to encourage the pupils to present their own work.

In the light of the pupils' and teachers' evaluation of this task, and with respect to the limitations of such activities, the use of assignments of this nature in the IST programme would need to take the following factors into consideration:

(i) The introduction of the younger pupils to the specific skills associated with the presentation of essays and reports would possibly be more effective if directly related to subject content which has been deal with in class. By using this strategy, pupils would not be confronted by such a variety of skills.

(ii) The development of library skills necessary for the search and extraction of material from printed sources could be developed more gradually and systematically, while continuing to collaborate with the teacher-librarian at the school.

introduction presented less of a problem as 79% of the pupils used the correct conventions in this area. The analysis also revealed that the pupils had correctly interpreted the topics they chose and that they had generally been able to understand the source material used for the assignment.

The pupils' evaluation of this task indicated that while they had enjoyed the reading necessary for their chosen topic, the actual presentation of the essay-type report had not been particularly enjoyed. One of the pupil's evaluation of the entire exercise was that she "didn't see how this is going to help me in my after-life." In spite of the somewhat bizarre way of expressing it, this pupil, as did others, revealed that they saw little relevance in an activity of this nature as they were unable to see the necessity for developing the various conventions that were emphasised.

The evaluation of the geography teachers in the department indicated that:

(i) Reports of this nature have merit in that the pupils are given practice in writing a formal, structured essay; they are exposed to the various conventions necessary for the writing of assignments and projects; the pupils are given the opportunity to develop essential 'library' skills and are given instruction in the use of secondary source material.

(ii) By restricting the length of this essay, pupils had been deterred from copying directly from the printed sources; they were less likely to copy from each other and that the work was a truer reflection of their own abilities.

(iii) The criterion marking used for this assignment was less clumsy and more effective than the ranked scale used in the worksheet.

While it is accepted that pupils need to develop the skills which the geography teachers identified in (i) and that this structured assignment had provided the ideal vehicle for developing those skills, the following limitations were identified:

(i) The 'mechanical' nature of the end product detracted from the interest and excitement of discovering new information. Thus, as the pupils had shown in their evaluation of the task, they had

(iii) When once the younger pupils had developed the skills necessary for an activity of this nature, the enquiry-learning would need to be structured in such a way that the pupils could be presented with more problem orientated topics or activites, which would have greater relevance and value in terms of the pupil acquiring a body of knowledge in geography.

(iv) Pupils needed to be given the opportunity to present this type of information in a variety of ways, which would not detract from the excitement of discovery, but which would enhance it.

Ideally, many of these basic skills ought to be developed in the primary school (Mills, l986). However, teachers in the junior secondary phase cannot assume that the pupils have the necessary skills, as was revealed by this second task.

7.3.3 RESULTS AND EVALUATION OF THE FIELD EXCURSIONS

The following analysis and evaluation concentrated on the Std 7 group excursion to a local beach area frequented by the East London teeangers, and on the research projects completed by the group of Std 9 volunteers, which were based on a study of a beach l2 km from the city centre.

7.3.3.l The Std 7 results and evaluation

The Std 7 pupils, having completed the school trail (chapter six) earlier in the year, had been taught the techniques they needed to employ in the field. Preparation for the excursion could therefore be kept to a single class period, which was sufficient time to ensure that the pupils had their groups organised, that each group member knew her role and to go over the worksheets which would be used in the field.

The pupils were allowed four class periods to do necessary follow-up work, this included:

(a) the pooling of data among the group, as each member had set tasks with regard to data collection; this strategy was used both to save time and to ensure that all the girls were responsible for their share of input;

(b) general discussion and feedback relating to the activities undertaken in the field;

(c) guidance on the analysis, interpretation and processing of the collected data;

(d) opportunities for the pupils to use the school library for additional information.

The results of the Std 7 field report are shown in table 7.24. The figures in brackets reflect the results of the 'comet' activity.

TABLE 7.24

STANDARD 7 FIELD REPORT RESULTS

(N = 124)

A. GLOBAL ASSESSMENT: EXPRESSED AS PERCENTAGES
(Figures in brackets indicate the second activity's results)

A. 80%+	B. 70-79%	C. 60-69%	D. 50-59%	E. 40-49%	F
14,9 (7,5)	23,7 (26,5)	35,6 (42,5)	14,8 (20,2)	11 (3,3)	- -

B. ANALYSIS AND EVALUATION (PROBLEM ORIENTED ASPECTS OF THE REPORTS): EXPRESSED AS PERCENTAGES
(Figures in brackets indicate the second activity's results)

Total scores:	1	2	3	4	5
	1,5 (14,8)	5,4 (14,0)	51,1 (28)	27,0 (39)	15,0 (4,2)

C. LANGUAGE AND ILLUSTRATIVE TECHNIQUES: EXPRESSED AS PERCENTAGES
(Figures in brackets indicate the second activity's results)

	Pupils scoring 4+		Pupils scoring 3		Pupils scoring below 3	
Language	74	(43)	15	(51,5)	11	(5,5)
Illustrative techniques	66,3	(36,2)	14,9	(60,8)	18,8	(3)

In assessing the field reports, emphasis was placed on explanation rather than on description and on the way in which the pupils used the data collected in the field to meet the requirements of their chosen topic. The visual material included in the reports was analysed in relation to relevance to the task, accuracy of presentation, the variety of techniques used and their suitability to the theme. The summative results of this activity revealed that progress had been made by the group with regard to their use of problem-solving techniques, language and illustrative techniques.

A detailed analysis of the reports revealed that:

(i) The majority of the pupils had expressed themselves fluently in both descriptive areas and in areas requiring explanation. The pupils appeared to be more comfortable with the report format than previously indicated. The development in the use of language in this activity is ascribed to the emphasis that had been placed on the role of correct language in tasks of this nature and to the pupils' increased maturity six months into the Std 7 year.

(ii) The illustrative material used by the pupils (Appendix 7G) included the use of a variety of graphs, schematic diagrams, field sketches and photographs. Pupils used visual techniques correctly and their illustrations were both relevant and suited to the theme. In most cases pupils made reference to the visual material in their text. While pupils continued to take care with their presentation, the lack of the purely 'decorative' in this assignment was noticeable when compared to the earlier work.

(iii) Pupils generally showed competence in the analysis of the data and its interpretation and were able to make comparisons, identify patterns and make associations. The pupils further revealed that they were sensitive to the role played by people in this beach environment and effectively identified problems associated with the area regarding over-utilisation of the resources during the holiday season.

(iv) Originality was primarily reflected in the pupils' organisation and presentation of the material. Originality in terms of finding creative and innovative solutions to the identified problems remained within the domain of those pupils who had demonstrated creative and lateral thinking abilities throughout the pilot programme.

The pupils' evaluation of the field excursion and field report revealed that they found this activity to be the most interesting of the three tasks. Reasons most frequently given for their enjoyment of this activity included the following:

* "Because it was fun."

* The fact that they had learned about an area which, although frequently visited, had been observed from a different approach, as one pupil explained it: "it showed how much more there is in a place you go to often and don't notice."

* It was "better than learning out of a textbook."

Activities which the pupils rated highly were those that involved counting, measuring, collecting samples and, according to one pupil, "spending time scratching around." The pupils also indicated that they had enjoyed being able to choose a particular area of study for the reports as it meant that they could "concentrate on the things that interested us."

Naturally, not all of the pupils were as generous in their praise for the activity and, according to one pupil, the entire affair was "childish."

The staff evaluation of the field excursion and the field report was once again done by the geography teachers and the two senior biology teachers.

The biology teachers were asked to comment on:

(i) the relevance of the study to this particular age group;
(ii) the quality and quantity of field activities;
(iii) the approach used for the pupils' reports; and
(iv) the final reports handed in by the pupils.

The chief concern of these two teachers was the amount of class time used for the follow-up in terms of the time needed to complete the syllabus. They were, however, impressed by the final reports, particularly with regard to the use of graphic material, field sketches and diagrams, as well as the depth of insight shown by the girls in relation to the study areas. Both of these teachers commented favourably on the general organisation of the material and the maturity of many of the pupils' work. The fact that pupils had been allowed to choose one aspect of the beach for the study also impressed these teachers as they felt that this had reduced the "superficiality" which they identified as a general weakness in field reports of this nature.

The geography staff felt that this field excursion and the subsequent report highlighted the need for fieldwork to be more challenging and more varied in Std 8 and Std 9, as otherwise pupils in these classes were simply repeating the same techniques and skills each year. The staff also felt that allowing pupils to concentrate on one section had worked well as the pupils had obviously found the activity to be satisfying. Although this strategy did not noticeably reduce the workload as expected, it did serve to focus the reports.

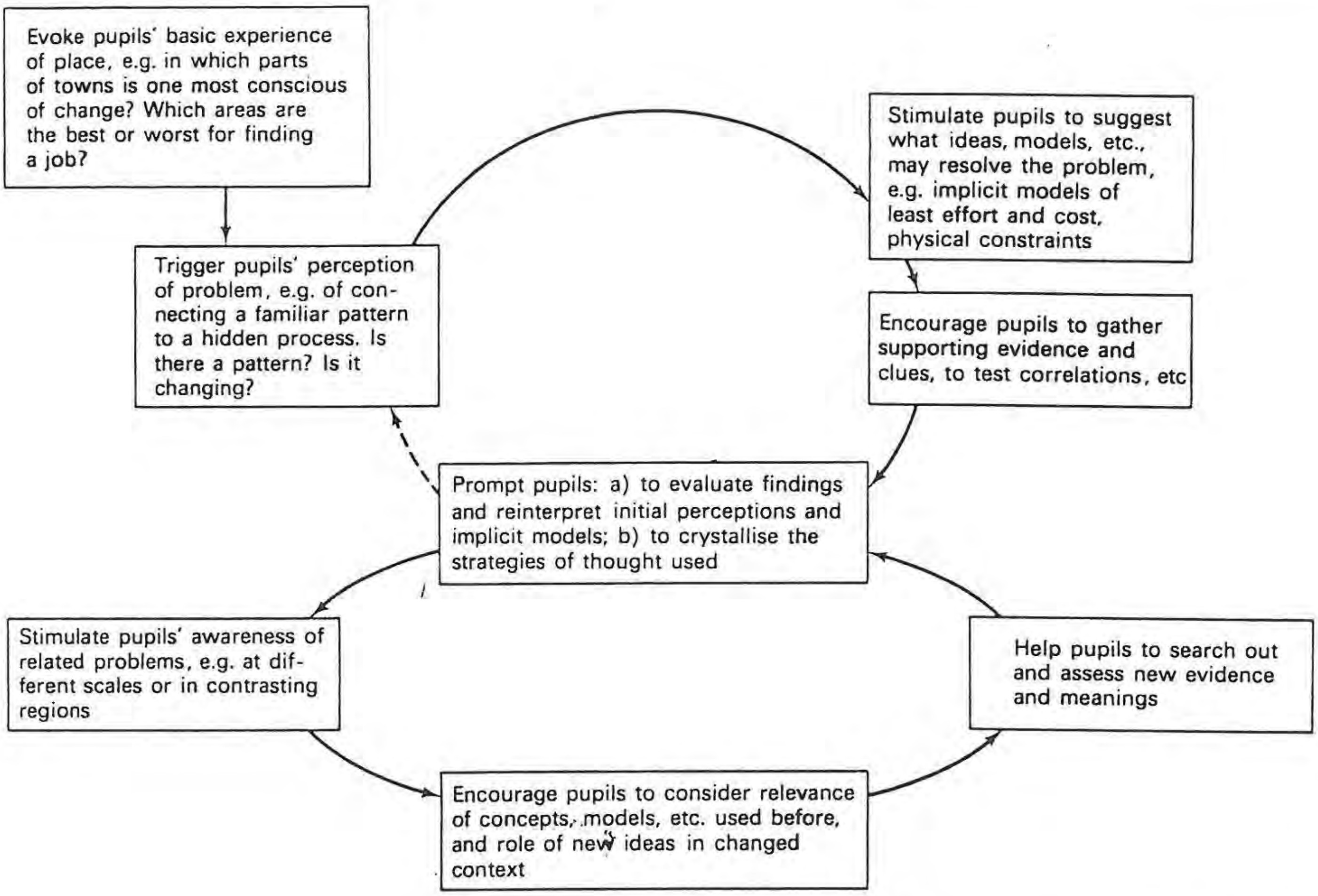
The Std 7 teachers judged the "school trail" as particularly valuable in preparing pupils for this excursion as they were able to apply the techniques learnt in the school grounds to the beach study without any problems.

Finally, the geography teachers emphasised that the class time used for the follow-up work after the excursion had added a further dimension to the excursion, making the field trip more relevant in terms of the work done by the pupils in the course of their geography in the first six months. This time had also enabled pupils to discuss their data and to organise it for more effective use in the reports. The class time used also afforded the teachers a further opportunity to emphasise and to develop the pupils' graphic skills. The only regret which these teachers expressed was that there had in fact not been enough time allocated, as the pupils had shown that they would have enjoyed more lessons devoted to the discussion and analysis of that which had been observed.

7.3.3.2 Results and evaluation of the Std 9 field research project

The twenty-seven pupils who initially volunteered for the field research project met with the researcher prior to their group field excursion. This meeting was necessary for the following reasons.

(i) The pupils needed guidance in the approach to be used, as they had no previous experience in problem identification, hypothesis formulation or hypothesis testing. The explanation was based on the model given in Figure 7.5.



(after Tolley and Reynolds, 1977, p. 91)

FIGURE 7.5

MODEL USED FOR HYPOTHESIS TESTING

(ii) The researcher needed to explain her role as a facilitator as well as the pupils' roles as independent investigators.

(iii) Agreement had to be reached with regard to the practical aspects of the exercise. The pupils, in conjunction with the researcher, made the following decisions:

(a) The pupils volunteering for the project would attend the general field excursion planned for the Std 9 group and would complete the worksheets and field exercises set for the group, as this would provide them with additional background for the project and would help them to identify problems in the study areas.

(b) The pupils would present their research topic in the form of a written proposal which identified the problems, gave the hypothesis they would like to test and, where possible, any other information which would be relevant to the facilitator. The proposals, it was agreed, would be handed to the researcher two days after the excursion. These would be assessed and then discussed with the pupils.

(c) A second visit would be made to the area during a Saturday, to give the pupils a further opportunity to gather data needed for their projects.

(d) The completed project would be handed to the researcher at the same time that the rest of the group had to hand their general report to the teachers concerned.

(e) The pupils would be free to consult the researcher, as the facilitator, by appointment at any time during this period.

A most important aspect of this meeting was the decision to allow any pupil who felt the need to withdraw from the experiment not to do so until after the proposal discussion or until after the second visit to the study area. Pupils who withdrew would complete the general report done by the rest of the Std 9 group.

The initial proposals presented by the pupils revealed that eighteen of them had identified suitable problem areas which could be analysed in the time available. Two of the pupils' initial proposals were too ambitious to be done in the allocated time and seven of them were unable to identify suitable problems.

After discussion with the researcher, these seven girls elected to withdraw from the project and to do the general report. One of the ambitious proposals was revised to form a more manageable project. The remaining twenty pupils were required to do further work on their proposals according to the suggestions made by the researcher. The pupils were given the week before the second visit to the study area to work on their proposals to ensure that they were absolutely clear about what was required.

After the second visit to the study area, the girls met with the researcher as a group to discuss the planning and development of the projects, and the processing of their data. At the end of this round of discussions, a further six pupils chose to withdraw from the project. Fourteen pupils therefore completed the field project.

A summary of the problems and the hypotheses tested by the group is included in Appendix 7H. An analysis of their proposals indicated that the problems were kept simple and within the geographical experience of the pupils. Each of the individual study areas could be completed within the time allocated, as the pupils had two weeks to finalise their projects.

During the allotted time the pupils met regularly. The group meetings with the researcher were used to clarify technical aspects related to the particular line of enquiry used by the girls for the project. The researcher encouraged the girls to meet without her to discuss their progress and to check whether their data could be added to in terms of the work being done by the other pupils. The meetings between the researcher, as the facilitator, and the individual pupils, were used to help them with problems they were experiencing and to assess their progress. The final assessment of the project was a cumulative result as marks allocated for the problem identification, the search for possible solutions and the formulation of the hypothesis, were awarded before the final project was handed in.

TABLE 7.25 FIELD RESEARCH RESULTS

	No of pupil	Grade	June exam	Global result	Language	Presentation	Illustrative material	Total for content		Problem Identification	Possible solutions identified	Hypothesis formulation	Relevance of environment	Conclusion	Insight	Logical development
								Marks	%							
Mark allocation			100	100	10	15	20	55	100	5	5	5	15	5	5	20
	1	SG	35	63	7	13	15	28	51	3	1	4	5	3	3	9
	2	HG	50	70	7	13	17	35	64	3	2	4	7	3	2	12
	3	HG	35	56	7	11	6	33	60	3	3	4	6	4	2	10
	4	HG	45	62	5	10	8	39	71	3	2	4	8	4	4	14
	5	HG	77	88	9	14	20	45	82	3	3	4	8	4	4	19
	6	HG	78	64	6	12	16	30	54	3	3	3	5	2	3	11
	7	HG	51	57	7	10	12	24	44	3	1	4	4	2	2	8
	8	HG	40	59	6	10	14	29	53	3	2	4	6	2	2	10
	9	HG	55	62	6	12	15	29	53	2	2	3	6	2	3	11
	10	HG	78	69	7	13	14	35	64	3	1	4	7	3	3	14
	11	SG	60	64	7	9	13	35	64	3	3	4	6	3	3	13
	12	HG	48	45	6	9	9	21	38	2	2	2	4	2	2	7
	13	HG	65	60	6	10	14	30	55	3	3	4	5	3	2	10
	14	HG	55	64	6	11	13	34	62	3	3	4	6	3	3	12

An analysis of the results in Table 7.25 reveals the following:

(i) The volunteers who completed the project were a mixed ability group and, as indicated by their June results, were not exclusively the top geography candidates in the Std 9 group.

(ii) Having mastered the technical aspects related to the project, the pupils were able to complete their projects adequately, with two of the pupils achieving particularly pleasing results. Only one of the girls experienced real difficulties in analysing her study area, but was nonetheless able to achieve an overall passing grade.

(iii) Pupils initially experienced difficulties in identifying a broad variety of alternative solutions to their problems. This was primarily related to their lack of in-depth knowledge of the theoretical aspects of their study area. All of the pupils had difficulty in presenting a conclusion, which was caused by a lack of experience rather than a lack of ability, as with help, the pupils were able to solve this particular problem.

(iv) The final presentation of the projects revealed that pupils generally made good use of their data in terms of being able to process and analyse it. A few of them had difficulty in applying the data adequately to the problem, which was reflected in marks allocated for the logical development of the project.

(v) The pupils' use of language, illustrative material and general presentation was assessed in terms of its suitability to the project format and to the study area. Illustrative material was used well as pupils had been given some guidance in the role and use of graphs and tables in tasks of this nature. Pupils who lost marks in this area were marked down either because they had not made the best use of their data in terms of presenting it graphically, or because they needed greater illustrative back-up for the text.

An analysis and evaluation of this project would, however, be incomplete without assessing the 48% of the pupils who withdrew. The following aspects were highlighted when these pupils were consulted:

(i) Pupils found it difficult to identify a 'problem' in a study area such as this. Few of the pupils who withdrew fully understood what was meant by a problem in this context.

(ii) Having once identified the problem, few of the pupils experienced difficulty in formulating an hypothesis, but they did have problems in visualising ways to test the hypothesis. This factor appeared to be closely related to the pupils' grasp of the theoretical aspects of coastal geomorphology and the processes associated with beach areas.

(iii) The pupils also indicated that they found it difficult to relate the line of enquiry to the processes they needed in the field.

(iv) Others simply gave up because they felt the general report done by the rest of the group would be easier and, therefore, they would score higher marks.

Working with this group underlined the following in respect of the development of projects of this nature.

(i) Pupils needed to have prior instruction and practice in applying a systematic scientific approach such as this if they are to be able to apply the methodology in the field.

(ii) A scientific approach such as was used for this project does not appeal to all pupils and when doing projects they need to be introduced to a number of alternative approaches.

(iii) A great deal of time was spent in the identification of problems and unless pupils are trained to do this they tend to confuse cause and effect.

(iv) The study of a beach area such as this is clearly related to a specific body of knowledge and without a clear understanding of the essential features and processes affecting such an area, the pupils are either hampered in their investigations or the investigation becomes rather superficial.

(v) While the weaker pupils need a greater amount of help from the facilitator, their feeling of satisfaction and accomplishment in being able to complete such a task, albeit within limitations, is well worth the effort and time spent with these pupils. It was notable that the weaker pupils appreciated what they had achieved to a far greater extent than the two particularly able students in the group. Project work, therefore, ought not only to be offered to the academically able students, but should be experienced by all of the pupils in the group, providing the students are given guidance in choosing a study arera which is within their range of ability and experience.

(vi) When the teacher adopts the role of facilitator it increases the work load, as the facilitator needs to spend time with individual pupils. Individual projects with large groups of pupils may therefore be problematic and teachers may have to either encourage group projects or use other facilitators.

The pupils' evaluation of this activity showed that while they all considered it to be difficult, they felt that it was more interesting, challenging and worthwhile than the more usual field reports which they, at this stage, found to be 'boring'. Eight of the fourteen pupils indicated that they would have enjoyed applying this approach to a study area of their own choice rather than to the designated field excursion. The same girls also felt that having to identify the problems in this area and then to relate it to a manageable project in terms of size and time created a degree of artificiality. They would have liked to have more time to do an investigation which had broader relevance.

The geography staff found this activity difficult to evaluate having had no experience in conducting this type of project. One of the teachers, however, echoed the comments of the girls relating to the narrowness of the identified problems. The biology teachers who conducted small-scale group projects with the Std 10 classes, however, felt that the problems identified by this group were suitable in that this was the pupils' first introduction to this type of activity. These teachers, in their evaluation of the activity, strongly supported the idea of group projects as being suited to larger groups. The biology staff expressed their approval of:

* the assessment method used, and particularly favoured the idea of a cumulative assessment.

* the time allocated to the work;

* the methodology which the pupils used.

The pupils' work was also favourably commented upon, but these teachers felt that the time spent with the individual girls was too much to expect from a single facilitator. This latter comment emphasised the need for pupils to be given instruction and practice in this approach prior to its application in the field, as much of the time was spent in explaining technicalities to the pupils.

7.4 EVALUATION OF THE PILOT PROGRAMME

In evaluating what had been achieved by the pilot programme at the end of 1986, the researcher and the geography staff:

(i) evaluated the pupils' development and progress in the skill areas identified at the start of the programme; and

(ii) analysed the programme with respect to the general aims identified for IST in 1985 and with regard to the objectives set in 1986 for the pilot programme.

7.4.1 ANALYSIS OF THE PUPILS' PROGRESS AND DEVELOPMENT IN THE SKILL IDEAS IDENTIFIED

The field reports completed by the Std 7 group were judged as being particularly illuminating regarding these pupils' development in the application of higher order skills related to problem solving and were compared, in particular, to the initial activity. The progress made by these pupils within the first seven months of the year was ascribed to the following:

(i) The pupils' understanding of the techniques necessary for tasks of this nature, which had been made possible by both the feedback sessions after each of the tasks and the additional opportunities pupils were given to practice these skills in class and homework exercises designed specifically for this purpose.

(ii) The increasing maturity and general development of the pupils.

(iii) The enthusiasm and motivation of the teachers concerned.

(iv) The pupils' self-motivation and interest in the field excursion.

The analysis of the Std 9 pupils' progress in these areas was hampered by the problems the pupils experienced in understanding the coursework for the first activity, the fact that they completed only two assignments, and the small sample size of the field research project. It was, therefore, felt that few generalisations could be made with regard to these pupils' development in problem-solving techniques and the associated skills. While the group who volunteered for the field project were introduced to a variety of skills and given the opportunity to apply them, there was no way to judge to what extent these pupils had acquired a lasting proficiency in their use and application.

An analysis of the Std 7 pupils' use of language and ability to express themselves was made by comparing their work in the three tasks. This analysis revealed that pupils in Std 7 had improved considerably in this area. The most interesting aspect was the development made by these pupils in terms of the increased sophistication of the language used.

The Std 9 group revealed that their fluency of expression appeared to be closely related to their confidence in terms of the content they were presenting. Where pupils were comfortable with the content, they made fewer errors and expressed themselves fluently and coherently. In those sections where pupils had difficulties, the incidence of errors rose appreciably.

An analysis of the use of illustrative material and the skills related to graphicacy revealed a considerable improvement in the Std 7 pupils. 'Decorative' visuals decreased dramatically in the field reports. These pupils had also developed considerable skills related to the function of visual material in tasks of this nature and were able to make use of histograms, line graphs, pie-charts, as well as schematic diagrams, field sketches and photographs. The Std 9 development in this area was difficult to measure or to evaluate as these pupils had not been taught or given the opportunity to develop additional graphic or statistical techniques, other than those suggested by the researcher for the field project.

As a means to assess skill development through IST the Std 7 programme proved to be more illuminating than the Std 9 activities. It was also realised, with hindsight, that it was not practical to attempt comparisons between the Std 7 and Std 9 pupils as there were far too many variables.

7.4.2 AN EVALUATION OF THE PILOT PROGRAMME WITH REGARD TO THE AIMS AND OBJECTIVES

An evaluation of the extent to which the pilot programme achieved the general aims and specific objectives, revealed the following:

(i) The structured nature of the tasks set in the Std 7 programme in particular, meant that the pilot programme had failed to provide the teachers and pupils with opportunities to develop and exercise their own interests, talents or abilities. While the research done with the small group of Std 9 pupils attempted to achieve this goal, the choice of topics was reduced by the application of this project to a single study area and by the considerable input from the researcher because of the pupils' lack of experience.

(ii) The Std 7 group were exposed to a reasonable variety of resources in that they were able to make use of the library in a far more constructive way than previously, having been introduced to the correct ways of extracting and processing material from sources which included books, periodicals, newspapers and other printed material. They were exposed to a primary resource base through their fieldwork, but had few opportunities to make use of other resources in their local environment or community. The Std 9 pupils, in the course of their field research projects, were able to consult the local nature conservator, who gave invaluable insight into their study area. Pupils in this group also consulted the conchologist, the marine biologist and the ornithologist of the local museum, who were also most helpful and generous with their time.

(iii) Skill development in the pilot programme, by concentrating on cognitive skills, largely neglected the development of affective or social skills. The activities designed by the programme also neglected the type of decision making skills associated with values and attitudes.

(iv) The circumstances under which the pilot programme was organised prevented the development of a realistic framework for skill progression from the junior secondary to the senior secondary phase in geography.

(v) The assessment system used for the various tasks was problematic in the following respects:

* despite the criterion marking, the assessment was essentially product oriented and made profiling in specific skill areas difficult;

* the use of the scaled rating system created a clustering effect in the middle range of marks;

* pupils did not always understand the criteria fully.

These limitations, as well as those identified for the individual activities, needed further consideration in the subsequent development of an IST programme.

Notwithstanding the limitations, the pilot programme provided a better insight into skill development in geography. Thus, at the completion of the programme, the researcher and her colleagues had a better understanding of:

(i) the role of skill development in geographical education;

(ii) the sorts of skills that IST could develop;

(iii) how skills are acquired;

(iv) the links between the practical and project component of IST with regard to skill development;

(v) the role of the teacher in the practical assignments and as a facilitator for individual projects.

On a practical level, the pilot programme made the researcher more aware of:

(i) what pupils think about tasks such as these;

(ii) what pupils find rewarding and satisfying;

(iii) the sorts of difficulties which pupils experience in understanding learner-centred tasks of this nature;

(iv) the fact that with guidance and patience the academically weaker pupils can develop problem-solving techniques and skills, as evinced by the research project completed with the Std 9 pupils.

Despite the limitations of the assessment system applied to the activities of the pilot programme, a more deliberate and conscious application of criterion marking resulted in:

(i) a better understanding of the individual pupils' progress in geography and of their strengths and weaknesses, which benefited the pupils as well as the teacher, particularly with regard to specifics such as use of language, illustrative techniques, insight and originality;

(ii) a fairer and more realistic analysis of pupil performance, which was acceptable to the pupils and the teachers;

(iii) a re-assessment of the sorts of comments made by the teachers when marking IST, comments which, when linked directly to specific criteria concerning use of explanation, analysis, justification, etc., are more constructive and helpful to the pupil and to the teacher.

Below is a set of proposals adopted by the researcher and the geography staff, which was applied to the future development of IST in the school:

(i) to re-assess and to evaluate the aims and objectives of IST both in terms of the general aims of geography and with regard to the specific learner-centred needs of the pupils;

(ii) to continue to investigate how pupils acquire skills and to ensure that pupils have the necessary opportunities to develop skills through the IST programme;

(iii) to develop a programme which would include opportunities for pupils and teachers to develop their own interests and talents through geography;

(iv) to increase the resource-base available for IST;

(v) to continue to investigate the assessment of IST in order to provide a means of recording and analysing pupils' performance in geography.

7.5 SUMMARY

The approach to IST, as initiated by the pilot programme, was essentially a shift towards a more learner-centred view of geography. The particular strategies related to the design, structure and analysis of each of the activities provided the researcher and her colleagues with the opportunity to look 'into the pupils' minds' in terms of what they needed and enjoyed. The limitations of the programme were as beneficial to the researcher as were the positive effects with regard to identifying a point of departure for the future development of IST as an integral part of the geography curriculum.

CHAPTER EIGHT

THE IMPLEMENTATION OF RESEARCH RELATED TO IST IN THE DEVELOPMENT AND ADMINISTRATION OF A SCHOOL PROGRAMME FOR IST IN GEOGRAPHY

The IST programme adopted by the school's geography department in 1989 was the cumulative result of the following:

(i) The implementation of the results of the pilot programme of 1986 (chapter seven).

(ii) An evaluation of teacher responses to IST with regard to their implications for the organisation and administration of an IST programme (chapter five).

(iii) The application of those learner-centred strategies, identified in chapter four, which are designed to meet the learner-centred aims and objectives of the geography syllabus.

This chapter examines the ways in which the above factors influenced the practical and project components of IST from 1987 to 1989 with regard to their effect on the development of:

1 The aims and objectives of the IST programme.

2 The organisation and administration of IST.

3 The assessment of the tasks within the programme.

4 The evaluation of the individual tasks.

8.1 THE AIMS AND OBJECTIVES OF THE IST PROGRAMME

Geographical education, when viewed within the framework of the Rylian notion of knowledge (Griffiths, 1987) is concerned with the pupils' mastery of:

(i) those facts, principles and concepts which have been selected as being 'worthwhile' in terms of the pupils' needs and interests and in relation to the 'essential concepts' of geography (Hall, 1982);

(ii) the propositional knowledge which underpins the theoretical base of geography and which requires understanding and reflection;

(iii) the affective and cognitive skills which aid pupils in their understanding of environment and community.

The above framework requires that the IST programme be perceived as a process which focuses on the pupils' conceptual and perceptual development. As a result, the primary goal of IST was seen to be the means which would aid pupils in their development of the skills, propositional knowledge, values and attitudes that would enable them to relate to their own environment and community, while developing an empathy for the wider environment and other communities in order to survive in a rapidly changing society.

The emphasis on the IST programme as a process and the development of the model for IST (chapter three) led to the decision to use Rath's (l97l) "criteria for identifying activities that seem to have some intrinsic worth" (Table 8.l) (quoted in Stenhouse, l98l, p. 86) as the "principles of procedure" upon which to base the design of the activities for IST.

These criteria replaced the formulation of specific behavioural objectives. Thus, while individual activities might include behavioural objectives considered to be relevant to the particular task, the programme as a unit was guided by Rath's criteria.

In order to realise the primary aim of IST and to follow the principles of procedure it was necessary to:

(i) establish a framework of progression in skills, values and attitudes;

(ii) identify and produce a resource-base which would enhance the development and design of a wide variety of learner-centred activities both in the practical and project components of IST;

(iii) develop a structure within which the various activities could be designed, assessed and evaluated.

The above process took two years to develop. During this period the geography staff working with the reserarcher were free to choose the extent of their involvement in the various developments. Thus, while a basic

TABLE 8.1

PRINCIPLES OF PROCEDURE FOR THE DEVELOPMENT OF IST ACTIVITIES

"All things being equal, one activity is more worthwhile than another if:

(i) it permits children to make informal choices in carrying out the activity and to reflect on the consequences of their choices;

(ii) it assigns to students active roles in the learning situation rather than passive ones;

(iii) it asks students to engage in inquiry into ideas, applications of intellectual processes, or current problems, either personal or social;

(iv) it involves children with realia (i.e. objects, materials and artefacts);

(v) completion of the activity may be accomplished successfully by children at several different levels of ability;

(vi) it asks students to examine in a new setting an idea, an application of an intellectual process, or a current problem which has been previously studied;

(vii) it requires students to examine topics or issues that citizens in our society do not normally examine - and that are typically ignored by the major communication media in the nation;

(viii) it involves students and faculty members in 'risk' taking - not a risk of life or limb, but a risk of success or failure;

(ix) it requires students to rewrite, rehearse and polish their initial efforts;

(x) it involves students in the application and mastery of meaningful rules, standards or disciplines;

(xi) it gives students a chance to share the planning, the carrying out of a plan, or the results of an activity with others;

(xii) it is relevant to the expressed purposes of the students."

(Rath, 1971, in Stenhouse, 1981, p. 86)

programme of activities was planned for each year for each standard, teachers could elect to follow any additional activities which were planned by the researcher. The geography staff, however, agreed to act as evaluators during the two year period.

8.1.1 THE ESTABLISHMENT OF A FRAMEWORK FOR PROGRESSION IN SKILLS AND VALUES AND ITS IMPLICATIONS FOR THE DESIGN AND DEVELOPMENT OF ACTIVITIES

The pilot programme had highlighted the value of activities which focus on skills, understanding and reflection, rather than on the recall or presentation of facts, both as a means to enhance the mastery of subject material and for the development of specific geography related proficiencies. The degree to which practical tasks complement project work was further emphasised during the course of the pilot programme.

The results of the 1986 programme when related to the somewhat negative responses of the survey population with regard to the perceived value of IST as a means to develop propositional knowledge and cognitive and affective skills (chapter five) necessitated a more systematic analysis of the high school geography syllabus than had been undertaken for the pilot programme. The subsequent syllabus analysis was undertaken both in order to identify the skills, values and attitudes which underpin the subject content and to relate the proficiencies to specific activities which had been identified as suitable for inclusion into the IST programme. The investigation into learner-centred strategies applicable to geographical education (chapter three) revealed that each activity has a role to play in the development of particular skills, attitudes and values.

The resultant analysis (Table 8.2) of the 1985 Revised Geography Syllabus in terms of the main components of the geography curriculum from Std 6 to Std 10 was accomplished by relating graphic skills, numeracy and language skills associated with the development of oracy and literacy to the syllabus content. The importance of values in geographical education necessitated the application of this aspect to the syllabus content and is reflected in part 4 of the analysis.

The analysis provided a guide from which to select and develop activities in both the practical and project components of IST and revealed the considerable potential each section of the curriculum has for skill development

TABLE 8.2

SKILL DEVELOPMENT IN RELATION TO PRESCRIBED SYLLABUS COMPONENTS

1. GRAPHICACY	MAPWORK AND GENERAL GEOGRAPHIC TECHNIQUES	CLIMATOLOGY AND NATURAL REGIONS	GEOMORPHOLOGY, OCEANOGRAPHY AND ECOLOGY	POPULATION GEOGRAPHY	ECONOMIC GEOGRAPHY	SETTLEMENT GEOGRAPHY	REGIONAL STUDIES
a) Tables, graphs and statistical data	Construction/analysis of graphs for: * Gradient * Intervisibility * Contours & landforms * Contours & height * Slope types * Cross-sections (line graphs, polygraphs)	Construction/analysis of graphs related to: * Composition of atmosphere * Temperature readings * Pressure readings * Rainfall readings * Wind readings * Cloud cover readings * R.H. readings * Geostrophic flow * P.G. * Comparisons of weather data for regions on macro or micro scale * Weather phenomena related to atmospheric models * Weather patterns * Effects of micro-climate (line graphs, polygraphs, histograms, pie-charts, climograms)	Graphic analysis of: * Seismographs * Population dynamics * Tidal ranges * Ocean depths * Fishing data Construction and/or analysis of graphs related to: * Slope analysis * Gradient * Soil profiles * Soil particle size * Soil composition * Cross-sections * Stream profiles * Stream flow pattern * Volume of streams * Channel analysis * Landscape evolution * Structural landscapes * Flow characterisation (line graphs, polygraphs, histograms, hydrographs, pie-charts, pyramids)	Graphic analysis and/or construction of graphs for: * Population growth * Population characteristics * Demographic factors * Population movements (line graphs, flow charts, histograms, population pyramids, pie-charts, polygraphs)	Graphic analysis for: * Economic growth * Comparisons of primary, secondary & tertiary activities in selected areas * Comparisons of production of selected commodities * Comparisons of supply & demand of selected commodities & services Construction of graphs for case or general studies related to: * Factors affecting factory location * Transport costs & development * Labour costs & supply * Land values (line graphs, polygraphs, histograms, pie-charts, flow charts, scatter diagrams)	Graphic analysis for: * Urbanisation * Population movements * Population density * Urban growth, Rural depopulation * Urban hierarchies * Urban problems Graphic analysis and/or graphics construction for case studies, fieldwork or field research: * Traffic counts/analysis * Pedestrian counts * Threshold & range * Land values * Land use * Urban profiles * P.V.I. * Environmental appraisals * Topographic analysis or urban & rural settlements (line graphs, polygraphs, histograms, pie-charts, scatter diagrams)	Graphic analysis of: * Climatic factors * Natural vegetation * Physiography * Dams * River flow & volume * Erosion factors * Natural resources * Economic factors * Population * Transport * Export, import * G.D.P. * G.N.P. (line graphs, pie-charts, polygraphs, histograms) Construction of graphs for: * Case studies * Peer group teaching * Reports * Self-study, etc. for above aspects

<table>
<tr><th>1. GRAPHICACY Continued</th><th>MAPWORK AND GENERAL GEOGRAPHIC TECHNIQUES</th><th>CLIMATOLOGY AND NATURAL REGIONS</th><th>GEOMORPHOLOGY, OCEANOGRAPHY AND ECOLOGY</th><th>POPULATION GEOGRAPHY</th><th>ECONOMIC GEOGRAPHY</th><th>SETTLEMENT GEOGRAPHY</th><th>REGIONAL STUDIES</th></tr>
<tr><td rowspan="4">b) Schematic diagrams, models, photographs, charts, posters, video, OHP, slides.</td><td colspan="7">* Use of schematic diagrams, photographs, slides, OHP transparancies, 3-D models, video presentations to support assignments, field reports, field research, case studies, projects, peer-group teaching, seminars, role play and simulation.</td></tr>
<tr><td colspan="7">* Use of schematic diagrams, photographs, slides, OHP transparancies, video presentations, 3-D models, maps, charts, posters as support in presenting and teaching of processes, spatial phenomena, morphology, etc.</td></tr>
<tr><td colspan="7">* Use of schematic diagrams, photographs, slides, OHP transparancies, maps and video material for data response activities, data analysis in practical component of IST.</td></tr>
<tr><td>* Use of sandtray for processes, contours, etc.</td><td>* Use of theoretical models with support of diagrams, photos, etc. to explain weather patterns, weather phenomena, weather processes</td><td>* Use of theoretical models with supporting visuals relating to landscape evaluation, tectonic processes
* Use of sandtray for processes relating to river capture, backwashing, abstraction, etc.</td><td>* Use of theoretical models for developmental theory</td><td>* Use of theoretical models for factory location, transport costs, harbour development</td><td>* Use of theoretical models for developmental theory, determination of spheres of influence, C.P., urban hierarchies, urban structure</td><td>* Use of theoretical models for developmental themes.</td></tr>
</table>

	MAPWORK AND GENERAL GEOGRAPHIC TECHNIQUES	CLIMATOLOGY AND NATURAL REGIONS	GEOMORPHOLOGY, OCEANOGRAPHY AND ECOLOGY	POPULATION GEOGRAPHY	ECONOMIC GEOGRAPHY	SETTLEMENT GEOGRAPHY	REGIONAL STUDIES
1. GRAPHICACY Continued c) Mapping	Use of Atlas to: * determine 'where', 'what', 'how much', 'how many', 'how big', 'how small', 'how high', 'how low' * Direction * Bearing * Latitude & Longitude * Shape * Projections 1:50 000 with various photographs aerial; oblique, vertical & ortho-photo maps * Symbol analysis * Descriptions * Interpreting, identifying, analysing: landforms, slopes, landscapes, vegetation, soil/geology, climate, settlements, hydrology, internal & external forces, structural landscapes & landscape evolution General Use of: Municipal maps * Erts maps * Satellite maps * Photographs * Topo Cadartral maps * Geological maps * Economic maps * Field sketching * Field mapping	Use of Atlas for: * Weather maps * Climate maps Use of synoptic maps and Met Sat photos: * Reading, identifying, interpreting and analysing: weather phenomena, weather patterns * Forecasting Weather & Climate maps * Interpretation * Graphic analysis * Weather data * Weather patterns * Regional studies Vegetation & physical maps related to and compared with weather data for regional studies Municipal maps for micro-climate; city climates 1:50 000 maps & orthophoto maps micro-climate	Use of Atlas for: * Components & structure of earth * Components of crust * Plate tectonics * Internal & external forces * Physical features * Topography * Ecology (Gaia, etc.) 1:50 000/Topo & photographs for: * Hydrology & stream analysis, river basin analysis * Slope types * Gradient * Structural landscape analysis * Landscape evolution * Coastal analysis * Internal & external forces * Geology & soil analysis * Vegetation analysis * Orienteering * Fieldwork & field research * Field sketching * Mapping of local or field sites	Use of Atlas for: * Population distribution & density * Population characteristics * Demographic factors * Levels of development * Population growth * Population movements * Population problems Use of 1:50 000 maps & photos for localised studies of: * Population distribution & density * Urbanization * Urban growth * Urban problems Municipal maps * Migration & growth * Squatter problems * Environmental problems	Use of Atlas for: * Production of primary, secondary & tertiary commodities & services * Location of industry * Transport networks & routes * Economic development & data e.g. G.D.P, G.N.P., etc * Climate, soil, geology, vegetation & population density & distribution maps to analyse factors influencing economy of specific regions or centres Use of 1:50 000 maps & photos for local studies relating to: * Factory location * Industrial developoment * Transport * Services & resources analysis Use of Municipal maps for: * Factory location * siting of roads, bridges, resorts, new settlement, labour situation & supply Use of Cadastral maps for: developmental projects Influence of technology	Use of Atlas for: * Urbanization * Urban growth * Population distribution & density * Population movements * Rural urban ratio * Developed/underdeveloped areas * General maps to analyse factors influencing population & settlement structure 1:50 000 maps & photos * Settlement pattern * Distribution, density * Hierarchy * Spheres of influence * Nodality & * Centrality * Rural-urban problems * Rural/urban fringe * Settlement type, site, situation * Topographic analysis of urban area Municipal maps: * State, size growth * Ground plan analysis * urban profiles * C.B.D. * Land values * Land use * Functional structure * Traffic flow * Pedestrian flow * Transects * Environmental problems and evaluation	Use of Atlas for: * Systematic study of area * Thematic study of country * Physical data * Economic data * Population data Use of 1:50 000 maps & photos & topo-cadastral maps for local studies

2. NUMERACY	MAPWORK AND GENERAL GEOGRAPHIC TECHNIQUES	CLIMATOLOGY AND NATURAL REGIONS	GEOMORPHOLOGY, OCEANOGRAPHY AND ECOLOGY	POPULATION GEOGRAPHY	ECONOMIC GEOGRAPHY	SETTLEMENT GEOGRAPHY	REGIONAL STUDIES
	← GRAPHIC ANALYSIS →						
	← CONSTRUCTION OF GRAPHS →						
	← ANALYSIS OF TABLES →						
	Calculations for: * Scale * Distance * Bearing * Declination * Area * Intervisibility * Vertical exaggeration * Vertical intervals & height * Median * Mode * Mean * Sampling * Time * Interpolation Measurement of: * Position * Co-ordinates * Latitude & longitude	Calculations for: * Lapse rates * Climatic & weather differences & ranges * Sampling * Interpolation for weather maps Measurement of: * Temperature * Pressure * Rainfall * Humidity * Cloud cover * Wind speeds * Wind direction * P.G. Tabulation of: Weather data and climatic information	Calculations related to: * Run-off * Infiltration * Stream ordering * River comparisons as to volume, basin size, etc. * Flow characterisations * Sampling * Interpolation * Population dynamics * Food pyramids * Nutritional density Measurements related to: * Environmental problems * Drainage density Calculations in the field related to: * Channel characteristics * Flow patterns * Velocity * Volume * Stream depth * Vegetation characteristics * Slope analysis * Gradient * Height * Distance * Soil analysis * Pollution etc.	Calculations related to: * Density & distribution of population * Nutritional density * Interpolation * Population composition * Population growth * Demographic characteristics * Urbanization * Population movements Measurements related to: * Resource analysis * Developmental trends * Migration * Immigration	Calculations used in case studies, fieldwork & field research for: * Costs related to factory location * Labour costs * Transport costs * Production costs * Cost projections for production * Effects of inflation * Growth projections * Supply & demand projections * Building costs etc. Measurement of: * G.D.P. * G.N.P. * Regional differences in production of selected commodities & services * Differences in supply & demand of selected commodities * Economic factors affecting selected centres or regions Tabulation of economic data for: * Countries * Regions * Commodities and services	Calculations in the field of: * Pedestrian counts * Traffic counts * C.B.D. * Transects * Land values * Population desnity * Threshold & range * Topographic height differences * Environmental evaluation * Population components * Demographic factors Calculations & movements concerning: * Nutritional density * Urbanisation * Population movements * Growth & expansion * Determination of spheres of influence * Urban hierarchies * Central place theory Tabulation of data relating to: * Environmental problems * Rural & urban problems * Traffic * Population * Income, etc.	Calculations & measurement of: * Climatic data * Population data * Economic factors * Physical data Tabulation of: data related to above

3. LANGUAGE SKILLS	MAPWORK AND GENERAL GEOGRAPHIC TECHNIQUES	CLIMATOLOGY AND NATURAL REGIONS	GEOMORPHOLOGY, OCEANOGRAPHY AND ECOLOGY	POPULATION GEOGRAPHY	ECONOMIC GEOGRAPHY	SETTLEMENT GEOGRAPHY	REGIONAL STUDIES
a) Reading	← TEXTBOOKS PRESCRIBED AND SUPPLEMENTARY →						
	← TESTS, EXAMINATIONS, ASSIGNMENTS AND PROJECTS - FOR NEW VOCABULARY, TERMINOLOGY AND 'CUE' WORDS →						
	* Background reading for map analysis related to case studies, fieldwork, field research & 'classroom fieldwork'	* Newspaper reports for topical weather phenomena & daily weather bulletin * Magazines, journals & books for topical weather phenomena, background & enrichment relating to weather patterns, S.A. weather systems * Novels relating to natural disasters, e.g. 'Typhoon', etc. * Environmental papers, magazines etc.	* News reports of natural 'disasters' * Magazines, journals, books relating to geomorphic processes, new 'discoveries', mining news, and for enrichment & background to field reports & field research or case studies	* News reports relating to population data, urbanisation, resettlement, squatters, etc., & births/deaths column for local stats * Magazines, journals, encyclopaedia, year books & general reports relating to population statistics, growth, movements, problems	* News reports for economic news, company news & stock markets; also financial papers & general economic reports	* News reports relating to development, resettlement, squatters * Journals, occasional papers published by town & regional planners relating to urban & rural development, environmental news	* News reports relating to regional news local & overseas, economy, etc. * Travelogues as background to study areas * Magazines & journals pertaining to aspects of S.A. or country studies
b) Writing	* Written answers to practical assignments, tests, examinations * Map analysis for field reports, field research	* Weather summaries related to class weather charts	* Written map analysis for field research	* Written analysis of population data & statistics	* Written analysis of economic data & statistics	* Written analysis of settlement aspects from maps	* Written analysis of data & statistics relating to population, economy etc. of areas
			* Reports, essays, slide tape, video scripts, computors for assignments, projects relating to aspects of geomorphology syllabus, fieldwork & field research	* Reports for assignments or projects related to population data problems or growth * Computing data and reports	* Reports, essays, slide-tape scripts, computor reports for assignments relating to economic problems, resources, etc., fieldwork & field research	* Reports, essays, slide-tape & video scripts, computing for assignments & fieldwork & field research	* Self-study reports * Use of computors for reports, etc.

3. LANGUAGE	MAPWORK AND GENERAL GEOGRAPHIC TECHNIQUES	CLIMATOLOGY AND NATURAL REGIONS	GEOMORPHOLOGY, OCEANOGRAPHY AND ECOLOGY	POPULATION GEOGRAPHY	ECONOMIC GEOGRAPHY	SETTLEMENT GEOGRAPHY	REGIONAL STUDIES
c) Talking	← ANSWERING QUESTIONS; ASKING QUESTIONS →						
	← GROUP INTERACTIONS DURING CLASSROOM DISCUSSION, FIELDWORK, FIELD RESEARCH, ASSIGNMENTS AND PROJECTS →						
		* Peer group teaching * Rôle play * Simulation games for natural regions studied * Panel discussions, & debates relating to environmental problems relating to climate, e.g. 'Maize in marginal areas', 'Sugar in the Pongola area', 'Bridges over estuaries', 'Roads in wetlands & forests'	* Peer group teaching relating to aspects of volcanism, earthquakes, and agents of erosion other than rivers or sea in Std 9 & Std 7 * Presentations of fieldwork, field research projects, case studies, related to geomorphological area studied and to environmental problems and management strategies * Debates, panel discussions relating to effect of man on environment in sections of geomorphology, ecology and oceanography	* Presentation of seminars & reports related to population data for local area problems of local areas * Debates and panel discussions of local population problems, population 'solutions', environment and population, community development	* Presentation of reports & seminars relating to peer group teaching relating to self study areas, production of commodities & services, scarce resources, and * Games & simulations relating to factory siting, industrial development, effects of technology * Debates & panel discussions relating to environmental problems created by development: mining, power stations, etc.	* Presentation of reports relating to fieldwork, field research * Debates & panel discussions relating to urban problems, rural problems * Simulation games relating to developmental theories in rural & urban areas	* Peer group teaching of aspects of countries * Presentation of reports & seminars of country studied or region analysed * Debates & discussions relating to country's 'problems'

4. VALUING	MAPWORK AND GENERAL GEOGRAPHIC TECHNIQUES	CLIMATOLOGY AND NATURAL REGIONS	GEOMORPHOLOGY, OCEANOGRAPHY AND ECOLOGY	POPULATION GEOGRAPHY	ECONOMIC GEOGRAPHY	SETTLEMENT GEOGRAPHY	REGIONAL STUDIES.
	* Values related to map analysis in terms of: development of dams, roads, bridges, settlements, new suburbs, power stations, crops or grazing, location of farmhouses, sewerage farms, dumps, new resorts, marinas, forestry plantations, power lines, etc.	* Values related to environmental problems because of incorrect farming in marginal areas, poor farming methods in climatically favourable areas, utilization of mountain areas for farming, forestry, irrigation of dry areas, cutting down of rain forests, ozone layer destruction, greenhouse effect, polar ice-cap melt.	* Values related to environmental problems associated with poor farming methods, accelerated erosion, overgrazing, poor mining methods, quarrying effects, over-utilization of ground water sources, water conservation, general conversation problems, management strategies & development of resorts, marinas, coastal mining, over-fishing effects of man on geomorphologically sensitive areas, e.g. riverine areas, estuaries, forests, slopes, dunes.	* Values relating to over-population, population 'control', re-settlement, migrant labour, squatting, forced removals, slum clearance, population solutions e.g. green revolution, use of insecticides, fertilizers, genetic experimentation, AIDS & other sexually transmitted diseases, prostitution, overpopulated areas, etc., 'dumping' of food, food aid.	* Values relating to exploitation of resources & labour, development problems, power stations, roads, bridges, etc; developmental theories, State subsidies on grain, bread for farmers, transport, strikes, labour action, inflation and tax.	* Values relating to developmental problems & schemes, re-settlement, squatters, slum clearance, Group Areas Act, urban & rural problems & solutions, developmental theories, siting of dumps, sewerage farms, quarries, brickworks.	

in each of the four basic skill areas associated with geographical education. This implies that the IST programme operating in a school needs to be developed within a far broader framework than was identified by the survey (chapter five).

A further implication is that the development of specific skills, attitudes and values ought to be perceived holistically and therefore need to be applied and refined throughout each successive year of the geography curriculum. This aspect was translated into the perceived need for a framework which would ensure progression in skills, values, etc.

The resultant framework for skills progression in IST (Table 8.3) was an attempt to translate skill development as identified in Table 8.2 into the processes associated with assignment and project work. The framework was developed in two parts. The first part related to the development of skills associated with geographical education, including spatial perception, to specific activities for IST. The second part of the framework was developed to provide the sorts of guidelines needed to ensure skills progression in designing and structuring assignments and projects in particular, as these activities presented the greatest difficulties to teachers.

The identification of skills within the various components of the syllabus and the development of the framework for skills progression created a valuable structure within which to plan and develop the various activities of the schools' IST programme, discussed later in this chapter. The development, in both these areas, further served to highlight the key role played by skill development in current geographical education.

The activities undertaken in the course of the pilot programme, however, revealed that pupils will not acquire skills, values or attitudes simply by being exposed to activities designed within a skill framework. The acquisition of these proficiencies is the result of their being taught and practiced. A further factor emphasised by the pilot programme was that without mastery of the propositional knowledge which underpins various skills, there can be no mastery of that skill. In order to teach the mechanics of constructing cross-sections from a topographical map or aerial photographs, therefore requires a knowledge of the pupils' understanding of contours, scale, distance, etc., the degree of spatial understanding the pupils have and, indirectly, their ability to comprehend, analyse and evaluate. Skill acquisition cannot therefore be viewed as a product associated with the pupils'

TABLE 8.3

PART I

ANALYSIS OF ACTIVITIES IN THE PRACTICAL AND PROJECT COMPONENTS OF IST IN RELATION TO GEOGRAPHICALLY ORIENTATED SKILLS

COGNITIVE AND AFFECTIVE SKILLS APPLIED TO	GRAPHICACY	NUMERACY	LITERACY	SPATIAL PERCEPTION	VALUES

Data response

Data analysis

Statistical analysis

Problem identification and problem solving - general and fieldwork, field research, projects

Hypothesis formulation and testing " " " " " "

Simulations involving decision making

Games involving decision making

CASE STUDIES

	GRAPHICACY	NUMERACY	LITERACY	SPATIAL PERCEPTION	VALUES
	* model making * development of posters & charts * orienteering * mapping * field sketching * drawing analysis and construction of graphs, schematic diagrams * slide tape presentations, video presentations * computing	* calculations * computing * sampling	* reports, essays, script writing, questionnaire construction, interview construction * debates, panel-discussions, role play, peer-group teaching, group interactions, interviewing, questioning, answering * reading, 're-searching'	* model making * model analysis * maps & map games * photo & map interpretation * valuing	* values explanation * values clarification * values analysis * values probing * 'moral dilemmas'

TABLE 8.3

PART II

FRAMEWORK FOR SKILLS PROGRESSION IN IST

	STD 6 : AVE. AGE (JUNE) 14.3	STD 7 : AVE. AGE (JUNE) 15.3	STD 8 : AVE. AGE (JUNE) 16.3	STD 9 : AVE. AGE (JUNE) 17.3	STD 10 : AVE. AGE (JUNE) 18.3
GENERAL ASSIGNMENT AND PROJECT SKILLS a) 'Search and extract'	* Use of Dewey system in library to find printed MATERIAL AND OTHER software * Use of encyclopaedias * Use of index and table of contents for general non-fiction * Use of general magazines: National Geographic, Custos, etc. * Use of newspapers * Use of Atlas index * Simple extraction based on given questions without copying verbatim from the text	As for Std 6 but to include * Use of year books * Use of more specialised magazines, S.A. Digest and publications of Department of Information, Department of Environmental Affairs, etc. * Use of specialised texts Branch (1983) Day (1973), etc. * Use of Atlases for more specialised purposes; projections, geomorphology, settlement, etc. * Extraction of material based on the given problems without copying from the text	As for Junior Secondary but to include * Use of census data * Use of specialised magazines and journals; Archimedes, Sciential, etc. * Use of Almanacs * Use of more advanced texts; Strahler & Strahler (1982), D.E. Mountain (1968), etc. * Extraction of information related to general problems without copying from the text	* Use of economic reports * Stock Market reports * Journals; S.A. Geographical, Financial Mail, etc. * Use of occasional papers; town and regional planner's reports, etc.	
b) 'Problem solving' skills	* Moving from the known to the general * Moving from the concrete to the abstract * Identification of relationships and simple patterns * Explanation of the above with regard to 'where', 'when', 'how', 'why' * Description with regard to 'what', 'how', 'where', 'when'	* Simple identification of problems * Analysis of information and data and its evaluation in order to draw conclusions * Explanation with regard to 'to what extent', 'in which circumstances', 'with respect to' * Comprehensive, yet clear and concise descriptions	* Making of assumptions which can be accepted in general argument * Finding general propositions * Going beyond the finite and concrete in special conceptualisation * Use of systems analysis and systems development or identification * Making judgments based on rational thinking * Dealing with complex relations	The development and refining of the 'higher order' processes introduced in Std 8	

c) Presentation skills	STD 6 : AVE. AGE (JUNE) 14.3	STD 7 : AVE. AGE (JUNE) 15.3	STD 8 : AVE. AGE (JUNE) 16.3	STD 9 : AVE. AGE (JUNE) 17.3	STD 10 : AVE. AGE (JUNE) 18.3
	i) Written reports using: title page, table of contents, list of illustrations, referencing of texts used, acknowledgement of sources, correct use of introduction and simple conclusions Correct use and presentation of illustrative material; simple line graphs, bar graphs, photographs, tables & schematic diagrams	i) Written reports as for Std 6 but to include: use of appendices for data, correct use of quotations, cross-referencing & illustrative material, correct use of captions for illustrative material	As for Junior Secondary but to include: i) Use of cross-referencing in text; use of footnotes; application of scientific or other methodological route for investigation and presentation	These developed and refined in Std 9	
	ii) Verbal presentation using: logical sequencing, formal language, OHP transparencies, slides, posters & charts	ii) Verbal presentations as for Std 6 but to include: use of slide-tape presentations, video, computors	ii) Multi-media A.V. presentation	Refined & developed in Std 9 and Std 10, where applicable	
	iii) General graphicacy to include models as well as above	iii) Graphicacy in written and verbal presentations to include: polygraphs, bar diagrams, line graphs, pie-charts, tables, photographs, field sketches, maps, schematic diagrams and models, cross-sections	iii) Graphicacy in written and verbal presentations as for Std 7 but also climagraphs, pyramids, flow diagrams, flow maps, density and distribution maps, general mapping using physical, political, specialised maps, and synoptic maps, 2-D and 3-D schematic diagrams, theoretical models	iii) Graphicacy in written and verbal presentations as for Junior Secondary phase, but also scatter graphs, hydrographs, field mapping, prediction curves	Refined and developed in Std 10 where necessary and applicable to syllabus
	iv) Numeracy used for written and verbal presentations Calculation of scale, distance, position, co-ordinates (degrees and minutes), bearing (direct), time, general area of map extract, climatic data	iv) Numeracy used for written and verbal presentations: calculations as for Std 6 but to include: co-ordinates, viz: minutes & seconds, magnetic declination, air photo scale, cross-sections and V.E. gradient, area using grid, media, mode and mean	iv) Numeracy used for written and verbal presentations calculations as for Std 6 & 7 but to include: sampling, table analysis ranking, interpolation, measurements related to population geography, intervisibility	iv) Numeracy used for written and verbal presentation as for Junior Secondary phase but to include in Std 9 and/or Std 10: weather data as per syllabus, measurement related to geomorphology, economic geography as settlement geography as per syllabus.	

	STD 6 : AVE. AGE (JUNE) 14.3	STD 7 : AVE. AGE (JUNE) 15.3	STD 8 : AVE. AGE (JUNE) 16.3	STD 9 : AVE. AGE (JUNE) 17.3	STD 10 : AVE. AGE (JUNE) 18.3
d) Language skills	* Short written reports, essays & paragraphs * Verbal presentations relating to: fieldwork, peer-group teaching, role play, debates and group interaction	* Written reports, essays and paragraphs * Verbal presentations as for Std 6 but to include: panel-discussions (and may include interviews and interview results in both written and verbal presentation)	* Written reports, essays etc. as for Junior Secondary phase but generally longer for the project * Verbal presentations as for Junior Secondary phase * Written and verbal presentations to include interviewing and interview results, analysis of surveys and simulations	To be refined and developed where applicable and relevant Written and verbal presentations to include critical analysis of reports and other written and verbal source material	
e) Valuing skills	* Moral 'dilemmas'	* As for Std 6 but to include: values clarification	* As for Std 7 but to include: values analysis	Values analysis, values clarification to be used in Std 9 and Std 10 also to include values probing	
f) Specific fieldwork and field research skills	Fieldwork and field research skills to include skills related to problem solving, graphicacy, numeracy and 'search and extract' in all classes as identified above, but also to include: * Observe and record using 'inventory skills' * Measurements related to distance, depth, height and volume and for climatic data	* As for Std 6, but also: * Measurements related to stream flow, density and relationships, spatial pattern, and as per syllabus requirements for settlement and geomorphology	* As for Junior Secondary phase, but also: * Measurements related to population and geomorphology as per syllabus requirements	* As for Junior Secondary phase, but also: * Measurements relating to economic, settlement, climatology and geomorphology requirements as per syllabus * Data analysis, data evaluation in field, more complex measurements relating to field research topics in terms of density, depth, height, etc. and in relation to surveys, etc.	

chronological age or 'intelligence', but as a process which is aided by the pupils' stages of development and experiences (Stenhouse, 1981). As such, the design of an IST programme needs to be viewed as an integral and essential part of the geography curriculum, rather than as a 'sometime' activity as would appear to be the case in many of the schools surveyed (chapter five).

8.1.1.1 The implications of the framework for skills progression on the design and development of activities

The process by which children develop skills, attitudes and values, therefore, had the following implications for the development of the IST programme:

(i) Aspects of the syllabus which were directly or indirectly skill related needed to be approached by linking the skills with the propositional knowledge with which they were associated and translated into activities which would enable the pupil to practice the skill. The practical component of IST therefore came to incorporate a far greater variety of short tasks directly related to the subject content. There was less of an emphasis placed on homework and classwork tasks that were primarily related to note-taking, summarising and rote-learning. Data response and data analysis activities and the interpretation of schematic diagrams, maps or photographs were used whenever possible. Where this type of task was not relevant to a specific section of the work, pupils were set problem-type questions. Thus, the gathering of information through mechanical note-making was largely replaced by problem related activities.

(ii) Since skills were taught and practised in the normal course of class teaching and through the short, teacher-directed but learner-centred activities, larger assignments and projects could demand a higher level of skill application in relation to problem identification and problem solving than had previously been the case. By 1988 pupils in Std 7, 8 and 9 were able to complete projects based on the structuring of the O- and A-Level projects designed for British school geography. While not all of the pupils were able to achieve the same degree of expertise in the application of complex skills, they were all able to achieve a sufficient level of competence which allowed them to complete the projects satisfactorily and to gain personal satisfaction from the task. Thus, the view held by respondents to the survey (chapter five), that problem-type research projects are beyond the scope of all but the most academically gifted, was negated both by the results of the pilot programme and the subsequent project development.

8.I.I.2 The design of activities within the progression framework and the identification of 'performance barriers' in their structure

A better understanding of how skills develop and their wider application to the day-to-day activities necessitated further analysis of the structure and design of the tasks set. The activities which were designed for the pilot programme gave consideration to the way in which language may inhibit the pupils' performance. However, further analysis revealed that the structure and design of IST may contain a number of such 'barriers' which affect pupils' performances. The identification of these problems led to the following considerations with regard to the design and structuring of activities.

(i) Teachers had to be aware of the need to relate the tasks to the pupils' experience. For example, it was discovered that the younger pupils, who often have difficulty with the more abstract theoretical sections of the syllabus, frequently found it easier to deduce certain principles or theory from so-called "real world" situations, than having to relate the given theory to such situations. Prior to this, fieldwork activities and other practical activities set for Std 6 and Std 7 were designed in such a way that the pupils were required to relate the 'taught' theory to a given situation. A shift in emphasis, whenever possible, improved the pupils' performances.

(ii) The realisation that as valuable as visual material is for the development of perceptual awareness and conceptual understanding, many pupils have problems with two-dimensional visual material. Therefore, employing graphs, schematic diagrams, maps and photographs as a means to test the pupils' mastery of the subject matter depends on the skills they have acquired in the interpretation of such material as the type of visual used may be a barrier to the pupils' performance.

In an attempt to alleviate the difficulties pupils have with two-dimensional visual material, the IST programme:

* exposed pupils to as wide a variety of two-dimensional material as possible;

* introduced pupils to the analysis and interpretation of two-dimensional visual material as early as possible in the high school geography course;

* designed activities in the practical component of IST which employed such visual material as often as possible either as data response tasks or as interpretation tasks;

* ensured that pupils made use of such material in their assignments, field reports and projects;

* provided pupils with frequent opportunities to construct graphs, schematic diagrams, etc;

* supported the two-dimensional visual material with three-dimensional models and photographs whenever feasible when introducing new variations of two-dimensional visual material.

(iii) Further analysis of the role which language plays in the pupils' performance meant that in designing the tasks the staff concerned had to be aware of the need to develop the pupils' understanding of instruction or 'cue' words and their ability to understand precisely what was expected of them. Poor performance was frequently revealed to be the result of pupils' lack of comprehension of what was needed, rather than their inability to carry out the task. The evaluation and analysis of these activities revealed that many pupils in the lower standards have surprisingly limited vocabularies in relation to their chronological age. Instruction in the language used became an important part of the development of the practical tasks. Pupils also needed to be given frequent opportunities to express themselves verbally and through the written word in order to develop their ability to express themselves coherently and to use a formal mode of language.

(iv) Teachers had to be aware of the problems which many of the pupils have with regard to numeracy in geography. The pilot programme and subsequent analysis of practical activities revealed that many of the pupils were unable to:

* apply learned formulae to actual calculations on maps and photographs or in the field;

* manipulate the figures contained in tables;

* apply simple statistical concepts;

* conceptualise distance; for example, many of the younger pupils revealed that they had no perception of a kilometre and as a result distance on maps in relation to real distance was beyond these pupils' frame of reference;

* comprehend large numbers such as are associated with map scales, therefore the conversion of scale or application of scale presented problems;

* complete simple arithmetical procedures involving the use of ratio, multiplication with decimals or long division;

* analyse graphs where numbers were involved.

One obvious reason for these difficulties is that not all the geography pupils take mathematics as a subject in the senior secondary phase. A more serious problem, however, is that many of the pupils from Std 6 to Std l0 actually feared anything to do with figures. The problem was to break down this deep-seated antipathy and to disassociate the application of numbers in geography from the pupils' notion of "It's maths, therefore, I can't do it." It was also found that a number of pupils when using calculators were able to 'press the right buttons', but because the concepts and relationships which underpin the mathematical or arithmetical procedures were not understood, pupils such as these operated according to an approach which Skemp (l976, in Stoker, l983) identified as 'rules without reasons'. These pupils were therefore unable to solve problems for themselves. To combat these difficulties, the researcher and the staff concerned adopted a similar approach to that used in the development of the pupils' understanding of two-dimensional visual material.

8.I.2 THE ESTABLISHMENT OF A RESOURCE-BASE TO CATER FOR THE DEVELOPMENT OF SKILLS, VALUES AND ATTITUDES, THROUGH THE ACTIVITIES OF IST

Resources for IST may be categorised as follows:

(i) Software, which includes all printed material and audio-visual material, such as slides, transparencies, maps, charts, videos, etc.

(ii) Hardware, which includes cameras to take photographs or slides, a video camera, television and VC recorders, OHP's, slide projectors, tape-slide projectors, tape-recorders and computers.

(iii) Human resources.

(iv) Places which included the school grounds and for the purpose of this research included all places within a radius of four to five hours travelling from the school.

Software, in the form of printed material, included geography textbooks, year books, newspapers, magazines, journals, economic reports issued by various commercial and industrial institutions in the Republic and Homelands and in neighbouring territories, specialised non-fiction and a variety of other publications. The printed material identified provided a source of data, diagrams, maps and statistics etc., which are invaluable in the practical component and in providing pupils with evidence for their project work. Audio-visual software which is commercially prepared is not simply a teaching resource, but is stimulus material upon which a wide variety of activities can be based. As the IST programme developed, pupils were encouraged to develop their own photographic slides for slide-tape presentations; OHP transparencies to use in their oral presentations and video productions which were used by pupils as part of their presentations. Pupils who were computer literate were encouraged to use the computer to analyse data and to develop graphics, as well as to produce written reports. The 'hands-on' policy in terms of producing and using software proved to be invaluable. Pupils' oral presentations improved, the use of such material motivated the pupils as they enjoyed producing and developing visual material using the available hardware.

Thus, pupils from Std 6 upwards learnt to use the video camera, the l6mm camera, slide-tape machines and the ecktographic camera to make slides from printed material and tape recorders. They were taught to edit, to superimpose music on their tape productions and a variety of other skills related to the use of the school's hardware. Interested pupils were invited to attend workshops held after school. Each workshop concentrated on a different piece of equipment. this meant that very soon there was a large group of trained pupils who could develop and produce resources of a high quality. Not only, therefore, did this aspect of the IST programme motivate the pupils and improve their presentations, but it also meant that the researcher and other staff concerned could use these pupils to develop teaching resources and resources which were needed for the practical or project components. Resources which teachers normally do not have time to develop.

However, the human resources are perhaps the most valuable for the development of an IST programme, particularly in relation to the project component. As the programme developed, a wide network of people was identified, contacted and used as an integral part of the programme. These contacts included members of both the public and private sectors from the town and the area which was used in the programme and included:

(i) local town and regional planners, both within the various municipalities and in the private sector;

(ii) the 'city' engineers of the various municipalities visited;

(iii) publicity associations;

(iv) museum staff;

(v) library staff;

(vi) members of the various forestry stations, nature conservators, and the staff from various nature reserves, game parks and game ranches in the area;

(vii) members of the Chamber of Commerce;

(viii) public relations officers of various commercial firms and industries;

(ix) social workers and other community service staff;

(x) farmers in the district;

(xi) the local town councillors;

(xii) the local meteorological officers;

(xiii) university staff from Fort Hare and Rhodes University.

The members of the private and public sectors were an invaluable source of publications, maps, photographs and statistical data, which are not generally accessible to the public or the schools. Far more valuable, however, was the vast reservoir of expertise and knowledge that became readily available to the researcher and to the pupils. Without exception, the people who were contacted were willing to give of their time and knowledge. In this way the school gained access to primary, secondary and tertiary activities within the economic sector. This access meant that pupils were able to investigate individual activities as case studies, since they were invited to visit the commercial institutions, factories, farms, forests, etc., and to interview a wide variety of people employed in the activity. Help and guidance also frequently took the form of advice in relation to a methodology which was needed to approach a study. This was essential to avoid IST lapsing into 'Cook's Tour' type visits. Farmers, nature conservators, museum staff, library staff, town and regional planners and city engineers, were all able to instruct the researcher and the pupils in techniques for investigation and frequently supplied the scientific apparatus needed for studies, or provided access to equipment needed for the analysis of data or for the reproduction of maps or photographs, etc. The researcher and the pupils were therefore exposed to a wide variety of research techniques which led to an increase in skills.

Guidance of this nature is essential for the development of an IST programme which is broad enough to capture the interest of all the pupils, particularly in respect to the development of the project components. No single teacher or group of teachers is expected to have the scientific or technical expertise which the pupils need for the development of their individual talents and interests. The broad spectrum of biogeographical knowledge and skills can only be explored with the help of the resources within the local community. Nor can any one teacher be expected to have the time at his or her disposal to spend on the sorts of investigation which involves not only a class or a group, but individual pupils. Thus, through a network such as this, the teacher is able to delegate much of the facilitating to members of the private and public sector who are more than willing to act as mentors to the pupils in the course of their project work or investigations. Other advantages of developing a wide network within the community are:

(a) the same people are not necessarily involved in the IST programme each year; and

(b) it provides the teacher and the pupils with a great deal of flexibility in the selection of teacher-directed structured assignments, or for individual projects.

Initially, the researcher identified possible areas for investigation and these tended to be influenced by her particular spheres of interest. As the programme developed, the pupils' input became increasingly important.

Areas and specific places identified for the field excursions, field research projects, case studies and individual pupils' research projects are indicated in Appendix 8A.

The researcher and the pupils discovered a wealth of resources both locally and within easy travelling distance for weekend excursions or for four to five day excursions over long weekends. More will be said about the actual organisation and administration of these excursions later in this chapter.

An analysis, therefore, of the resources available for both the practical and project component of IST revealed that each community, whether large or small, has a vast and usually untapped reservoir of resources which can be used by the teachers and the pupils. As the programme developed, the researcher and the pupils' thinking about IST was freed from the conventional approaches to assignment and project work and the activities became not only more exciting but also more meaningful as pupils investigated and covered topical issues, controversial situations and included exploration into a broad spectrum of social, economic and physical aspects of biogeography.

8.1.3 THE DEVELOPMENT OF A STRUCTURE WITHIN WHICH THE INDIVIDUAL ACTIVITIES COULD BE DESIGNED, ASSESSED AND EVALUATED

The organisation and administration of IST must of necessity operate in the geography curriculum for each standard and within the general school curriculum. Thus, not unexpectedly, the schools surveyed (chapter five) identified the most serious constraints to IST as being the time available for teachers and pupils, the length of the syllabus and examination constraints. The development of IST prior to the pilot programme and during 1986 had been approached as a programme which occurs parallel to, but separate from, the general teaching of the subject. This approach does create problems and was the primary reason for the problems experienced in the Std 9 programme of the pilot study. Should IST be perceived as a separate entity in the geography curriculum it will mean that pupils in each standard can produce one assignment at the most of the sort done at the start of the pilot programme, per term, with either one field trip for the year or a research project.

An alternative approach to IST, however, is to view it as an integral part of the geography curriculum and to shift the emphasis in classroom management accordingly. During 1987 and 1988 IST was increasingly incorporated into the general development of the syllabus by the researcher by means of an increased number and variety of learner-centred tasks, which were divided into the following types of activities:

A Short, structured activities

Short, structured, yet learner-centred activities were designed for homework or as class exercises, which operated on a day-to-day basis as they were directly related to the subject matter. These activities included:

* data response

* data analysis

* interpretative activities based on maps, photographs, schematic diagrams or graph analysis

* problem-orientated questions

* the presentation of short seminars, debates and panel discussions

* role play and other simulations; and

* occasional peer group teaching of sections of the work

Resources for these activities generally included prescribed textbooks, atlases and supplementary sets of textbooks housed in the senior geography room. Many of the tasks were taken from prepared activities in the more recent textbooks and used as presented or were adapted. The researcher found that maps, diagrams, photographs, etc., contained in the textbooks could be used as a single resource which could be used for a variety of standards. Thus, aspects of settlement geography in the Std 10 textbook could be used to design tasks for the Std 7 pupils, with the converse also being possible. Where pupils needed additional material for debates, role-play or peer group teaching, it was either provided in the form of photocopied material or pupils could use the school library. Slides, transparencies and prepared video programmes were a further source of material upon which to base these activities. Pupils were also encouraged to use audio visual material whenever relevant in their presentations.

The design and development of these activities required a minimum of time, fuss and trouble. Key factors in administering activities of this nature were:

(i) a well organised, labelled and catalogued resource base;

(ii) advance preparation by the teacher; the researcher spent one afternoon a week in preparing the activities for each week;

(iii) the training of pupils in the skills needed for the activities; the researcher found that if pupils are introduced gradually to learner-centred approaches in the junior secondary classes, by the senior secondary phase the pupils need relatively little supervision;

(iv) the Std 6 orientation programme for geography, by including a section of library skills and on simple AV techniques, meant that these pupils had a basic set of skills which they could apply to the tasks set in IST.

B Structured worksheets

Worksheets, such as those designed for the first of the activities in the pilot programme, formed a part of the practical component of IST. These longer activities, developed to reinforce, to test or to enrich the work within the syllabus, were generally administered at the start or completion of a section of work, depending on the purpose for which they were designed. In the senior secondary phase all the pupils had a fixed fortnightly geography test period of one hour and ten minutes. One of these test periods each fortnight was used for the worksheets. These worksheets were designed to test skills related to map work and numeracy, or were problem oriented and were based on the skills and propositional knowledge related to the section of work covered. As such, they formed a part of the progression framework for skill development in these standards. The Std 6 and Std 7 pupils generally completed one such exercise during a term. In the case of the younger pupils, a single lesson was devoted to the worksheets and took the place of one of the class tests for the term.

C. Structured assignments

Structured assignments in Std 6 and Std 7 were designed to prepare pupils for project work in the senior secondary phase. An important aspect of tasks of this nature, which was highlighted by the pilot programme, was therefore to teach pupils the skills they need with regard to data collection and processing, presentation and time management, among others.

The researcher had initially intended that two such activities would be completed during the Std 6 and Std 7 years, in addition to those pupils' field report. This was, however, found to be impractical. Therefore one of the assignments was related to the field study and one involved the use of library resources. The latter assignment was either based on an aspect of the syllabus or on a topic the pupils chose.

The assignments could be presented either as a group task or as individual assignments and included:

* written reports
* oral presentations
* models; or
* poster presentations

Pupils in the lower classes were initially wary of group work as indicated by their evaluation of the pilot programme. The primary cause for their concern was that individual members would be passive, while others had to do all the work. A second area of concern was the assessment of group work. To solve these problems, the researcher gave each group the opportunity to divide the workload so that each member of the group was responsible for a particular aspect of the work and would be assessed on that aspect. The researcher found that pupils preferred to present an individual assignment for their field report, but were happy to present a group task for the other assignment. It was also found that although pupils were allowed to choose their method of presentation, they generally preferred to do the field report as a 'written' assignment, with the other assignment being used to vary the method of presentation.

When possible, these assignments were planned for the terms in which no general examination took place. This, therefore, meant that the first assignment was completed in the first term, with the second completed in the third term. Since pupils needed to acquire additional skills during the course of the year for the field excursion, this activity was set as the second assignment.

This type of activity was undertaken on two occasions with a Std 9 group. However, these pupils found it to be too time consuming in view of their other project work and this type of activity, if undertaken with senior pupils, would need to take the place of a project. The Std 10 urban trail, described in the fieldwork section below, was, however, administered as a structured assignment because of the pressure of work on this group.

D Field activities

Field based activities became increasingly important as pupils revealed a considerable interest in activities related to actual issues which were associated with the local area or in the area demarcated for field studies. Fieldwork evolved within the following framework:

(i) The school trail as an introduction to field techniques was continued with the Std 6 and Std 7 pupils and completed during normal teaching time.

(ii) Structured field excursions were continued with the Std 6 and Std 7 pupils, with one day a year set aside for this activity. The approach to the fieldwork described in the pilot programme was continued, as the selection of one aspect of the study area for an in-depth report had proved to be both popular and successful.

(iii) Senior fieldwork evolved as follows:

* The Std 8 pupils were taken on one group field excursion in the course of the year. The field report based on this excursion was related to problem identification and an attempt to find solutions to the problem. A second field-based activity for this group was designed as an individual project with pupils choosing their topics.

* The Std 9 group were required to undertake a field research project. While the research for this project was based in a single area, each pupil could choose an aspect of the study area for their research topic. Initially, all the pupils had to present this as a full length project, but at the request of the pupils, the field project could be done either as a major or a minor project.

* The Std l0 group's field excursion was related to an urban trail. The results were discussed and analysed in the course of normal class periods associated with the relevant syllabus sections covered on the trail. Each pupil was required to write a short report on one aspect of the trail, which was designed to develop conceptual understanding of the urban settlement compared to the Std l0 syllabus (Appendix 8B). This method was used because of the severe time constraints on these pupils.

(iv) Fieldwork within the extra-mural programme developed in the following manner:

* One afternoon each fortnight was set aside for an excursion. These excursions formed a part of the activities of a particular cultural society, the 'Life Sciences Society'. Many of the senior members of the society were pupils not taking

geography as a subject. Geography pupils could, if they wished, incorporate one of these afternoon visits into their structured assignments for the term or, in the case of the senior pupils, could use these as an exploratory visit upon which to base their research projects.

* As the pupils became increasingly interested in investigating local places and issues, these afternoon visits were considered to be too short for any in-depth investigations and a group of pupils, both geography and non-geography students, decided to form a 'research' group. As a result of their enthusiasm, and the results of their investigations, this type of activity was incorporated into the schools' enrichment programme.

* Twelve weekend excursions were developed especially for the Std 7 group as a means to generate interest in geography and environmental studies. Each of the excursions was different and pupils could choose the field experience which appealed to their individual interests. The groups attending these excursions were limited to 25 pupils, this being the maximum which could be transported in the school vehicles. While each pupil was expected to attend one excursion, where there was space they were allowed to attend others. The excursions were designed in such a way that all the follow-up and analysis was completed in the course of the weekend.

(v) Classroom fieldwork evolved from activities in the practical component of IST, designed to develop graphicacy, in particular map skills and graphic analysis, and numeracy, through the analysis and interpretation of l:50 000 topographical maps and aerial photographs. The introduction of a thematic problem solving approach (Appendix 8C) to these activities resulted in the pupils reacting more positively to this aspect of the syllabus than when using short, discrete exercises such as are used in the senior certificate examinations (Paper 2). The response to these activities led to further development in the form of photographs of the mapped area or other information about the mapped area, hence the idea of classroom fieldwork which came to be developed according to Hart and Thomas' (l986) model of topic oriented fieldwork (Figure 8.l). It was interesting to note that the pupils viewed these activities in the same way as a simulation game. As such classroom fieldwork activities were included in the practical component of IST and were administered in the same way as the structured worksheets.

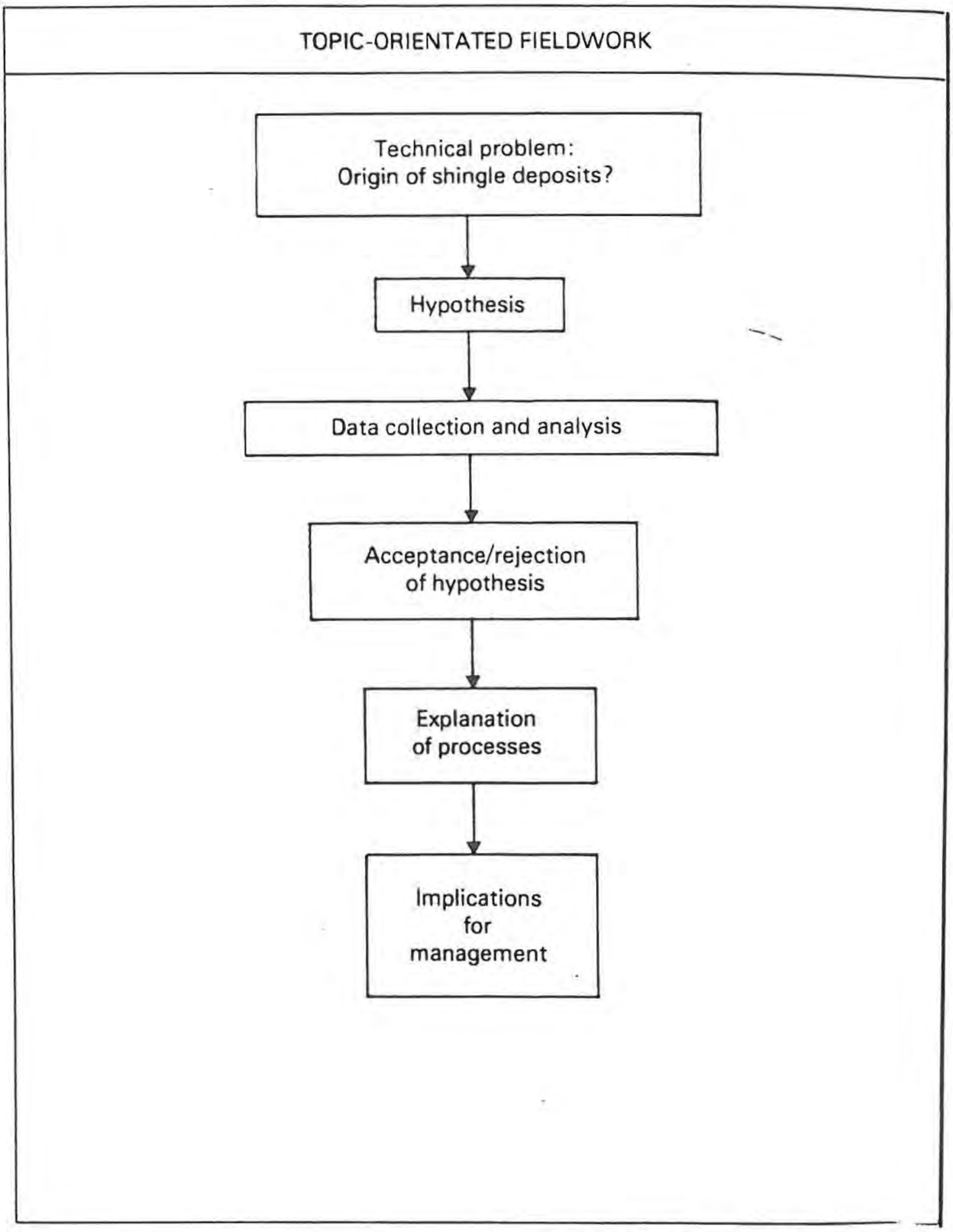
Fieldwork within the extra-mural programme was made possible by the network of resources previously discussed and the support of the geography staff, as well as other staff members and parents. In the second year of operating these excursions, they became far more integrated as the biology and art teachers evinced an interest in their structure and development. On a number of occasions the Std 7 pupils, as well as the other groups, were joined by two local schools, who had a shared interest in the extra-mural field excursion project.

E The project component

The development of the project component was the fifth area of activities designed within the IST programme framework. These individualised or small group tasks proved to be the most time consuming for the teacher, since as a facilitator, the teacher needs to spend time with each pupil or small group. These activities also required the application of a wide variety of skills and techniques. While the researcher found pupils at Std 7 level to be capable of project work, the realities of this type of investigation makes it impractical to undertake projects with the younger pupils as they need far more guidance than the older pupils and have as yet not acquired the many techniques necessary for projects of the nature described by Beaumont and Williams (l983) (in chapter two). The project component in the formal school programme of IST was therefore only made compulsory for Std 8 and Std 9. Project work, with its demands on time, was considered to be unrealistic for Std l0 pupils.

The project component evolved in the following manner:

* Each pupil in Std 8 was to complete one investigative project located either in the East London area or, if the pupil was a boarder, she was permitted to do a study in her local area, with the proviso that the data collection needed for the topic was



(Boardman, 1986, p. 210)

FIGURE 8

TOPIC ORIENTED FIELDWORK

completed by the end of the July vacation. This, with their field report, formed their individualised programme. This method proved to be successful and popular with the pupils and the teachers concerned, and was maintained when the IST programme was drawn up for 1989.

* In the year after the completion of the pilot programme the Std 9 pupils were required to do a field research project as well as an individualised study of their own choice, both being equally weighted in terms of their assessment. The researcher and the pupils found this to be impractical as two major projects in a year not only took too much time, but had limited benefits regarding the acquisition of additional skills. The decision was therefore taken for the Std 9 pupils to do one major project and a minor project. The written report for the minor project was restricted to 1500 words, while the major study was restricted to approximately 4000 words. (This was necessary as a number of the previous reports had exceeded 30 foolscap pages.) This system satisfied the researcher as well as the pupils, as they could still be exposed to the full range of project skills and techniques, while reducing the total time necessary for the tasks.

The field research projects and the individualised study areas chosen by the Std 8 and Std 9 pupils included a broad range of topics which, of necessity, meant that the pupils were introduced to a variety of enquiry techniques and data collecting instruments. The three basic lines of enquiry followed are reflected in the systematic scientific model, the phenomenological model and that of framework fieldwork (Figures 2.1, 2.3 and 3.3 in chapters two and three). The planning and structuring of these investigations were closely related to the need to identify members of the community who were able to give guidance in this respect and thence to the network of human resources referred to earlier in this chapter. While it is impossible to detail all the project areas covered and the sorts of resources to which the pupils were exposed, Appendix 8D presents examples of group projects which were completed both in the formal and informal component of IST, while Appendix 8E presents examples of topics undertaken by individual pupils during 1987, 1988 and 1989 in Std 8 and Std 9.

8.2 THE ORGANISATION AND ADMINISTRATION OF IST LEADING TO THE DEVELOPMENT OF THE SCHOOL PROGRAMME FOR IST

The organisation of an IST programme for the entire school has, however, to take into consideration the following aspects:

(i) The experiences of the teachers in the geography department.

(ii) The teaching style with which each teacher is most comfortable.

(iii) the interests of the individual teachers and their areas of expertise.

(iv) The individual work load of each teacher.

The researcher was able to apply the IST programme as described with her classes for the following reasons:

* As an experienced geography teacher, she was completely familiar with the entire school geography curriculum.

* As the Std IO geography teacher, she knew precisely what areas of expertise could not be neglected in terms of the demands made by the senior certificate examination.

* As subject head and head of department, she taught only geography and had a maximum of six classes for which she was responsible - generally the two Std IO groups, one Std 9 group, two Std 7 classes and one Std 6 class.

* She was not responsible for any sport, as her extra-mural portfolio was largely related to the "Life Science Society" and the research group.

* Her family commitments were such that it was possible for her to commit herself to the numerous weekend excursions.

It was therefore not possible to expect each teacher in the geography department to follow the same schedule of IST. The researcher, with the teachers concerned, therefore developed a school programme for IST based on the following:

(i) The use of short, structured activities for homework or for class exercises, as described, to be administered at the individual teachers' own discretion. The only injunction was that pupils had to have experience in the identified skills, propositional knowledge, attitudes and values. How teachers helped their pupils to develop in these areas depended on their own particular class management and teaching style.

(ii) Longer worksheets or structured assignments could be planned and developed by the individual teachers when it suited them and their classes. However, in the junior classes, two such activities had to be completed each year for the purposes of the year mark and to preserve continuity of experiences for the pupils. The Std 8 teacher was free to develop this system as she wished, but all the Std 9 pupils would do the same worksheets done by the researcher's group.

(iii) Each class had to produce one completed task based on a field excursion, which meant that all the classes did the same field excursion planned during the school day for that particular standard.

(iv) The Std 8 pupils had also to complete one individual project in the course of the year.

(v) The Std 9 group's project work was set at one major project and one minor project for the year. All the Std 9 geography students attended the same field excursion, but they were free to decide whether this would be their major or their minor project. Each teacher responsible for a Std 9 group acted as facilitator to her students in the project component.

Effectively, this meant that each pupil in Std 6 and Std 7 had to produce a minimum of three pieces of work assessed for the IST year mark and each pupil in Std 8 and Std 9 had to produce two projects for the year mark. Any additional work done in IST by the teachers was included in the term marks. The assignments and projects that were done throughout each standard were designed, developed, assessed and evaluated by the teachers concerned with these standards and were moderated and controlled by the researcher.

The researcher made all of the activities she developed for her classes available to the teachers concerned with the standard for whom they were designed and teachers could therefore use them if they so wished. Teachers were also encouraged to pass on any of their material they had developed. The researcher, however, did not at any time check to see which of the activities were used by other teachers as she considered this to be an invasion of their privacy and believed that it would upset the type of co-operation needed in the general administration of the IST programme.

The extra-mural fieldwork and research projects were the responsibility of the researcher and, as mentioned, geography staff members were free to attend these or to join in the research projects if they wished to do so. In practice, geography staff members became heavily involved in this extra-mural programme.

The IST programme design for each year was planned by the researcher with the rest of the geography teachers at the start of each year. This included:

* the selection of fieldwork sites for all the standards;

* setting dates for fieldwork for each standard;

* the selection of the general activities that would be included in the pupils' year marks and planning the time frame for these activities;

* setting weekend excursion dates (the actual areas to be visited were negotiated with the girls concerned at the start of the first term);

* general planning for the logistics involved in the management of the activities, e.g. who would be in charge of the design; the general organisation; attend the excursion; assess the assignments, etc.

Other than the advance planning, each activity was designed and developed by the teachers concerned in the term in which the activity was to take place.

The design and development of the activities were based on the guidelines provided by:

(i) the set of criteria which acted as the principles of procedure for the programme design;

(ii) the identification of the skills related to the subject content;

(iii) the framework for skills progression;

(iv) the analysis related to the identified barriers to performance.

Each staff member had copies of these guidelines and they were used to evaluate the actual design of the individual activities as well as its development.

8.3 THE DEVELOPMENT OF A SYSTEM OF ASSESSMENT FOR IST

The development of an assessment system for the individual activities within the IST programme for each standard evolved parallel with the development of the structure within which to base the school programme.

The IST programme needed a system of assessment which would:

(i) provide the teacher with a more complete picture of the pupils' progress in and aptitude for geography than is possible with the product oriented system of testing and examinations;

(ii) challenge the academically able pupils, without neglecting the needs and aspirations of the average and weak pupils;

(iii) be practical and viable in terms of its administration.

The pilot programme revealed that one of the most problematic aspects of IST is the assessment of tasks which focus on skills, values and attitudes particularly in respect to assignments, field reports, longer worksheets and projects based on written reports. The use of criterion marking based on a numerical evaluation and written comments was an attempt to provide a guide to the pupils' development in these areas. As indicated in the evaluation of this system, a major concern was the subjective nature of this assessment despite the application of criteria. As the programme developed, through 1987 in particular, assessment related problems were exacerbated by the fact that more than one marker was responsible for marking across the standard. Key difficulties included ensuring that:

(i) the individual markers interpreted the criteria in the same manner;

(ii) the criteria were applied to the pupils' work in the same way by the individual markers;

(iii) the criteria were applied consistently to all the pupils.

A related problem was ensuring that the pupils understood the criteria used in order to meet the requirements of the tasks and to provide them with the guidance they needed to develop in the areas identified by the criteria.

Although less serious, a number of other problems required attention. These included:

* the so-called 'cosmetic' effect identified by Marsden, 1976 (in chapter three); even with the use of criterion marking it was extremely difficult not to be unduly influenced by the presentation of the work, especially in the longer assignments;

* an over-generous allocation of marks to weaker pupils who had obviously worked to their utmost limits; this remained a particularly contentious problem, especially in the lower standards where geography is undifferentiated;

* the tendency of marks to become 'bunched' as a result of the use of criteria.

A final problem related to assessment was the development of pupil profiles. Detailed comments along a broad spectrum of criteria proved to be too time consuming in view of the total number of pupils taught by each teacher. This problem was especially serious for teachers responsible for the junior classes as, having three geography periods a week per class meant that these teachers' time-tables were filled by giving them more classes than teachers responsible for higher standards. Yet it was in these standards that the profiles were considered to be especially valuable as a means of providing comprehensive guidance for subject choice in the senior secondary phase.

As these problems emerged, the researcher met with the teachers concerned and attempts were made to resolve the difficulties. These included:

(i) A reassessment of the criteria which had been negotiated for the pilot programme; in this respect it was decided to:

* provide a more detailed explanation of the revised criteria (Appendix 8F);

* structure the criteria used to meet the objectives of the particular task;

* expand the use of comments to provide specific and constructive criticism;

(ii) The holding of pre-assessment meetings between the individual markers in the standard to ensure that the same standards were being applied. This was done by using a random sample of the pupils' work with each teacher marking the sample independently, then discussing the results.

(iii) The decision to have an internal moderator of the tasks as the assessment was completed; the researcher as subject head, continued to moderate samples of all the assignments and projects which were assessed for the pupils' year mark.

In an attempt to solve the problems related to the development of pupil profiles, the following decisions were taken:

(i) The assessment of the short, structured tasks set for homework or as class exercises would be entered under the specific skill or set of skills for which the task was designed. Thus, the assessment of these tasks were entered under the following categories:

graphicacy; numeracy; mapwork; language; spatial perception; attitudes; values and creativity (originality).

(ii) Teachers were left to decide whether or not to develop subsets in each of the categories.

(iii) The assessment of the longer assignments and projects would continue to use a printed proforma which would enumerate the criteria and which would indicate the assessment by means of a numerical evaluation and relevant comments. One copy of the proforma would be kept by the teacher and one would be retained by the pupil.

The researcher invited staff to participate in the application of peer group assessment in group tasks and oral presentation. A workshop was held to consider techniques for peer-group assessment and to consider the advantages and disadvantages of this type of assessment. The geography staff felt that the most serious obstacle to the successful implementation of this system could be the pupils' reactions in terms of peer acceptance and peer pressure. The decision was taken to introduce this method gradually, if at all, and to follow the guidelines set out below:

(i) Initial assessment should be in the form of a discussion between the group members concerned with the presentation and based on a specific proforma.

(ii) As pupils became used to this method, the discussion should be opened to the whole class, once again using the set proforma.

(iii) While no numerical assessment ought to be involved in the peer group evaluation, pupils would be invited to give a written or verbal report and on the basis of the criteria used to give an overall symbol.

The proforma which was negotiated between the researcher and the staff is shown in Appendix 8G.

In putting peer-group assessment into practice, the researcher introduced the assessment informally for sections of the syllabus presented as peer-group teaching seminars in the various standards. The word 'assessment' was not used at all in the initial stages, pupils were simply asked to discuss the presentation according to the criteria in the proforma. At the completion of the seminars and the discussions, pupils were asked for their views on such a discussion. Pupils in all standards from Std 6 to Std 9 indicated that they had found it interesting and worthwhile, and requested that this be done again. When the suggestion was put to the groups as to whether they would care to use this method as a system of assessment by the group, the younger pupils insisted that the teacher also assess the work in addition to their peers. Older pupils were satisfied to accept the peer assessment as the assessment for the presentation. This method therefore came to be accepted by the pupils for any oral presentation and as a supplementary assessment for written reports done as group assignments or projects. Individual assignments, reports and projects were assessed by the researcher or other staff as it was impractical to apply this type of assessment to this type of work.

The researcher introduced a system of self-assessment among the Std 7 and Std 9 pupils in 1989 just before leaving the school. Little can be said about the results or effectiveness as this area was not implemented or analysed sufficiently. Pupils were asked to assess their own assignments and projects on the same basis as the peer group assessments and they approached this very hesitantly and warily as was to be expected for the first time.

The assessment of activities in IST had, of necessity, to employ a variety of methods as the nature of the activities varied considerably.

(i) Short, structured activities based on data analysis in the form of map or graph interpretation or the interpretation of tables, diagrams or photographs, could generally be assessed by using an objective numerical assessment.

(ii) Activities requiring the processing of data could also be assessed by means of a single numerical value.

(iii) Longer worksheets of the type used in the pilot programme needed to use a combination of assessment strategies, thus certain aspects would be assessed by means of a set of comments, others by means of criteria with comments, while yet other sections of the worksheet could be allocated a single numerical value.

(iv) Assignments, field reports, field research reports and project reports primarily used criterion marking with written comments.

(v) Oral presentations, such as seminars, role play, simulations or peer-group teaching either used peer-group evaluation or were given a numerical value or written assessment by the teacher with a single symbol evaluation or without any numerical evaluation at all.

8.4 THE DEVELOPMENT OF AN EVALUATION SYSTEM FOR THE ACTIVITIES IN THE IST PROGRAMME

The development and results of the activities were largely evaluated according to the guidelines contained with the principles of procedure.

Although short, structured activities, worksheets and oral presentations were evaluated by the researcher, the pupils and members of staff, when new strategies were introduced, the greatest attention was given to the evaluation of those activities which contributed to the pupils' year marks.

These assignments, field reports, field research projects and individual and group projects were evaluated by the researcher and the teachers concerned with the administration of the task. A geography staff member, not involved in a particular task, would be asked to comment independently and where assignments or projects had an ecological or environmental, historical or architectural component, the members of staff in these subject areas would be asked for comments.

Thus, evaluation of the structured assignments followed the procedure below. The analysis and evaluation was undertaken with regard to:

(a) the design and structure of the assignment, which was anlaysed by considering:

   (i) the level of interest and 'pupil appeal';

   (ii) the degree to which the assignment catered for the individual pupil's needs and interests;

   (iii) levels of complexity and degree of difficulty;

   (iv) possible barriers which would influence and inhibit pupil performance;

   (v) clarity of instructions and directions;

   (vi) the objectives as related to the actual task and the processes which would be involved in the carrying out of the task;

(vii) the assessment proforma as an accurate guide to the objectives of the assignment and as a means to achieve the purpose of assessment in IST;

(viii) possible problems that could occur.

This section of the evaluation was done before the assignment was finalised and presented to the pupils.

(b) the period during which the assignment was being done; here consideration was given to:

(i) the time being taken by the pupils;

(ii) the ease or difficulty they were experiencing in carrying out the task;

(iii) the pupils' involvement and levels of interest shown;

(iv) the resources that were being used and the pupils' level of competence in utilising the resources.

This aspect of the evaluation relied heavily on input from the pupils and the teacher who worked most closely with the pupils and was done fairly informally.

(c) the final product; here consideration was given to:

(i) the actual assessment done according to the marking proforma;

(ii) the degree to which pupils exhibited development and progress in the area for which the assignment was designed;

(iii) pupil evaluation.

The evaluation of the projects followed the same route as that of the assignment, in that the design and structure of the project, the progress of the project and the final product, were evaluated.

By their nature, however, these tasks were far more closely monitored, as each stage of the project developed it had to be considered and pupils needed to consult with the facilitator on a regular basis. The greatest problem in the evaluation of these projects was a factor that is closely related to projects in general, viz. the amount of time which it demands of the facilitator. When pupils are able to work closely with outside facilitators this particular problem is alleviated. Working with outsiders, however, also may create problems, since the majority of these people are not teachers they at times either expect too little from the pupils or too much. It was therefore necessary for the facilitator to provide guidelines to be applied at the outside facilitator's discretion. An advantage of using outside facilitators as evaluators is that the pupils working within a particular area are exposed to the methodology associated with that area of study. This was particularly evident when pupils worked with nature conservators, museum staff, or with the town and regional planners. Another advantage was that the pupils not only found it extremely stimulating working with these people, but were highly motivated by their contact with these 'experts' in various fields.

The final evaluation of the projects and the assignments was done by the Superintendent of Education responsible for the moderation of the year marks. Each pupils' work was scrutinised by the superintendent who gave a general evaluation. With hindsight, much more could have been made of this aspect of evaluation.

Again, with hindsight, evaluation of the assignments and the projects would also have been enhanced with a broader evaluation by teachers not connected with the school. While certain activities in the extra-mural fieldwork and research programme were developed and evaluated with colleagues at other schools, there was no structured or planned outside evaluation other than that provided by outside facilitators.

8.5 SUMMARY

The implemetation of IST as discussed in this chapter reflects a process of development in which a variety of factors were incorporated to form the framework upon which the IST programme for the school could be based.

At the centre of this framework was the acceptance that the acquisition of knowledge is a process in which the pupil must, of necessity, be an active participant and, furthermore, that the fabric of knowledge consists of facts, concepts, theory and skills, all of which are woven together to form an interdependent system.

The application of this tenet to the geography curriculum in the secondary school created the need for:

* the analysis of the existing syllabus to identify the various threads that make up geographical knowledge for the pupils;

* the development of a framework of progression in skills which would enable pupils to master the concepts and theory contained in the syllabus;

* the identification of a structure within which these skills could be developed, assessed and evaluated.

The achievement of these objectives was associated with an increasing awareness of how pupils learn and what they need to otpimise their performances in completing the tasks. This understanding aided the identification of both the performance barriers discussed and those factors which, in motivating pupils, increased their chances of success and personal satisfaction.

To cater for the pupils' expanding interests and to develop the necessary skill areas, an increasingly comprehensive resource-base was developed, which created a ripple effect in that each new source of information created further opportunities to develop activities and thereby extended the skills, concepts, theories, values and attitudes to which the pupils were exposed.

The momentum which carried IST to beyond the confines of the classroom was initiated by the fact that basic skill development occurred within the day-to-day teaching, allowing a greater diversity of skills to be utilized in the assignments and projects. The pupils' proficiency in the skills needed for enquiry enhanced the natural curiosity of a number of the pupils and led to the establishment of opportunities for this curiosity to be satisfied through the school's enrichment and extra-mural programmes.

The projects undertaken in the extra-mural programme had the added advantage of reducing pupils' perceptions that a numerical assesment is the most important measure of achievement, as these activities were not assessed in any way. The pupils involved in these projects and their peers who either attended the final presentation of who were peripherally involved, accepted that the processes associated with the study, along with its final presentation, provided its own 'rewards'. Thus, the process of evaluation was seen by these pupils to have greater value than a summative assessment.

As the pupils' projects, fieldwork and assignments developed in the various standards, a summative product assessment by means of a numerical evaluation, even with the use of criteria marking, was increasingly perceived to reveal little of the actual value of these activities. The assessment of this type of work remained the greatest problem of the IST programme and one which the researcher believes was not resolved. This system of assessment was, however, of greater value to the teachers and to the pupils in measuring the success or lack thereof of the particular activities, despite its limitations.

The developments which occured in both the practical and project components of IST, from Std 6 to Std 10, resulted in the acceptance of learner-centred activities as an integral part of the geography curriculum. The IST programme, by employing a variety of strategies, was perceived as a vehicle which would aid pupils in the processes needed for the development of the skills, values and attitudes presented by the 1985 Revised Syllabus as essential to geographical education.

CHAPTER NINE

PROGRAMME EVALUATION

Evaluating a programme of this nature presented a variety of problems (chapter four). These difficulties were partly resolved by adapting the model for responsive evaluation proposed by Stake (l973). Responsive-type evaluation proved to be particularly relevant to the formative evaluation applied to the individual activities and learner-centred strategies of the IST programme and to the evaluation applied at the end of each year.

An attempt was, however, made to incorporate preordinate evaluation techniques to the summative evaluation of pupils' work as in the case of the evaluation of the pilot programme (chapter seven). These techniques were included in the summative evaluation of the programme at the conclusion of the research period. Preordinate evaluation was largely an attempt to answer specific questions raised by the geography and other staff concerned in the development of the IST programme and to reply to the inferred questions raised by the survey. These concerns were primarily related to an assessment of pupil performance over the period and to an evaluation of the aims and objectives in terms of the programme outcomes, the so-called 'payoffs' to which Scriven refers (in Madaus, l983, p. 302).

This chapter presents the summative evaluation of the IST programme at the conclusion of the research. The initial analysis is an evaluation of the programme in terms of its 'measured effectiveness'. The responsive evaluation which follows is concerned with the cumulative effects of the IST programme. The latter evaluation attempts to analyse the IST programme as a process rather than a product.

9.l THE PREORDINATE EVALUATION OF THE IST PROGRAMME

The analysis which follows reveals the attempt made to measure the effectiveness of IST in terms of particular concerns expressed by teachers.

(i) The researcher's colleagues and teachers responding to the survey, questioned IST as a means to develop a greater interest in the subject, thereby encouraging more pupils to choose geography as an elective subject. This concern was particularly relevant at the time at which the research was initiated as accountancy was introduced at this school as a competing elective with geography and history. At the end of 1985 this resulted in a sharp drop in the numbers of pupils in Std 7 choosing geography. The table below (Table 9.1) presents an analysis of the Std 7 pupils choosing geography as an elective subject during the period 1980 to 1989.

TABLE 9.1
PERCENTAGE OF PUPILS ELECTING TO CONTINUE WITH GEOGRAPHY

	A Prior to the introduction of accountancy		**B After the introduction of accountancy**
1980	43%	1985	42%
1981	45%	1986	34,7%
1982	48%	1987	36,7%
1983	58%	1988	40%
1984	50%	1989	46%

Satisfactory as the increased numbers choosing geography as an elective after the introduction of the IST programme in 1986 may be, to ascribe the reversal entirely to the effects of IST would be naive. There are too many variables to accept the changes at face value, not least of which is the fact that the 'novelty' of a new subject, with its attendant publicity is eventually reduced.

(ii) A particular concern of the staff working with the researcher was whether IST would help to attract the more academically able pupils to geography. Traditionally, the top 2% of pupils in terms of their academic achievement elected to take Latin as this was viewed as a 'high status' subject. The introduction of accounting as a higher grade subject reduced the number of academically able pupils in geography and history considerably, because of the perceived status of accounting and its tertiary education implications. Geography at this school is also offered as an alternative to mathematics and with the reduction in the number of traditional commercial subjects more pupils in the non-mathematics group elected to do geography primarily because they had no other choice beyond art, home economics and history.

Table 9.2 reveals the pattern of pupils who, in Std 7, having obtained an 'A' symbol for geography, chose to continue with the subject after 1986.

TABLE 9.2

% OF PUPILS WITH 'A' SYMBOLS IN STD 7 CONTINUING WITH GEOGRAPHY

1986-1987: 23% of 'A' candidates in geography continued with the subject
1987-1988: 40% of 'A' candidates in geography continued with the subject
1988-1989: 42% of 'A' candidates in geography continued with the subject

That the IST programme challenged and stimulated the more able pupils was revealed by the quality of their work and in their evaluation of the individual activities. However, to credit IST as the sole reason for the changes depicted in Table 9.2 would once again be naive.

(iii) A primary objective of IST was to develop a framework of skill progression not only operative in each standard but between the junior and secondary phases of high school. This was considered to be particularly important in terms of the process model approach adopted. A further consideration in this respect was, however, the poor perceptions which respondents revealed in the survey of IST as a means to develop geographical skills. The following analysis attempts to identify pupils' progress in problem solving activities (Table 9.3) and in relation to graphicacy (Table 9.4). A comparison is made between the assignment results of the 1986 Std 7 group and the project results of these girls in 1988 as Std 9 pupils.

TABLE 9.3

COMPARISON OF PUPILS' PERFORMANCES IN 1986 AND 1989 WITH REGARD TO PROBLEM SOLVING (EXPRESSED AS PERCENTAGES)

	4+ on rated scale (+70%)	3(50-69%)	Below 3 (Less than 50%)
1986 Std 7 (a) Total Group	39	50.1	10.8
(b) Pupils continuing with geography	19	54.3	26.7
1988 Std 9	43	39	18

These figures, based on the assignment marks relating to the field report done by this group of pupils in Std 7, reveal that of the 36% of the Std 7 group who elected to continue with geography, only 19% had scored particularly well in those areas of the field report which were problem oriented. This group was the first to be involved in the individualised project programme described in chapter eight. The Std 9 results are therefore based on an assessment of the major and minor projects completed in the course of 1988. The field report of 1986 and the projects placed a high priority on the use, interpretation and incorporation of maps, diagrams and various types of photographs as well as on the uses and interpretation of graphs and tables.

TABLE 9.4

A COMPARISON OF PUPILS' PERFORMANCE IN 1986 AND 1988 WITH REGARD TO GRAPHICACY (EXPRESSED AS PERCENTAGES)

	4+ on rated scale (70%+)	3(50-69%)	Below 3 (Less than 50%)
1986 Std 7 (a) Total Group	66	25	19
(b) Pupils continuing with geography	28	72	0
1988 Std 9	35	47	18

This analysis shows a general improvement in this group's performances in the geographical skill areas which were assessed. Whether these figures can be seen as an accurate reflection of the effectiveness of the learner-centred approaches in geography or whether they are simply an indication of the pupils' increased maturation, is difficult to determine with any certainty and remains typically 'elusive' (Scrivener, in Madaus, 1983).

(iv) The researcher and the geography staff working with her were intent on establishing the relationship between pupils' performances in the application of high order skills and their academic ability (as related to their achivements in examinations and to their IQ scores). This was perceived to be particularly relevant as the survey revealed a tendency among teachers to associate IST related to problem identification, hypothesis formulation and testing as only being suited to the 'academically able'.

The analysis of the Std 7 group's results in terms of their application of high order skills in 1986 showed an apparent link between the pupils' progress in skill application and their academic ability. As was to be expected, the pupils identified as academically able progressed more rapidly and more markedly than those perceived to be less able (chapter four). Similar comparisons made in 1987 and 1988 confirmed the 1986 analysis.

One other aspect, however, remained constant. An analysis of the 'E' classes in Std 7, identified as the weakest academic group, revealed that despite their disadvantages in relation to the 'A' classes, more than half of these girls showed an improvement in high order skill application during the course of the year. Table 9.5 indicates the comparison of pupils' results between the first assignment of the year and the field report. These results are based on those sections relating to high order skill application. It must be stressed again that the field report demanded a greater variety and sophistication in terms of high order skills than the initial assignment.

TABLE 9.5
'E' CLASS RESULTS IN STD 7 IN TERMS OF SKILL APPLICATION (EXPRESSED AS PERCENTAGES)

	% of pupils improving	% of pupils whose results remained static	% of pupils whose results decreased in the field report
1986 'E' class	55.6	2.8	41.6
1987 'E' class	80.6	6.5	12.9
1988 'E' class	70	17.5	12.5

The above results, furthermore, indicate that the intensified IST programme of 1987 and 1988, with its greater emphasis on the development of high order skills, appeared to benefit these pupils. A key factor contributing to the development of these pupils' interest, however, must be related to the effects of the teachers' encouragement and motivation, which gave these pupils the confidence to attempt tasks which they would otherwise have perceived as being 'too difficult'.

(v) A final concern expressed was whether the development of skills, propositional knowledge, attitudes and values upon which these activities focused would result in improved examination results in geography. To many teachers, parents and even pupils this was the primary criterion used to assess the IST programme. This question was also the most difficult one to answer. Since it was not possible to use a control group in the school situation in which the programme developed, there is no way of knowing how these pupils would have performed had they not been exposed to the learner-centred approaches used in IST.

An analysis of the senior certificate results prior to the implementation of IST and of these pupils in 1987, 1988 and 1989 who had been exposed to IST for either one or four years, reveals nothing conclusive. There was no statistically significant increase in the number of 'A' candidates in geography, nor, however, did any geography pupils fail during this period.

The apparent effectiveness of IST in terms of the measurements applied above are as follows:

(i) During the period in which the programme was implemented, the number of pupils electing to take geography increased.

(ii) The number of 'A' candidates in geography in Std 7 who chose geography as an elective increased.

(iii) Pupils' performances in relation to skill application increased both in the course of a year and in relation to the progression framework applied between the junior secondary phase and the senior secondary phase.

(iv) The development and application of the skills needed for problem identification and problem solving were not confined to the academically able pupils.

An analysis of outcomes such as the above is not only problematic in terms of providing valid and reliable generalisations, it is unable to illuminate the processes with which a programme such as this is associated, or to identify the cumulative effects of the programme. A preordinate evaluation such as this above all fails to capture the spirit of the IST programme, since an important measure of the success of a learner-centred approach lies in what may be referred to as the 'Eureka experience'.

9.2 PROGRAMME EVALUATION BASED ON PUPILS' RESPONSES

In this section of the evaluation the researcher presents the perspective as a co-learner, of the extent to which the IST programme provided the intellectual exhilaration, which, while not comparable to that of Archimedes in its scientific input, for the pupil evinced a similar sense of satisfaction. A learning experience which results in a feeling of accomplishment of this nature provides the impetus for further learning. Where experiences such as these are part of a particular school subject, that subject is given relevance, not in the sense of that which is immediately or tangibly useful, but in the educational sense of 'worthwhile'.

An evaluation of activities based on the pupils' reactions and responses is obviously problematic for the observer, as the sense of accomplishment and satisfaction varies considerably with a large group. The first part of this analysis is therefore based on those activities to which the greatest number of pupils responded positively in the 'Eureka' sense. The second part of the analysis concerns those activities to which the pupils responded negatively.

(i) Fieldwork and Field Research

This area of the IST programme was rated the most highly in terms of learning experiences which provided the learner with personal satisfaction. An analysis of field excursions in relation to pupils' responses revealed that:

(a) The pupils' initial response to a field site was closely related to the degree of enthusiasm with which they approached the investigation and that this influences the eventual depth and perceived worth of the learning experience. Those pupils coming from an urban environment responded best to field sites situated in areas of scenic beauty, areas which were ecologically threatened or which formed a part of their immediate environment. Therefore, beach, river, forest and farm sites had great appeal, as did urban studies in East London, which had greater appeal than urban studies in the areas mentioned in chapter eight, with the exception of those aspects of the study related to architectural styles and the history of the particular town. While pupils gained valuable learning experiences from sites to which they did not respond positively, the amount of energy the teacher needed to expend in motivating the pupils reduced the general effectiveness of the exercise. Nor did such studies evolve the 'spark' which was necessary for the pupils' sense of achievement and satisfaction. Thus, while pupils were able to accept the value and relevance of certain studies, such as relating to problems of treatment and disposal of sewage or refuse, they were less positive, than in an investigation where the site appealed to them.

(b) The structuring and design of the actual activities undertaken in the field needs to capture the interest of the pupils, if the results are to be effective. Younger pupils preferred to be engaged in a micro-view of a site, while older pupils tended to prefer to take a macro-view. Std 7 pupils by way of example were happy to spend hours studying a series of rock pools, a single stretch of a stream or river, the vegetation of a dune or marsh area or in a study of a shopping area or section of the CBD, while the Std 9 pupils preferred to cover an entire beach section, the river and its surrounds or to do a full urban trail.

While younger pupils enjoyed activities which involved precise counts, measurements involving the use of apparatus such as nets, stop-watches, clinometers, magnifying glasses, thermometers, etc., the Std 9 girls found these sorts of activities too time-consuming and 'finicky', preferring a greater variety of activities which could be completed fairly quickly.

Despite this absorption with minutiae, the researcher found that for the younger pupils the real value of these micro-activities lay in the 'why' rather than in the apparently absorbing 'what' and 'how'. The Std 7 pupils gained a great deal of satisfaction from being able to find reasons associated with their observed discoveries and in being able to develop generalisations. Activities which rely solely on observation and recording in the field tended to detract from that which the pupils found most rewarding.

Senior pupils achieved the greatest satisfaction from studies which allowed them to investigate problems which in their opinion were relevant and with which they could empathise. Studies which resulted in workable and practical solutions were rated far more highly than broad general studies. These pupils therefore responded most positively to investigations in the field which focused on management strategies. The older pupils also found activities which involved the analysis of peoples' reactions to the study areas or which included opportunities for them to interview and challenge experts about their views, particularly worthwhile.

(ii) **Individualised projects**

Pupils' responses to fieldwork and field research in the manner discussed above largely influenced the choice of study areas for the individualised projects as pupils preferred to base their study on a field related investigation of some sort or another. These projects were perceived by the majority of the pupils as the most challenging aspect of IST, yet at the same time as among the most satisfactory of their experiences in geography. Pupils' responses to projects, whether done individually as in the case of the senior pupils, or as small group projects, were analysed during each stage of the task's development revealed that:

(a) The search for a study area to which the pupils felt they could relate with the degree of involvement necessary for a project, was for many of the girls an exercise in self-discovery. The topic choice was an indication of that which concerned the pupil and which a particular pupil found to be relevant and worthwhile. Thus, the more closely the pupil was able to relate to her chosen topic, the greater the likelihood of commitment and a continued interest in the field with which the study was associated.

(b) Problem identification within the study area frequently presented pupils with greater difficulties than the formulation and testing of the hypotheses. Pupils learnt that often so-called 'problems' were in fact symptoms rather than the actual problem. Precise problem identification required the sort of probing and reasoning that was often found to be frustrating, but always challenging and utlimately rewarding.

(c) The testing of hypotheses involved pupils in collecting data along a broad spectrum, together with its analysis and evaluation. For many pupils this represented the stage of project development which required the greatest motivation and encouragement. Being inexperienced in this type of investigation, they were impatient to find solutions and to reach conclusions.

The researcher was interested to note that it was often the most academically able pupils who experienced the greatest problem in this area of the study. The average or weak student appeared to find a type of security in the disciplined search for evidence, while the brighter pupils were impatient to move on to the next stage. Thus, on the one hand the facilitator had to ensure that the more able pupils were not attempting to take invalid short cuts, while on the other hand, the weaker pupils had to be prevented from becoming bogged down at this stage and had to be encouraged to take the leap for which the brighter pupils were over-eager. This stage was a reflection of the considerable variations of pupils' temperaments and the way they reacted to different learning experiences.

(d) The techniques which the pupils had to employ for the testing of their hypotheses varied considerably from project to project. This stage of project development, therefore, became a particularly rewarding learning experience for both the pupil and for the facilitators, largely because of the varied nature of the collection and testing of the data. The specialised nature of a number of the projects meant that the girls had to consult experts at this stage of the study, either in terms of the methodology needed or for the specific techniques related to the data collection. As these pupils became more involved with the mentors (chapter eight) so the facilitators' role was reduced. Working with members of the private and public sectors in this manner resulted in considerable personal growth and academic development.

(e) Personal growth was reflected in the increased self-confidence and poise which the girls exhibited in the production and presentation of the completed projects. Being convinced of the 'worth' of their investigations enabled the pupils to expose their work to public scrutiny with conviction and pride, a factor which was frequently commented upon by parents and those members of the public who attended the presentation of the projects.

(iii) **Oral presentations**

The satisfaction which pupils experienced in presenting aspects of their investigations in a seminar situation was carried through to other areas of IST which gave pupils the opportunity to present work orally. These activities included peer-group teaching, role play and simulations as well as short seminars done by groups or as a panel discussion. An evaluation of these activities, which evoked the most positive response from the pupils and which were also perceived to have the greatest worth in terms of skill development reveals the following:

(a) Where presentations were involved with the development and use of audio or visual aids pupils gained in confidence as the visuals appeared to attract the attention, thus directing it away from the presenter. The visual material also provided the pupils with the opportunity to develop in skill areas which they found satisfactory and at the same time increased the academic worth of the presentation. Younger pupils tended initially to 'clutter' their presentations with too many 'props', however, as they gained from the feedback given after the presentations they learnt how best to make use of visuals and other 'teaching' aids.

(b) Group and individual presentations worked best when based on the analysis of data. While textbooks could be used as the basis for many activities, pupils reacted positively to having to find additional material or having additional source material given to them for analysis. Older pupils in particular found it valuable to sift through more than one source as this gave them the opportunity to analyse and evaluate the material before selecting what they needed for the presentation.

(c) The researcher found that group work leading to oral presentations were most satisfactory where the pupils were given guidance as to the focus of the presentation. This was particularly important for the younger pupils as without sufficient material or the necessary guidance, group discussions deteriorated after some 15 minutes into 'chat sessions'.

(d) The pupils' greatest satisfaction arose from the actual presentation which was seen as the highlight of the process through which they had moved in reaching this stage.

(iv) **'Classroom fieldwork'**

'Classroom fieldwork' (in chapter eight) proved to be one of the most satisfying and effective activities in the practical component of IST. Apart from the enjoyment which pupils obtained from their activities and their obvious benefits in terms of skill development in graphicacy and numeracy, other advantages of classroom fieldwork included:

* The flexible nature of this approach as these activities could be designed for a 15 minute exercise or for one which could last for two hours, depending on the objectives for which the activity was designed. Thus, a Std 7 class was able to complete one or more problems in a single 35 minute period, while Std 9 and 10 pupils could be set this type of activity in one of their fortnightly test periods or to replace a mapwork practical exercise.

* Classroom fieldwork could be applied to geomorphology, settlement geography, aspects of population geography, economic geography or to an integrated approach using the 1:50 000 maps

and various air photographs or orthophotomaps. Climatology could be applied in the same way by using synoptic weather maps with the vegetation maps or l:50 000 topographical maps.

* The activities were easy to develop, requiring relatively little apparatus and few additional resources.

* They were useful as training exercises for actual fieldwork or field research.

* Classroom fieldwork also lends itself to group work and as such was one of the most successful of the group activities used in the practical component of IST. Working in groups to solve a problem resulted in a degree of peer-teaching which benefited both the able and less able pupils and promoted a variety of valuable social skills as a result of the group interests.

The four sets of activities evaluated in this section must be seen in the context of this particular school and, in particular, in terms of the fact that this is an all girls' school. It is therefore very likely that the responses and reactions described will not be mirrored in a different school community.

In contrast to the activities described above, which were successful in terms of the responses of the pupils, the following were less favourably received:

(i) Assignments based entirely on the results of a library search were generally not enjoyed by the pupils. An analysis of this type of activity revealed that while pupils enjoyed the reading required, they found the writing of a report based on this reading to be tedious. The skills related to library searches are such that the researcher felt it necessary to include these in the programme. Pupils, however, were less averse to the type of activity if they were able to give the report in a verbal presentation and also preferred doing this as a group activity.

(ii) Regional studies in Std 7, 8 and 9 and homelands studies in Std l0 lend themselves to self-study units. Pupils generally found these activities boring, however, once again where there was a specific focus or they formed a part of the peer-teaching programme, there was less resistance.

(iii) Another of the less popular activities proved to be map and photo analysis and synoptic map exercises of the sort designed for examination questions in the senior certificate examinations.

9.3 IST IN RELATION TO SKILL DEVELOPMENT

The evaluation of the extent to which the IST programme provided a vehicle for skill development requires more than the analysis of measured outcomes presented at the start of this chapter. This is particularly important since a key factor emerging from the interviews, the formal discussion and the questionnaire was that few teachers of geography in either primary or high schools have a clear concept of the sorts of skills that ought to be included in the geographical education of pupils.

The analysis of the preamble to the l985 Revised Geography Syllabus (in chapter two), revealed that while an attempt had been made to identify the basic geographical skills, very little guidance beyond the grouping of these skills is given. Therefore, a skill analysis such as that given by Slater (l982) (Table 3.3 in chapter three) and that of Mills (l988) (Figure 9.l) provided a valuable framework for developing activities in the practical and project components of IST. Using a 'skill analysis' such as this helped the researcher and the teachers concerned with more than the selection of activities, but aided in the assessment and recording of the pupils' progress.

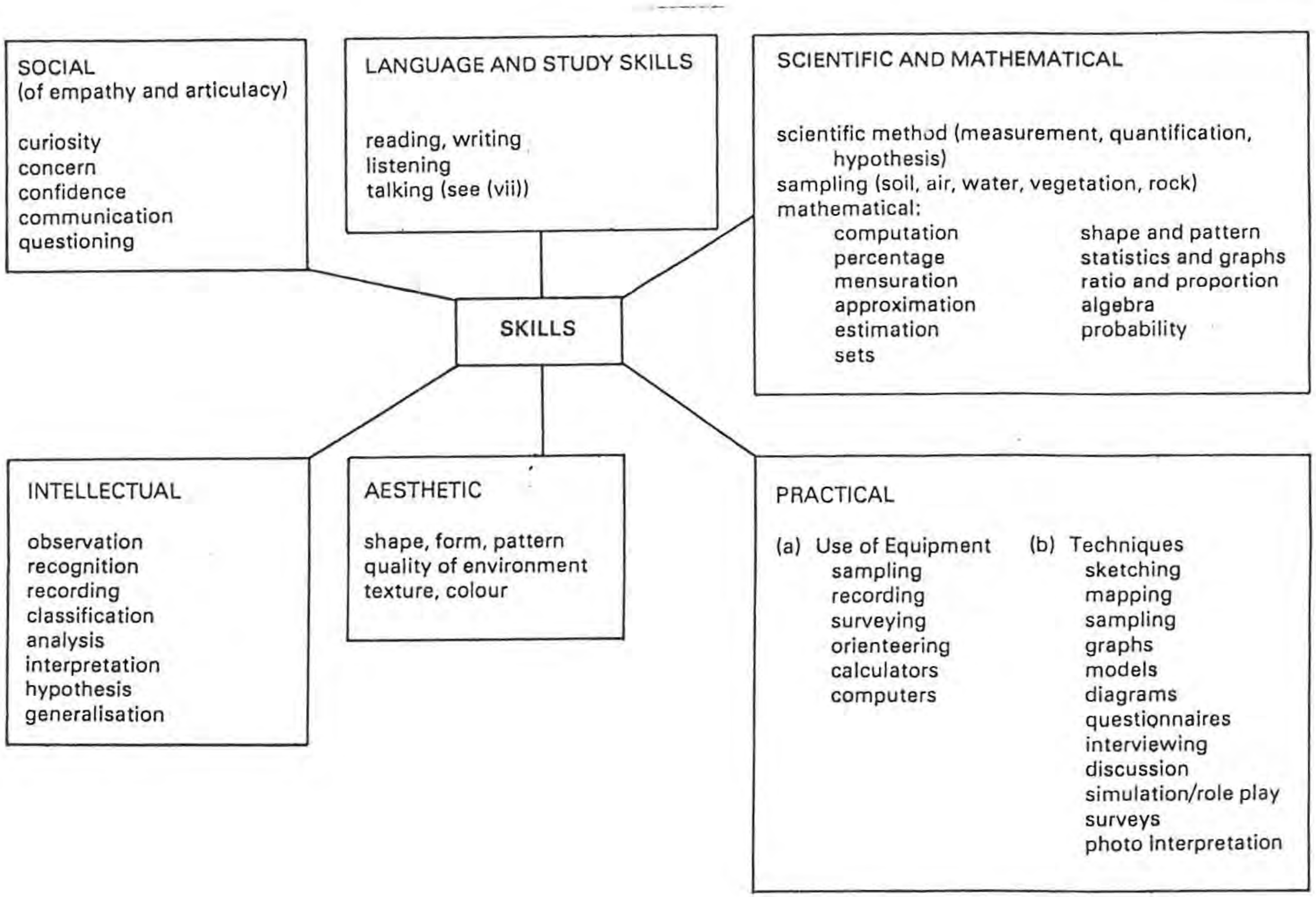
The framework for skills progression resulted in the successes which the senior pupils achieved in their projects. By the time these pupils were required to do individualised projects, they had acquired the necessary expertise and confidence to apply the skills needed for these tasks. This also led to the increasing sophistication of skill application which is evident in an analysis of the Quigney Study which was a group research project of the sort referred to in chapter eight.

An evaluation of this particular study is used as a means to demonstrate the range of skill areas possible in an investigation of this nature. Skills which the pupils were required to apply included:

FIGURE 9

SKILLS IN THE GEOGRAPHY CURRICULUM

(after Mills (ed.) 1988: Geography in the Primary and Middle School, p. 247)



(i) Planning and organisational skills which were necessary to develop the successive stages of the study while working within a specific methodology and according to a set agenda. These skills included planning agendas for meetings, developing short and medium term planning stragegies to ensure that deadlines were met; running meetings; keeping minutes; making decisions and developing strategies to carry out the decisions and managing time schedules. As members of a team, the pupils had to learn to listen to each other; to know when to follow and when to lead. In such situations the pupils needed to be able to communicate, orally and through written reports. All of which developed self-esteem and confidence, which were essential in the actual investigation as pupils came into contact with various sectors of the community. While skills of this nature may be regarded by geography teachers as peripheral to geographical education, these social, organisational and personal skills formed an essential foundation for investigation such as this which are based on developmental and management strategies.

(ii) Each stage of the three-phase study involved the pupils in:

* problem identification;
* hypothesis formulation and testing;
* the development of short, medium and long term solutions.

(iii) The study involved:

* the use of primary, secondary and tertiary sources which ranged from a search through archive material, analysis of census data, and traffic records, to the analysis of topographic and urban maps:

* the development, administration and analysis of questionnaires for the two surveys included in the study;

* the structure and conducting of interviews and the analysis of the information;

* the processing and presentation of data;

* the structuring and development of proposals.

(iv) Specific geographical techniques, which were employed, included:

* the construction of graphs and their analysis;
* mapping;
* development of models;
* sampling;
* construction of schematic diagrams
* map and photo interpretation;
* statistical analysis;
* data response.

(v) The collation and organisation of the data required:

* comprehension;
* analysis;
* evaluation;
* synthesis;
* conceptual understanding
* spatial understanding

(vi) The presentation of the reports and proposals required formalised writing according to a set structure.

(vii) As the final presentation of the study and the proposals for redevelopment was at a public meeting, the presentors were required to develop a variety of audio-visuals. These included a slide presentation, prepared OHP transparencies and a display of the maps which had been developed.

A study of this nature represents the most comprehensive application of skills in geography. Studies such as these are possible where pupils have been exposed to opportunities to develop the necessary skills and have acquired the confidence needed to apply them.

The preceding evaluation of the Quigney Study reflects the cumulative evaluation of the teachers concerned with the study and that of the town and regional planners who sponsored the project. The evaluation presented below was undertaken by a group of four pupils who were involved in the study. The commentary provided by the pupils was requested by the researcher when the pupils were in their Std 10 year as it was felt that a time lapse of some months would provide a more objective view as the initial euphoria had dissipated. The pupils elected to provide a combined evaluation (Appendix 9A). An analysis of this commentary reveals the following:

(i) The pupils were sensitive to their own personal development which they largely ascribed to the need for communication on a variety of levels with their peers and the many members of the public with whom they came into contact as a result of the study.

(ii) Having to take responsibility for the project was perceived as being particularly valuable as this provided opportunities for leadership and, according to the pupils, developed self-confidence.

(iii) The pupils also emphasised the variety of skills which they were able to develop and in particular stressed the value of developing social skills which were made possible by the need to interact with each other and with members of the public.

(iv) A further point emphasised was the "transformation of others involved in the project ". The pupils revealed that they were sensitive to the changes which resulted in more positive attitudes as the members of the group became involved in the project and aware of the problems of their own city.

(v) Throughout the commentary the emphasis was on the value of a project which had relevance to the pupils and which dealt with actual problems, rather than with a continued problem designed by the teacher.

The pupils' appreciation of the learning experience was clearly underlined by the presentation of the final evaluation and by members of their team who gave less formal evaluations.

9.4 THE ASSESSMENT SYSTEM USED IN IST

An evaluation of the assessment system employed for IST reveals that, notwithstanding the attempts made to solve the problems identified in chapter eight, this area of the programme remained the most problematic. The difficulties associated with the assessment of learner-centred activities of this nature resulted in the following limitations:

(i) The criteria applied to the assessment of the longer assignments and the projects were unable to give a specific analysis of high order skill development. All that was possible was a generalised idea of the degree to which pupils could apply analysis, evaluation and synthesis in terms of problem solving.

(ii) A detailed and broad profile of the sort initially envisaged by the researcher was also not possible, as teachers found this type of analysis to be far too time consuming. The criterion marking and system of comments, while improving on the previous impression marking, needed further refinement and analysis.

(iii) Criterion marking of the sort applied proved to be problematic for some teachers who found it difficult to apply the criteria in assessing pupils' work. A number of the teachers involved in the programme felt that criterion marking only minimally reduced the subjectivity of assessing larger assignments or projects.

The assessment system used proved to have most value in terms of analysing pupils' progress in terms of language development, graphicacy, numeracy and mapping skills, which were relatively easy to pinpoint or to measure. A less tangible, but valuable picture which emerged, related to the pupils' individual likes, dislikes, interests and general committment to the subject. In Std 7 this was more useful than the actual measurement of ability in specific geographical areas in advising pupils on their subject choice. In Std 9 this interest 'profile' was valuable in helping the girls to choose the study area for their projects.

Notwithstanding the reservations expressed by the geography staff and other staff members asked to comment on the assessment system, the pupils perceived criterion marking as a fair system which provided them with what they perceived as constructive criticism and guidance.

It is the researcher's contention, however, that the greatest value of the assessment system employed for IST was related to the feedback which was generated by the criterion marking and comments and which was made possible by the greater variety and number of activities completed by the pupils in the course of each year. In contrast to an earlier system, pupils' work was returned as soon as it was assessed. This created the opportunity of discussion not only between the teacher and the pupils, but among the pupils as they compared marks and comments. While this often led to pupils asking for clarification where they felt there was an 'unfair' discrepancy between their work and that of another pupil, the use of criterion marking helped the teacher to justify the assessment and to aid the pupil towards developing a better understanding of their own work and their problems. A number of the survey respondents identified the so-called 'quibbling' about marks as a negative aspect of IST, however, irritating as it could be, where teachers were prepared to give the pupils the time to explain and go over their work, they indicated that this could be a valuable learning experience.

Whether it is possible to develop a 'perfect' assessment system for individualised activities such as assignments, field reports or projects is a moot point. Any method which attempts to guide and analyse must, however, be an improvement on the allocation of a single mark or symbol without any additional comment.

9.5 THE ROLE OF IST IN INSTITUTING CHANGES IN TEACHING APPROACHES

The organisation and administration of a programme such as this, which focuses on learner-centred approaches, as an integral and essential part of the geography curriculum in the high school, is influenced by constraints such as those identified by Ballantyne (l986) and which were confirmed by the survey at the start of this study.

The most frequently cited constraints affecting changes in teaching approaches in geography included:

(i) the length of the syllabuses in each standard;

(ii) the nature and structure of the final examinations;

(iii) the resources which are available in terms of textbooks, audio-visual equipment, etc;

(iv) general resources required for learner-centred approaches;

(v) lack of literature which is readily available in relation to the strategies pertaining to learner-centred activities.

General constraints operating in a school system which were identified, included:

(i) the degree of support which exists in the hierarchical structure of the school for change and innovation;

(ii) the leadership within the subject and in particular the attitude of the subject head to change;

(iii) the individual work load of the teachers in a department.

The evaluation of the extent to which IST was able to effect changes in the teaching approaches of the staff concerned with the programme needs to be considered in relation to the degree to which constraints could either be reduced or removed.

The utilisation of the departmental syllabus from Std 6 to Std 9 as a guide rather than as being absolutely prescriptive gave teachers greater flexibility, both with regard to the examination structure for these standards and in the structuring of the curriculum to allow for the necessary time for greater pupil participation.

The staff concerned found that where pupils were actively involved at the level described in chapter eight it was not possible to cover the syllabus content as prescribed and as interpreted in the textbooks. While selected topics tended to be covered in greater depth than suggested by the syllabus, particularly in Std 6 and Std 7, other topics had either to be excluded or restructured, always bearing in mind the 'essential concepts' necessary for the final external examination. Since the Std l0 syllabus is directly linked to the senior certificate examination, the length of this syllabus and the examination are very real constraints in terms of the time available for pupils to spend on individualised assignments or projects. Therefore, these pupils were not expected to produce lengthy reports or to do projects. The Std 10 pupils, however, could be fully involved in the practical aspects of IST such as 'classroom fieldwork', and the various data analysis tasks described in chapter eight.

Problems related to resources, as shown in chapter eight, proved to be relatively easily solved as a result of greater emphasis being placed on investigations and studies located in the local environment. The lack of easily available literature concerning the application of learner-centred strategies is a problem which would not have been solved easily without access to the resources of a university.

The constraints operating within a school may well be more serious barriers to change than those associated with the curriculum or the examination system. This study and the extent to which it developed was possible because of the favourable climate which existed at the school in which the research was undertaken. The school is structured such that responsibilities are carefully distributed. Therefore, what may be perceived as one of the most serious barriers to change, that of teachers having unreasonable workloads, was largely reduced. The considerable autonomy given to each subject head to develop his or her own subject area was a further advantage in developing the IST programme.

The role which the pupils played in the development of the IST programme was considerable. Their responses to the various activities provided a useful barometer for the structuring of the assignment and project components in particular. Of greater value, however, was the fact that the pupils were prepared to evaluate what they were expected to do critically and generally constructively. Academically able and less able pupils alike provided the researcher and the staff member involved in all three years of the programme development with insights into the various activities which were frequently more astute than that of the adult evaluators. Therefore, while a number of the survey respondents perceived pupils' negative attitudes as a constraint to the development if IST, this study revealed that where these pupils were given the opportunity to take part in the planning and development of activities or where the activities were sufficiently varied, this problem was largely dissipated. Furthermore, by actively encouraging pupil evaluation and reacting positively to their responses, attitudes towards even the less 'popular' activities were markedly more positive.

Notwithstanding these positive factors, learner centred-approaches were not applied uniformly. One of the limiting factors was the change in the composition of the geography staff from year to year. The extent to which 'new' teachers joining the geography team for the first time were able to apply the full range of learner-centred activities which had been shown to be possible, depended on a great many variables. Active resistance to change was, however, far more difficult to overcome. Teachers who react negatively to change, either because it is in their nature to do so, or because they feel insecure with new strategies, had to be considered in the design of the general IST programme for the school (chapter eight).

Beginner teachers presented yet another problem in implementing learner-centred strategies. During the three year period of the research two beginner teachers joined the team at various points. The researcher found that a major cause of beginner teachers' problems, whether they were first year teachers or student teachers, is that of insecurity with the syllabus content. Through little fault of their own these teachers' degree courses had little relevance in terms of 'school' geography. Thus, while the higher diploma year introduced them to a variety of learner-centred strategies, their lack of familiarity with the subject content at school level was a barrier to their being able to apply these techniques. A few practical and common-sense approaches solved a number of the beginner teachers' problems and in so doing encouraged them to use more innovative teaching methods. The most obvious strategy was to link the beginner teacher with an experienced geographer who would act as her mentor. Working in tandem with this teacher meant that the beginner teachers' workload was halved in terms of setting of tests, examinations and having to develop and design activities. Working with the mentor teacher the beginner teacher was encouraged to introduce innovative techniques gradually. Other than these team-teaching strategies, subject workshops were held for the beginner teachers. These workshops analysed the content of selected sections, the important concepts and skills which were associated with the section under discussion as well as the appropriate teaching strategies.

The most significant change which occurred throughout the school as a result of the development of the IST programme was the emphasis which was placed on skill development and conceptual understanding. The most concrete evidence of this development was revealed in the field reports of the Std 6 and Std 7 pupils and in the projects of the senior pupils. Thus, in spite of the varying degrees with which learner-centred strategies were applied, the design and structure of the longer assignments and projects was such that skill development had to be a priority for all the geography teachers. Since the skills needed by the pupils for fieldwork, field research, etc., had to be taught and practiced, it meant that activities designed to develop those skills had to be included in the general teaching programme, whatever a teacher's preferred teaching-style.

9.6 SUMMARY

The above evaluation of the programme must first of all be seen as an attempt at a cumulative evaluation which involved a wealth of input from the researcher's colleagues, both in the geography department and in other departments in the school, the headmistress, Superintendents of Education, members of the community who were involved in specific areas of the programme development and the girls themselves, as well as teachers from other schools.

Each 'evaluator' who commented on the programme or on a specific aspect of the programme, however, presented a view which reflected a particular perspective. The range and variety of which created a multifaceted evaluatory approach which enriched each stage of the programme development as activities were reviewed, refined and reassessed. A summative evaluation, such as is attempted in this chapter, cannot, therefore, capture the essence of the processes activated by a multidimensional evaluation system.

More-over, the dynamics of IST are such that any evaluation which is attempted cannot be seen as 'final'. Thus, while the IST programme of I989 was able to identify the number of activities which ought to be completed in the course of a year in each standard, or the sorts of activities which should be included, the many variables affecting the programme would ensure that it in turn, would need to be evaluated in the same manner as each preceding, programme.

This chapter should, therefore, be perceived as a review of the three year period of the research. As such, conclusions which are drawn, particularly from the preordinate evaluation, must be tentative and placed in the perspective of this particular study and the community for which it was designed and developed.

It is the researcher's contention that the real value of this study is that it revealed that changes in the approach to the teaching of geography are possible, while continuing to work within the present syllabus constraints and complying with the demands of the existing examination system.

CHAPTER TEN

THE ORGANISATION AND ADMINISTRATION OF IST IN GEOGRAPHY: SUMMARY AND CONCLUSION

The nature of modern school geography is such that it has the potential to prepare pupils for the social, demographic, economic and political changes which challenge existing community structures by helping them to understand the environmental and human problems and issues upon which modern geography focuses.

Participatory teaching strategies in geographical education are designed to develop the pupils' ability to think critically and as a preparation for a more active role in the search for solutions to such problems (Fien, Gerber and Wilson, 1984; Graves, 1985). Geography's relevance to the educational needs of pupils is further underscored by the emphasis which the subject continues to place on an understanding of patterns and processes which encourage logical explanation and perceptual awareness, in addition to developing the skills associated with graphicacy which are unique to this subject. School geography as presented to pupils in the South African school system is, however, apparently unable to communicate the intrinsic worth of the subject when viewed in the light of geography's position relative to Std 10 enrolment figures and to its status in the curriculum as but one of many elective subjects.

Current educational thinking, with its focus on skills and propositional knowledge, accepts that where pupils are actively involved, the learning experience is more satisfying and has greater educational benefits than when pupils are passive recipients of facts (Griffiths, 1987; Evers, 1990). The aims and objectives of the 1985 Revised Syllabus and that of the 1993 Draft Core Syllabus, advocate a learner-centred approach to the teaching of geography, yet research shows that geography teaching in South African schools remains largely teacher-directed and textbook orientated (Ledger, 1977; Ballantyne, 1986).

Research has shown that widespread changes in teaching approaches are not necessarily effected by a reduction of the constraints that mitigate against change or by pressures which are exerted in an attempt to bring about the desired changes (Walford, 1982, 1984; Ballantyne, 1986). While the claim by Graves (1985), that significant changes in geographical education approaches are not solely determined by paradigmatic shifts or changes in content, but by the interaction of these factors in the presentation of the subject, highlights the importance of the teacher's role in bringing about changes in teaching strategies (Ballantyne, 1986).

10.1 THE RESULTS OF THIS STUDY

This study has revealed that changes in teaching approaches are:

(i) possible, notwithstanding the constraints identified in the existing South African state school system, the existing syllabus requirements and the demands of the present Senior Certificate examination;

(ii) the result of the individual teacher's understanding of the theory which underpins the subject and of the teaching strategies designed to achieve the aims and objectives central to current geographic paradigms;

(iii) associated with a particular process of change identified in chapter one of this thesis.

The analysis of the process of change in the context of this study revealed that the changes in teaching approaches and the school at which the research was undertaken were triggered by general dissatisfaction with the pupils' assignments. The analysis of the preamble to the 1985 Revised Syllabus provided the initial rationale upon which to base the changes and convinced teachers of the need for change, while the analysis of the concept of IST provided the means upon which to base the changes.

The framework which allowed the changes to be sustained and expanded was provided by the development of the model (Figure 3.2) and its application to the IST programme, the pupils' responses to the individual activities of the effectiveness and worth of the changes. The presentation of the pupils' work provided the final component in the process of change, since the 'public' acclaim from teachers, parents, the school hierarchy, members of the public and the pupils' peers created the necessary motivation to maintain the changes.

A process such as described, however, of necessity, operates within a particular school milieu and this determines the extent of the changes and the speed with which they can be effected. The favourable climate which existed at the school during the period in which the IST programme was developed no doubt facilitated the changes which this study describes.

The study further reveals that notwithstanding the positive factors which resulted in the changes, the changes were not adopted uniformly by all the geography teachers, nor did the pupils react uniformly to the changes. The process of change is, therefore, not only sensitive to the prevailing circumstances in a school, but to the responses of the individuals involved in the process. Thus, the IST programme needed to be sufficiently flexible to cater to the various responses which reflected the interests and needs of the teachers and the pupils. This flexibility was provided both by the principles of procedure that were adopted and the ecological paradigm within which the IST programme was situated.

While it is relatively easy to identify and to isolate the various components that constitute the process of change, this study has revealed that the actual mechanisms operating within that process are highly individualised. It is, therefore, difficult to formulate a set of guidelines which can be universally adopted to ensure that widespread changes will occur throughout the existing school system. For this reason, the focus on IST as a specific means to bring about changes which will result in skill development and the acquisition of propositional knowledge provides a methodology for change which is readily accessible to all teachers of geography throughout the South African school system. Thus, other than illuminating the process within which changes in teaching approaches occur, this study provides a basic framework which can be adopted by any geography teacher wishing to effect those changes which are at the heart of the current geography syllabuses and which are deemed essential if geography is to continue to justify its existence in the school curriculum (Walford, 1982; Bailey, 1986).

The perception of IST as a 'blanket' term to cover the activities of pupils in geography (Diepeveen, 1986, pers. comm.) provides teachers with the necessary flexibility to develop and design an IST programme which meets the needs and interests of their particular pupils and which is suited to the resources which exist within their particular environment. The distinction made between the practical and project components of an IST programme allows teachers to identify and to utilize a broad spectrum of teaching strategies designed to develop specific skills and propositional knowledge or to aid pupils in the development of positive attitudes towards the environment or towards those human issues with which geography is concerned.

The theoretical basis, which this study revealed as essential for the effective implementation of the IST programme as a means to achieve the aims and objectives of modern school geography, is provided by:

(i) the analysis of the introduction to the l985 Revised Syllabus and that of the l993 Draft Core Syllabus;

(ii) the analysis of current geographical theory and the aims and objectives which are central to this theory;

(iii) Rath's criteria for worthwhile activities (Table 8.l) as the principles of procedure upon which to structure the individual activities in the IST programme.

Guidelines for the selection of activities and for their design and development are provided by:

(i) the analysis of the syllabus content in relation to the skills pertaining to each syllabus unit and to the framework of skills progression (Tables 8.2 and 8.3);

(ii) the identification of a resource base which can be applied to the practical and project constraints;

(iii) the identification of barriers which affect pupils' performances in the completion of tasks;

(iv) the analysis of specific activities which were applied to the project and practical components of IST.

The development and application of systems of evaluation and assessment of the individual activities and of the programme as a unit provides the necessary input to assess the effectiveness and worth of the activities, which this study revealed as essential for the maintenance and expansion of the IST programme.

A further concern of this study was to establish teachers' perceptions of IST as a learner-centred strategy which is presented by the current geography syllabuses as a means to actively involve pupils in the learning experience. The survey conducted in 1986 revealed that IST was interpreted in much the same way as the pupils' assignments of the 1973 geography syllabus and as such teachers placed little value on this area of geographical education. The poor perceptions of IST as an approach which can be applied to achieve the aims and objectives of modern school geography revealed that not only was IST as a concept not understood, but revealed a general lack of understanding of the theoretical framework that underpins geographical knowledge as that which is concerned with more than the presentation of facts. This survey further highlighted the dichotomy that exists between the subject's aims and objectives and actual teaching practices.

10.2 THE PERCEIVED LIMITATIONS OF THE STUDY

The focus of this study on learner-centred activities and pupils' responses to these tasks led to a number of unintended outcomes which were not foreseen in the initial presentation of goals and which thereby highlighted the need for further research in a South African context. Thus, the analysis of the structure of the various activities, while providing useful insights into factors that affect pupils' performances in geography, emphasised the need in particular for further insights into:

(i) the role of language in geographical education and the factors within language that limit pupils' performances. While Langhan's study (1990) on the problems presented by textbooks to second language speakers is valuable, greater clarification is needed on language interaction in the geography classroom at both senior and junior school levels;

(ii) problems pertaining to numeracy in geography;

(ii) problems pupils have in terms of graphic skills in geography which goes beyond studies such as that of Burton (1986) and van Jaarsveld (1988), which consider problems pupils have with mapwork and climate studies respectively;

(iv) skills teaching and skill development in geography;

(v) methods of assessment and pupil profiling in geography.

As a small-scale study based on classroom research this study is further limited by virtue of the variables that operated in the particular school milieu in which the research was undertaken and by the highly individual nature of the study, which reflected the interests and expertise of the researcher in particular and those of the teachers with whom she worked. Thus, while this study provides a framework for changes in the teaching of geography and a methodology for such changes which are accessible and can be adapted by teachers, their viability as universal guidelines requires further testing in a variety of different school structures within the existing South African school system.

10.3 RECOMMENDATIONS ARISING FROM THE STUDY

The problems experienced by the researcher in the development of an IST programme designed to develop pupils' skills and to provide opportunities for pupils to explore a variety of environmental and human issues when related to the poor perceptions teachers have of learner-centred activities in general emphasised the need for:

(i) A journal or bulletin designed specifically for the South African geography teacher which will act as a forum for the dissemination of information related to change in geography and how this change can be effected, for, worthy as existing South African geography and teachers' journals are, they make a relatively small contribution to the teaching of geography in schools and cannot be compared with a journal such as the British **Teaching Geography** journal.

(ii) In-service courses at national and local levels, which concentrate more on learning and teaching strategies than on ways to improve the Std I0 examination results.

(iii) Local geography study groups to make concerted efforts to obtain the services of experts in the field of learner-centred strategies, for, as worthwhile as the efforts of the local teachers are in conducting seminars, these meetings all too often degenerate into "the blind leading the blind" in terms of skill development or the application of learner-centred activities.

(iv) Publications related to the design and development of learner-centred strategies within a South African context, which are accessible to teachers throughout the South African school system.

(v) A 'network' of geographical educational information related to skills teaching and skills development which is centralised in a data base which is accessible to all geography teachers and which can be easily and cheaply distributed.

10.4 CONCLUSION

The concerns of this study with the process of change and the development of IST as the framework upon which to base the changes in the approach to the teaching of geography must not obscure the real value of a study based on teacher-pupil interactions, that of the pupils' responses and reactions to a learning environment to which they are able to relate in view of its perceived relevance and because of their input into the learning experience. The development of the practical and project components and in particular the field experiences in both of these aspects of IST provided the researcher and her colleagues with unique opportunities to gain a better understanding of the pupils, their interests and their development in geography which is not possible in a teacher-tell situation where the pupils are largely passive. The pupils' responses more than any other aspect of this research highlighted the effectiveness and worth of classroom practices which centre on the pupils and thereby the need for a change in geography teaching from teacher-directed strategies to those which actively involve the teacher and the pupils in the learning experience.

LIST OF REFERENCES

Bale, J., Graves, N. and Walford, R. (eds.) (1973). Perspectives in Geographical Education. Edinburgh: Oliver and Boyd.

Ballantyne, R. (1986). Change in secondary school geography education: teacher attitudes and practice. Unpublished Masters Thesis. Cape Town: University of Cape Town.

Bailey, P. (1986). Geography in the school curriculum: a reply to Sir Keith Joseph's seven questions. Teaching Geography. 2(2).

Bartlett, L. (1984). Look into my mind: qualitative inquiry in teaching geography, in Fien J., Gerber R. and Wilson, P. (eds.) (1984). The Geography Teachers' Guide to the Classroom. (62-77). Melbourne: MacMillan Australia.

Beaumont, J. and Williams, S. (1983). Project Work in Geography. London: Croom Helm.

Beard, R. (1968). An Outline of Piaget's Developmental Psychology for Students and Teachers. London: Routledge and Kegan Paul.

Beehler, R. (1985). The schools and indoctrination. Journal of Philosophy of Education. 19(2) 261-272.

Bennetts, J. (1973). The nature of geographical objectives, in Walford R. (ed.) (1973). New Directions in Geography Teaching. (160-174). London: Longman.

Boardman, D. (1986). Handbook for Geography Teachers. Sheffield: The Geographical Associaton.

Boqwana, P. (1991). Fieldwork as a compensatory teaching strategy for rural Black senior secondary schools. Unpublished Masters Thesis. Grahamstown: Rhodes University

Bull, C. and Daniel, P. (1981). The geography of outdoor recreation. Teaching Geography. Occasional paper No. 33. Sheffield: The Geographical Association.

Burton, M. (1986). Graphicacy the third dimension, an investigation into the problem of poor performance in relief mapwork in South African secondary schools. Unpublished Masters Thesis. Grahamstown: Rhodes University.

Clark, E. (1989). Geography as a school subject in South Africa, 1839-1989. South African Geographical Journal. 71(1) 46-55).

Cohen, L. and Manion, L. (1984). Research Methods in Education. Brackenham: Croom Helm.

Cracknell, I. (1981). themes in geography, in Mills, D. (ed.) (1981). Geographical Work in the Primary and Middle School. (151-161). Sheffield: The Geographical Association.

Croall, S. (1986). Ecology for Beginners. London: Unwin Paperbacks.

Department of Education and Science (1990). Geography ages 5 to 16. Proposals of the Secretary of State for Education and Science and Secretary of State for Wales. July.

Department of Education and Culture: Administration: Assembly: 1993. Draft Core Syllabus for Geography: Higher and Standard Grade.

Department of Environmental Affairs (1989). White Paper on Environmental Education. 1989.

Earle, J. (1980). Towards better evaluation in secondary school geography in Nicol, I. (ed.) (1980). Geography and the School. Dennesig: (27-33). Society for Geography.

Evers, C. (1990). Educating the brain. Educational Philosophy and Theory. 22(2) 65-80.

Everson, J. (1973). Fieldwork in school geography in Walford, R. (ed.) (1973). New Directions in Geography Teaching. (107-114) London: Longman.

Fien, J., Gerber, R. and Wilson, P. (1984). (eds.) The Geography Teachers Guide to the Classroom. (146-153) Melbourne: The MacMillan Co. of Australia Ltd.

Fien, J. and Slater, F. (1981). Values probing: an integrated approach to values in education, in Wilson, P., Gerber, R. and Fien, J. (eds.) (1981). Research in Geographical Education. (46-56). Brisbane: The Australian Geographical Education Research Association.

Gould, P. (1985). The Geographer at Work. London: Routledge and Kegan Paul.

Gowing, D. (1973). A fresh look at objectives, in Walford, R. (ed.) (1973). New Directions in Geography Teaching. (152-150) London: Longman.

Graves, N. (1975). Geography in Education. London: Heinemann Educational Books.

Graves, N. (1980). Geographical Education in Secondary Schools. Sheffield: The Geographical Association.

Graves, N. (1985). Geography in education: a review, in Kent, D. (ed.) (1985). Perspectives on a Changing Geography. (15-22) Sheffield: The Geographical Association.

Graves, N. and Naish, M. (1986). (eds.). Profiling in Geography. Sheffield: The Geographical Association.

Grenyer, N. (1978). Contrasts in Development: Oxford Geography Project. Oxford University Press.

Griffiths, M. (1987). The teaching of skills and skills teaching: a reply to Robin Barrow. Journal of Philosophy of Education. 21(2) 203-214.

Hall, D. (1984). Knowledge in the geography classroom, in Fien, J., Gerber, R. and Wilson, P. (eds.) (1984). The Geography Teachers' Guide to the Classroom. (1-12).Melbourne: MacMillan Australia.

Hall, R. (1982). Key concepts: a reappraisal. Geographical Education. Vol. 4 (25-34).

Halloway, W. (1984). Planning a school based assessment programme, in Fien, J., Gerber, R. and Wilson, P. (eds.) (1984). The Georgraphy Teachers' Guide to the Classroom. (278-293) Melbourne: MacMillan Australia.

Hart, C. and Thomas, T. (1986). Framework Fieldwork in Boardman, D. (ed). (1986). Handbook for Geography Teachers. (205-218). Sheffield: The Geographical Association

Henerson, M., Morris, L. and Fitz-Gibbon, C. (1978). How to Measure Attitudes. Beverley-Hills: Sage Publications.

Hopkins, D. (1985). A Teacher's Guide to Classroom Research. Stratford: Open University Press.

Hurry, L. (1980). A Handbook for Geography Teachers in South Africa. Pretoria: Via Africa.

Hurst, M. (1972). A Geography of Economic Behaviour. Belmont: Duxbury Press.

Johnston, R. (1985). Geography in the 1980's, in Kent, A. (ed.) (1985). Perspectives on a Changing Geography. (9-14). Sheffield: The Geographical Association.

Kelly, A. (1978). Mixed Ability Grouping: Theory and Practice. London: Harper and Row.

Kleinig, J. (1982). Philosophical Issues in Education. London: Croom Helm.

Liebenberg, E., Rootman, P. and van Huyssteen, M. (1976). The South African Landscape: Exercise Manual for Map and Air Photo Interpretation. Durban: Butterworth.

Langhan, D. (1990). The textbook as a major source of difficulty in the teaching and learning of geography through the medium of English in Std. 3 in black primary schools. Unpublished Masters Thesis: Grahamstown: Rhodes University.

Ledger, R. (1977). The new geography in South African high school teaching. Unpublished Masters Thesis. Cape Town: University of Cape Town.

Levy, B. (1984). Geography teaching in South African schools for whites (1800-1980). Unpublished Masters Thesis. Johannesburg: University of the Witwatersrand.

Long, T. and Roberson, B. (l966). Teaching Geography. London: Heinemann Educational Books.

Madaus, G., Scriven, M. and Stufflebeam, D. (eds.) (l983). Evaluation Models: Viewpoints on Educational and Human Services Evaluation. Boston: Kluwer-Nijhoff.

Marsden, W. (l976). Evaluating the Geography Curriculum. Edinburgh: Oliver and Boyd.

Marker, M. (l980). School geography through fieldwork, in Nicol, I. (ed.) (l980). Geography and the School. (89-l02). Dennesig: Society for Geography.

Maye, B. (l984). Developing valuing and decision making skills in the geography classroom, in Fien, J., Gerber, R. and Wilson, P. (eds.) (l984). The Geography Teachers' Guide to the Classroom. (29-43). Melbourne: MacMillan Australia.

McElroy, B. (l984). Models and reality: integrating practical work and fieldwork in geography, in Fien, J., Gerber, R. and Wilson, P. (eds.) (l984). The Geography Teachers' Guide to the Classroom. (294-305). Melbourne: MacMillan Australia.

Meirding, B. (l973). Individualised learning in open classrooms. Journal of Geography. 7(2) (l20-l23).

Mills, D. (ed.) (l988). Geographical Work for the Primary and Middle School. Sheffield: The Georgraphical Association.

Möller, A. (l983). Didactics: Geography in the Secondary School. Pretoria: de Jager Haum.

Murray, L. (l984). Learning geography through classroom and library research in Fien, J., Gerber, R. and Wilson, P. (eds.) (l984). The Geography Teachers' Guide to the Classroom. (l00-ll0). Melbourne: MacMillan Australia.

Nicol, I. (l978). The evaluation of high school geography. South African Geographer, 7(l) 70-79.

Nicolson, I. and Morton, J. (l980). Working with Maps. Pietermaritzburg: Shuter and Schooter.

Open University, Social Sciences (l979). A Third Level Course: Research Methods in Education and the Social Sciences. Strafford: Open University Press.

Peters, R. (ed.) (l966). The Concept of Education. London: Routledge and Kegan Paul.

Peters, R. (l973). The Philosophy of Education. London: Oxford University Press.

Pocock, D. (l983). Geographical fieldwork: an experiential perspective. Teaching Geography. Vol 68 (3l9-325).

Preston-Whyte, R. (l982). Environmentalism in Geography. The South African Geographical Journal. 65(l) l-l2.

Proctor, N. (1985). Marking two responses to Rex Walford's article. Teaching Geography. 10(3) 103-104.

Provincial Administration of the Cape of Good Hope (1973). Department of Education: Syllabus for Geography: 1973. Junior Secondary course and Senior Secondary course (Higher Grade).

Provincial Administration of the Cape of Good Hope (1985). Department of Education: Syllabus for Geography 1985. Senior Secondary course.

Sauvain, P. (1989). Skills for Geography. Cheltenham: Stanley Thomas.

Shinn, R. (1980). Education in values: acculturation and exploration, in Sloan, D. (ed.) (1980). Education and Values. (111-123). New York: Teachers College Press.

Slater, F. (1982). Learning Through Geography. London: Heinemann Educational Books.

Smith, D. (ed.) (1977). A Handbook for Australian Geography Teachers. Melbourne: Sorrett Publishers.

Stenhouse, L. (1981). An Introduction to Curriculum Research and Development. London: Heinemann.

Stake, R. (1973). Programme Evaluation, Particularly Responsive Evaluation. Conference Paper. Sweden: New Trends in Evaluation 1973.

Stoker, J. (1983). A preliminary investigation into the development of computer ability, mathematical concepts and problem solving techniques using Turtle Geometry. Unpublished Masters Thesis: Grahamstown: Rhodes University.

Swanevelder, C., Kotze, J., van Huyssteen, M. and Hanekom, F. (1976). Senior Geography for Std 10. Goodwood: Nasou.

Swanevelder, C., Kotze, J. and Roos, T. (1987). Senior Geography Std 10 Higher and Standard Grades. Goodwood: Nasou.

Thomas, B. and Rouncefield, P. (1977). Fieldwork in a highland setting. Teaching Geography 3(1) 27-29.

Tolley, H. and Reynolds, J. (1977). Geography 14-18: A Handbook for School-based Curriculum Development. London: MacMillan Educational.

van der Merwe, A. (1982). Geography in the South African curriculum in relation to developments in the teaching of the subject overseas. Unpublished Masters Thesis: Grahamstown: Rhodes University.

van Jaarsveld, P. (l988). The integrative nature of the synoptic weather map in relation to adolescent cognitive structures and the teaching of senior secondary meteorology-climatology. Unpublished Masters Thesis: Grahamstown: Rhodes University.

Walford, R. (l969). Games in Geography. London: Longman.

Walford, R. (ed.) (l973). New Directions in Geography Teaching. London: Longman.

Walford, R. (l982). British school geography in the l980's: an easy test? Journal of Geography in Higher Education. 6(2) l5l-l59.

Walford, R. (l984). Marking. Teaching Geography. 9(3) ll8-l20.

Walker, D. (l97l). A naturalistic model for curriculum development. American Journal of Education. Vol. 80 5l-65.

Wiersma, N. (l986). Research Methods in Education: An Introduction. Boston: Allyn and Bacon (Inc.)

Williams, D. (l986). Naturalistic evaluation: potential conflict between evaluation standards and criteria for conducting naturalistic inquiry. Education Evaluation and Policy Analysis. Spring, 8(l) 87-99.

Wolforth, J. (l984). Using statistics in the geography classroom, in Fien, J., Gerber, R. and Wilson, P. (eds.) (l984). The Geography Teachers' Guide to the Classroom. Melbourne: MacMillan Australia

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APPENDIX IA

PREAMBLE: 1985 REVISED GEOGRAPHY SYLLABUS (AS ADOPTED BY CAPE EDUCATION DEPARTMENT)

1. PRINCIPLES ON WHICH THE SYLLABUS IS BASED

1.1 Nature of Geography

Geography as a subject has many areas of overlap with other subjects in both the natural and the social fields of study. This syllabus takes into account the essential nature of Geography. It ensures that:

1.1.1 the four major traditions in Geography are upheld. These are:

(a) man - land relationships

(b) the spatial perspective

(c) the regional viewpoint

(d) the earth-science component.

1.1.2 a balance is maintained between Physical Geography and Human Geography

1.1.3 provision is made for both the theoretical and the practical aspects of the subject

1.1.4 sufficient flexibility exists to allow for the changing nature of the subject.

1.2 General education of the pupil

Education is concerned with the development of the 'whole being'and not merely with imparting knowledge.

1.2.1 The most important aims, in the long term, are for pupils to:

(a) acquire and develop intellectual skills and abilities which will promote on-going education

(b) adjust to a society that is undergoing rapid and far-reaching social, economic and political changes

(c) enter the world-of-work that is becoming increasingly more technologically orientated

(d)/....

(d) develop their moral and emotional (affective) attributes.

1.2.2 The teaching of Geography should neither be specifically vocationally orientated, nor entirely university orientated. The syllabus provides for two groups of pupils:

(a) those who will receive no further instruction in the subject, after the secondary phase and

(b) those who will continue with the study of Geography at a tertiary level.

1.2.3 Although the syllabus is divided into a Junior Secondary Phase and a Senior Secondary Phase, the two phases must be related, and must allow for the progressive development of geographical knowledge, skills and attitudes.

2. OBJECTIVES

2.1 In lesson preparation teachers should bear in mind the higher abilities of comprehension, analysis, application, synthesis and evaluation.

2.2 This subject should be taught in such a way that pupils develop an eagerness for further study and individual inquiry.

2.3 Teachers should be aware of the contribution Geography is making to the general education of the pupil It is this awareness that gives direction to day-to-day teaching.

2.4 Objectives should be meaningful to pupils and teachers alike, and must constitute both realistic and achievable targets.

2.5 The type and number of short-term objectives in Geography are numerous, and those selected for a lesson should be closely correlated with the nature of the subject matter and the resources available to the teacher.

2.6 Objectives can be classified into four main categories:

2.6.1 Knowledge

(a) Pupils should acquire a fundamental body of knowledge which is meaningful and useful to them and which can be applied and reproduced in whatever form is requried.

(b) Pupils should discover the unity of knowledge through the links that Geography has with other subjects.

2.6.2 Skills

(a) No list of skills can be complete. The following should, however, be kept in mind:

(i) The importance attached to different skills should be related to the abilities and maturity of the pupils.

(ii) The development of skills should enable pupils to deal with knowledge in an organized manner.

(iii) Pupils should gain proficiency in the use of skills through repetition and the application of these skills to new situations.

(b) Geography makes a particular contribution to the following skills:

(i) Oracy and literacy: thinking logically, writing concisely, speaking with assurance and accuracy

(ii) Numeracy: facility with simple statistical methods, graphs and tables

(iii) Graphicacy: the ability to draw, read and interpret

(iv) Interpretation: of pictures, photographs and maps

(v) Fieldwork techniques: using the traditional (survey) and/or the scientific approach.

2.6.3 Perception

The way in which the environment is 'perceived' in relation to the 'actual' environment influences the pupil's concept of space (spatial conceptualization).

(a) In order to heighten the pupils' perception of their environment, it is necessary for them to:

(i) recognize the relationships that exist between people and their environment

(ii) identify spatial patterns, spatial relationships and interaction. (This is closely linked with an understanding of locaiton, distance and accessibility.)

(iii) be aware of the underlying processes which act upon spatial patterns and relationships and which bring about change

(iv) be aware of the world's place to place variety; to recognize the uniqueness of place.

(b) Many studies require pupils to examine the spatial aspects of social and economic problems. Such studies provide opportunities for pupils to respond to problem-solving and decision-making situations through critical, divergent and creative thinking.

2.6.4 Appraisal

(a) Studies in Geography should promote the formation and reinforcement of positive attitudes and values.

(b) Pupils need to develop a social awareness. This means that they are expected to:

(i) recognize the interdependence of man

(ii) acquire a tolerant attitude towards others with different social, economic and political circumstances.

(c) Pupils need to develop an environmental awareness. They need to feel a commitment towards the environment by developingf a 'caring attitude'. This means they re expected to:

(i) recognize the need for conservation

(ii) understand that the balance of nature is largely dependent on man's wise management of his environment

They should be aware of how man uses/abuses his environment, particularly the resources available to him; the options and constraints that are placed on his actions.

(iii)/....

(iii) realize that the quality of life is influenced by the aesthetic aspects of man's environment as well as by an appreciation of the grandeur and wonder of Creation.

3. TEACHING GUIDELINES

3.1 Teaching approaches

Teachers should make every effort to create effective learning experiences for their pupils. Whatever teaching approach is used, it is essential to develop a sense of reality in the teaching situation.

3.1.1 The holistic or global approach

(a) It is particularly important that the components of the syllabus be viewed as parts of a whole and not as isolated compartments of knowledge.

(b) The divisions of the syllabus should be regarded as a convenient means of grouping the characteristics of the individual components.

(c) Wherever possible, the relationship and interaction between components should be stressed.

3.1.2 The descriptive versus the problem-solving approach

(a) Although there is still room for some of the descriptive techniques of the traditional Geography, emphasis ahould be given to a more problem-orientated approach.

(b) Pupils should gain insight into the process of decision-making by participating in exercises such as simulation games.

3.1.3 The interdisciplinary approach

(a) Concepts studied in Geography may overlap with those of other subjects such as Biology, Science, and Economics.

(b) Interdisciplinary studies should form part of the broad teaching strategy. This will enhance the value of both the learning content and the learning objectives.

3.1.4/....

3.1.4 The scientific approach

Pupils should be trained in the scientific method of inquiry (statement of hypothesis, followed by the collection and classification of information, and finally, the testing of the hypothesis).

3.2 Teaching techniques

It is recommended that, where appropriate, teachers should:

3.2.1 integrate the reading and analysis of photographs and maps with the relevant section of the syllabus. This includes:

(a) photographs: vertical, oblique and horizontal (i.e. aerial and ordinary);

(b) maps: such as wall, atlas, topographic maps of Southern Africa (particularly the 1:50 000 S.A. Series) and maps of the local area;

(c) satellite images.

3.2.2 ensure that pupils become competent in the use of various measuring instruments and other apparatus.

3.2.3 make use of diagrammatic representation of statistics. For example, climatic figures, economic data and population characteristics can be illustrated by means of curves, columns, rectangles, circle segments, dots, colour, pictorial diagrams and isolines.

3.2.4 make use of physical models (such as globes, tellurians and paper mâché/sand-tray models) which provide effective representations of the real word.

3.2.5 undertake well planned and meaningful fieldwork

This includes: observation and measurement in the field; the recording and processing of data; the interpretation of written and graphical information.

3.2.6 encourage individual and group research techniques

(a) Pupil involvement, independent activity, initiative, creativity and independence should constantly be extended.

(b) Pupils should learn to rely on personal observation in the field (primary source) and to make use of secondary sources such as: reference books, maps, photographs and diagrams; films, tapes and slides; as well as television, the radio and the press.

(c) Pupils need to develop worthwhile attitudes towards learning such as: respect for evidence; an awareness of biased reporting; a suspicion of simplistic explanations; and a willingness to engage in rational discussion.

(d) Pupils need to distinguish between central issues of importance and peripheral issues.

NOTE: Pupils should undertake short independent study topics throughout the year on work related to the requirements of the syllabus.

3.3 Differentiation

3.3.1 Teachers should not expect the same amount and quality of work from all pupils. Differences in ability must be taken into account. However, each pupil can be expected to work at the highest possible level of his own ability.

3.3.2 Most of the topics studied are common to all grades. However, pupils in different grades will not be expected to study these in the same depth. The approach to, and the control of work for less able pupils should be more direct.

3.4 Evaluation

Evaluation is concerned with both:

3.4.1 the measurement of pupil achievement, and

3.4.2 the effectiveness of lesson preparation, class management and the achievement of lesson objectives.

4. EXAMINATIONS

4.1. There should be continuous evaluation for all standards.

4.2 The same subject matter should not be examined repeatedly.

4.3 Pupils must write an internal Geography examination at the end of each year.

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NOTE: Underlined statements in the syllabus are guidelines suggesting an approach. These should allow for greater flexibility when teaching the subject.

APPENDIX IB

EXTRACTS: I973 GEOGRAPHY SYLLABUS (PROVINCIAL ADMINISTRATION OF THE CAPE OF GOOD HOPE)

A. Senior Secondary Syllabus
B. Junior Secondary Syllabus

A

SENIOR SECONDARY COURSE: SYLLABUS FOR GEOGRAPHY (HIGHER GRADE)

The following syllabus for Geography (Higher Grade) for the Senior Secondary Course will be introduced as from 1st January, 1974.

The syllabus will be introduced in Standard 8 in 1974, and the first Senior Certificate Examination on this syllabus will be held in November/December, 1976.

SENIOR SECONDARY COURSE: SYLLABUS FOR GEOGRAPHY (HIGHER GRADE)

Standard 8

0. General geographical techniques

0.1 Introduction to map analysis.

0.2 Introduction to analysis of photographs.

0.3 Preparation for fieldwork.

0.4 Diagrammatic representation of statistics.

1. Physical Geography

1.1 Climatology:

1.1.1 The seasons, solstices and equinoxes.

1.1.2 The atmosphere: composition and structure.

1.1.3 Temperature:
- (i) Heating of the atmosphere by solar and terrestrial radiation and convection.
- (ii) Factors causing horizontal variations in temperature.
- (iii) Lapse rates of temperature.

1.1.4 Moisture in the atmosphere:
- (i) Relative humidity, dewpoint temperature.
- (ii) Simple cloud classification and recognition (cirriform, stratiform, cumuliform and their respective types).

1.1.5 Precipitation: rain, hail, snow.
Condensation: dew, frost.

1.1.6 *Practical work*: use of barometers, rain gauges, thermometers, anemometers and hygrometers; weather records; drawing isolines and simple *climatic maps* and diagrams and their interpretation.

A

1.2 Geomorphology:

1.2.1 Definitions: internal and external forces.

1.2.2 The earth's crust: composition and structure (sial, sima, moho).

1.2.3 Rock types: origin, characteristics and significance of igneous, sedimentary and metamorphic types.

1.2.4 Internal forces and resultant landforms: continental drift; warping, faulting and folding; volcanism and earthquakes; mobile belts (areas of crustal instability) and shield areas.

1.2.5 Weathering (processes and features).

1.2.6 *Practical work*: identification of simple rock types; contour sketches and use of topographic maps and photographs to illustrate specific landform types of 1.2.4; drawing of topographic profiles; at least one field excursion should be undertaken.

2. Human Geography

2.1 Population Geography:

2.1.1 Population distribution and density:
- (*a*) First order areas: S.E. Asia, Europe, Indian sub-continent, Eastern North America.
- (*b*) Second order areas: Indonesian/Philippine Archipelago, Nile Valley, Central America, S.E. Australia, Guinea Coast, California.

2.1.2 Population characteristics: birth and death rates, age structure and population pyramids; sex balance; rural/urban ratios.

2.1.3 Population movements:
- (*a*) Spontaneous movement: within political units (eg. rural depopulation) and across political boundaries (immigration and emigration and their effects); migrant labour.
- (*b*) Induced movement (e.g. effects of slavery in former times, ancient and modern pogroms).

2.1.4 Factors influencing the rapid growth of world population since the Industrial Revolution: improved farming methods and assured food supplies, improved health, reduced infant mortality rates, increased

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2.1.5 The population explosion:

(a) Growth rates, past and present.

(b) Associated problems: food supplies (the "green revolution" associated with the development of hybrid seed types and new forms of food production), living space; destruction of limited natural resources; disposal of waste.

2.1.6 *Practical work*: statistical diagrams and maps to show pyramids, densities and distribution patterns—their construction and interpretation.

3. Regional Geography

3.1 A general regional study of ONE or more from each of the categories listed below, with special reference to population problems: (The approach can be systematic or thematic.)

(a) Technologically advanced countries:

(i) Australia,
(ii) Italy,
(iii) Canada,
(iv) Japan,
(v) Netherlands.

(b) Technologically less advanced countries:

(i) Brazil,
(ii) Egypt,
(iii) India, Pakistan and Bangla Desh,
(iv) Indonesia,
(v) Botswana, Lesotho and Swaziland.

It is suggested that these studies should emphasise problems and contrasts within each country. Comparisons between the countries chosen in (a) and (b) should be stressed.

3.2 Assignments:

Two individual research assignments must be undertaken during the year. THESE MUST BE CHOSEN FROM COUNTRIES NOT STUDIED IN 3.1 ABOVE.

Standard 9

1. Physical Geography

1.1 Climatology:

1.1.1 Atmospheric pressure: definition and representation as isobars at M.S.L. and contours of constant pressure surfaces; pressure gradients.

1.1.2 Relationships between pressure and wind (stress airflow parallel to the isobars and direction of movement). Oblique flow at a small angle across isobars in the friction layer is best considered under 1.1.4 (i).

1.1.3 General circulation of the atmosphere:

(i) Primary circulation: meridional (N-S) section (tri-cellular arrangement); sub-tropical and polar highs, polar front, I.T.C.Z.

(ii) Secondary circulation: lows (depressions) and westerly waves (the life cycle of a depression is not to be included here); tropical easterlies (formerly trades) and accompanying waves; monsoons.

(iii) Tertiary circulation: land and sea breezes, katabatic flow, Chinook, Föhn and Berg winds, Mistral.

1.1.4 Weather processes:

(i) Causes of uplift: types of convergence, i.e. direct and indirect, frictional, slope (relief), frontal and convectional.

(ii) Thermal stability and instability.

(iii) Convergence and instability as the cause of precipitation.

1.1.5 *Practical work*: interpretation of mean pressure, temperature and rainfall maps; introduction to synoptic charts (airflow patterns from pressure distributions).

1.2 Oceanography:

1.2.1 Relationship between atmospheric and oceanic circulations: important ocean currents and their effects.

1.2.2 Basic causes and significance of tides.

1.3 Geomorphology:

1.3.1 Fluvial action: fluvial processes and landforms typical of fluvial erosion and deposition.

(B)

6.1.3.2 Elementary concept of mean annual rainfall maps, using colours where possible. Emphasise seasonal distribution, type of rain, drought and water conservation.

6.1.4 Natural vegetation map.

6.1.5 Population map and elementary explanation of distribution pattern (use diagrams to show the racial composition).

6.1.6 Maps to represent the distribution of the chief farming and mining products. Diagrammatic representation of the R.S.A. contribution to the world production of gold, diamonds, wool and maize.

6.1.7 A geographical study of at least TWO of the following:

6.1.7.1 Highveld (with particular reference to industries and mining).

6.1.7.2 Coastal Belt of Natal.

6.1.7.3 S.W. Cape Mediterranean region.

6.1.7.4 Transvaal Lowveld.

6.1.7.5 Natal Midlands.

6.1.7.6 Transvaal Middleveld.

6.1.7.7 Border/Eastern Cape.

6.1.7.8 Karoo.

6.1.7.9 Kalahari.

6.1.7.10 Transkei or some other Bantu Homeland.

6.2 SOUTH WEST AFRICA

A brief geographical study.

7. SOUTHERN CONTINENTS

SOUTH AMERICA AND AUSTRALIA

7.1 SOUTH AMERICA

7.1.1 A geographical study of at least one of the following:

7.1.1.1 The Pampas.

7.1.1.2 Chile.

7.1.1.3 South East Brazil.

7.2 AUSTRALASIA

7.2.1 A geographical study of at least one of the following

7.2.1.1 New Zealand

7.2.1.2 Western Australia

7.2.1.3 South East Australia.

(B)

8. TOPICS FOR INDEPENDENT STUDY

(Refer to directive in Standard 5 syllabus.)

Consult Standard 7 syllabus for examples of topics.

9. NEWSPAPER GEOGRAPHY

Consult the introduction.

THE EXAMINATION

The same pattern as prescribed for Standard 7 is to be followed.

STANDARD 7

1. MAPWORK

1.1 Introduction to aerial photographs and elementary interpretation of 1:50 000 sheets.

1.2 Drawing of cross sections from contour maps.

1.3 Records of practical fieldwork. (See 6—Settlement Geography.)

1.4 Map projections (principles only):

1.4.1 Cylindrical
1.4.2 Conical
1.4.3 Polar
} With reference to area, direction and shape distortion.

2. ASTRONOMICAL AND MATHEMATICAL GEOGRAPHY

2.1 Latitude and noon altitude of the sun.

2.2 The moon phases and eclipses.

2.3 Tides—simple explanation.

3. GEOMORPHOLOGY

3.1 Difference between weathering and erosion (very elementary).

3.2 Chief agents of erosion (elementary—without theories):

APPENDIX 2

INTRODUCTION TO I993 DRAFT CORE SYLLABUS

1. PRINCIPLES ON WHICH THE CURRICULUM IS BASED

1.1 The nature of Geography

Geography studies the relationship between man and his physio-cultural environment. As such it has many areas of overlap with other subjects in both the natural and the social fields, especially as far as learning contents are concerned. However, Geography has its own perspective on these learning contents. Therefore this subject curriculum provides for:

1.1.1 the use and emphasis of various viewpoints such as:

* the man-environment relationship
* the spatial perspective
* the regional approach

1.1.2 a balance between Physical and Human Geography

1.1.3 continuous integration of practical aspects with the theoretical aspects

1.1.4 sufficient flexibility to allow for the changing nature of the subject

1.1.5 ample opportunities to emphasize, inter alia, the following basic principles of the subject:

* a global image and holistic approach

  It is of vital importance that the components of the curriculum should be viewed as parts of a greater unit and not as isolated compartments

* spatial differentiation

  A study of the spatial aspects of the environment which is characterized by continuous change in form and pattern

* casual relationships

  A study of the factors, reasons, functions and processes responsible for the changes

* man-land relationship (especially the significance of issues for man)

1.2 General education of the pupil

Education is concerned with the development of the 'whole human being'. The curriculum should therefore:

1.2.1 help to achieve the following aims in the long term:

* the development of intellectual skills and abilities of pupils to promote on-going education

* the adjustment of pupils to a society that is undergoing rapid and far-reaching social, economic and political changes

* the entering of a world-at-work that is becoming increasingly technologically orientated

* the development of moral and emotional (affective) attributes of pupils to maintain themselves in a demanding world

1.2.2 be directed towards both a vocationally orientated and a university orientated approach to provide for three groups of pupils:

* those who will receive no further instruction in the subject after the junior secondary phase

* those who will receive no further instruction in the subject after the senior secondary phase

* those who will continue with the study of Geography at a tertiary level

1.2.3 relate the junior secondary phase with the senior primary and secondary phases to bring about a progressive development of geographical insight, skills and abilities

2. AIMS AND OBJECTIVES

* In lesson preparation teachers should bear in mind the higher abilities of comprehension, analysis, synthesis, evaluation and application

* The affective domain (attitudes and values) should receive appropriate attention

* This subject should be taught in such a way that pupils develop an eagerness for further study and individual inquiry

* Teachers should be aware of the contribution Geography is making to the general education of the pupils. It is this awareness that gives direction to day-to-day teaching

* Short-term objectives selected for a lesson should be closely correlated with the aims of the subject and the resources available

* Objectives should be meaningful to teachers and pupils alike, and must be realistic and achievable. Learning objectives should therefore be formulated in terms of clearly defined verbs and should be measurable

* Aims can be classified into a few main categories:

2.1 Observation

The way in which the environment is 'perceived' in relation to the 'actual' environment influences the pupil's concept of space (spatial conceptualization)

In order to heighten the pupils' perception of their environment, it is necessary for them to repeatedly:

* measure and identify spatial characteristics and patterns such as distance, location, direction, height, depth, distributions and different intensities

* recognize the world's place-to-place variety and the uniqueness of a place

* consult audio-visual teaching media, source materials and other conveyors of information to get hold of factual information

2.2 Exposition of relationships

Pupils should be able to explain the observed spatial characteristics of the environment (differences, similarities and changes) in terms of particular functions and processes. A search for reasons and factors responsible for the changing reality exposes specific relationships and provides pupils with the necessary practice in interpretation, conceptualization and the stating of relationships

2.3 Capabilities

2.3.1 No list of capabilities can be complete. The following should, however, be kept in mind:

* The importance attached to different capabilities should be related to the abilities and maturity of the pupils

* The acquisition of capabilities should enable pupils to deal with the observed facts in an organised manner

* Pupils should gain proficiency in the use of skills through repetition and application

* Pupils should acquire the ability to study the spatial aspects of social and economic problems. Such studies provide pupils with opportunities to respond to situations in which problems could be solved and decisions can be made through critical, divergent and creative thinking

2.3.2 Geography makes a particular contribution to the following capabilities:

* Oracy and literacy: to think logically, to write concisely and to speak with assurance and accuracy

* Numeracy: facility with simple statistical methods, graphs and tables

* Graphicacy: the ability to draw, read and interpret
* Interpretation: of pictures, photographs and maps
* Fieldwork techniques: using either the traditional (survey) or the scientific approach

2.4 Appraisal

2.4.1 Studies in Geography should promote and reinforce positive attitudes and values

2.4.2 Pupils need to develop a social awareness. This means that they are expected to:

* recognize the interdependence of man
* acquire a tolerant attitude towards others with different social, economic and political circumstances

2.4.3 Pupils should develop environmental awareness and a commitment to the environment by developing a 'caring attitude'. This means that they should be able to -

* recognize the need for conservation
* understand that the balance of nature is largely dependent on man's wise management of his environment

2.4.4 Pupils need to develop worthwhile attitudes towards learning such as: respect for evidence; a critical appraisal of reporting; a suspicion of simplistic explanations; and a willingness to engage in rational discussion

2.4.5 Pupils need to distinguish between central issues of importance and peripheral issues

2.4.6 Pupils should realize that the quality of life is influenced by the aesthetic aspects of man's environment as well as by an appreciation of the grandeur and wonder of Creation

2.5 Mastering the content

Practising of the above learning objectives should contribute to pupils mastering a fundamental body of factual and useful information

3. **TEACHING GUIDELINES**

3.1 Teaching approaches

Teachers should make every effort to create effective learning experiences for their pupils.

3.1.1 The holistic approach

* The components of the course should be viewed as parts of a whole

* Wherever possible, the relationship and interaction between components should be stressed

3.1.2 The descriptive versus the problem-solving approach

* Although there is still place for traditional descriptive Geography, emphasis should be given to a more problem-orientated approach

* Pupils should be trained in the scientific method of inquiry (statement of hypothesis, followed by the collection and classification of information, and finally, the testing of the hypothesis)

* Pupils should gain insight into the process of decision-making by participation in exercises such as simulation games and role play

3.1.3 The Thematic approach should be emphasized

3.1.4 The inter-disciplinary approach

* Concepts studied in Geography may overlap in with those of other subjects such as Biology, Science and Economics

* Inter-disciplinary studies should form part of the broad teaching strategy

* Notwithstanding the overlap with other subjects, studies should always be undertaken from a geographical perspective

3.2 Teaching aids and techniques

It is recommended that teachers should inter alia:

3.2.1 integrate the reading and analysis of photographs and maps with the relevant sections of the curriculum. This includes:

* photographs (different types of aerial and ordinary photographs)

* maps: such as wall, atlas, topographic maps of Southern Africa (particularly the 1 : 50 000 SA series) and municipal maps of the local area

3.2.2 ensure that pupils become competent in the use of various measuring instruments and other apparatus. Emphasis should be placed on the information gathered and not on the mechanism of the instruments

3.2.3 make use of diagrammatic representation of statistics

3.2.4 make use of physical models such as globes, tellurions, paper-maché/sand tray models

3.2.5 undertake well-planned and meaningful fieldwork

3.2.6 encourage individual and group research techniques

* Pupils should undertake short independent study topics throughout the year on work related to the requirements of the curriculum

3.2.7 utilize the media centre

3.3 Differentiation

3.3.1 Most of the topics studied are common to all grades. However, pupils in different grades will not be expected to study these in the same depth. The approach in lower grade should be more simple, concrete and perceptible. More observational activities and less application should be done by these pupils

3.3.2 Teachers should not expect the same amount and quality of work from all pupils, even though they are in the same standard and grade. However, each pupil should be expected to work at the highest possible level of his own ability

3.4 Evaluation and Assessment

* There should be continuous assessment in all standards to determine pupil progress

* Appropriate assessment techniques should be used

* Evaluation should also be undertaken to determine the achievement of lesson objectives and the effectiveness of: lesson preparation, appropriate remedial measures and class management

4. **EXAMINATION**

4.1 Pupils in standard 8 and 9 must write a examination at the end of each year

4.2 A final public examination will be written at the end of standard 10

4.2.1 Although the examination will deal with the content of the std 10 syllabus, pupils will be expected to utilize knowledge gained on principles and concepts, as well as specific skills which were acquired during the preceding years

4.2.2 Details of this examination will be explained later on

5. **LEARNING CONTENT FOR STANDARDS 8, 9 AND 10**

The learning content and commentary are indicated columnwise on the following pages:

5.1 Column 1: Core syllabus content

In the first column the core syllabus content is indicated for the standard concerned to be covered in one year

5.2 Column 2: Detailed content

The second column should enable teachers and authors of textbooks to determine how concisely or elaborative the content should be explained and taught. The curriculum is not prescriptive as far as the detailed content is concerned, yet there is a need for greater uniformity regarding the factual information contained in the different textbooks .

5.3 Column 3: Commentary

This column contains guidelines to assist the teacher in the planning of lessons and is therefore not prescriptive. The guidelines relate to the teaching techniques suggested in par. 3.2 From this it is clear that techniques such as mapwork, the use of instruments, models, statistical methods, fieldwork and the use of media are not study topics on their own. The purpose of these techniques is to initiate and to set in motion mental activities on the different levels of observation, interpretation and application. Pupils should master these techniques after many repetitions and continuous integration with the relevant learning contents.

5.4 A modular structure for the ordering of the core syllabus content for std 8 to 10

This structure is demonstrated in Table 1 on page 8.

APPENDIX 3

"RAINFOREST" GAME
(After Lergessner and Cave)

Figure 9.1 The Rainforest Game *(Developed by D. Lergessner and D. Cave, geography subject masters, Department of Education, Queensland with assistance from K. Cordwell, Department of Education, Queensland)*

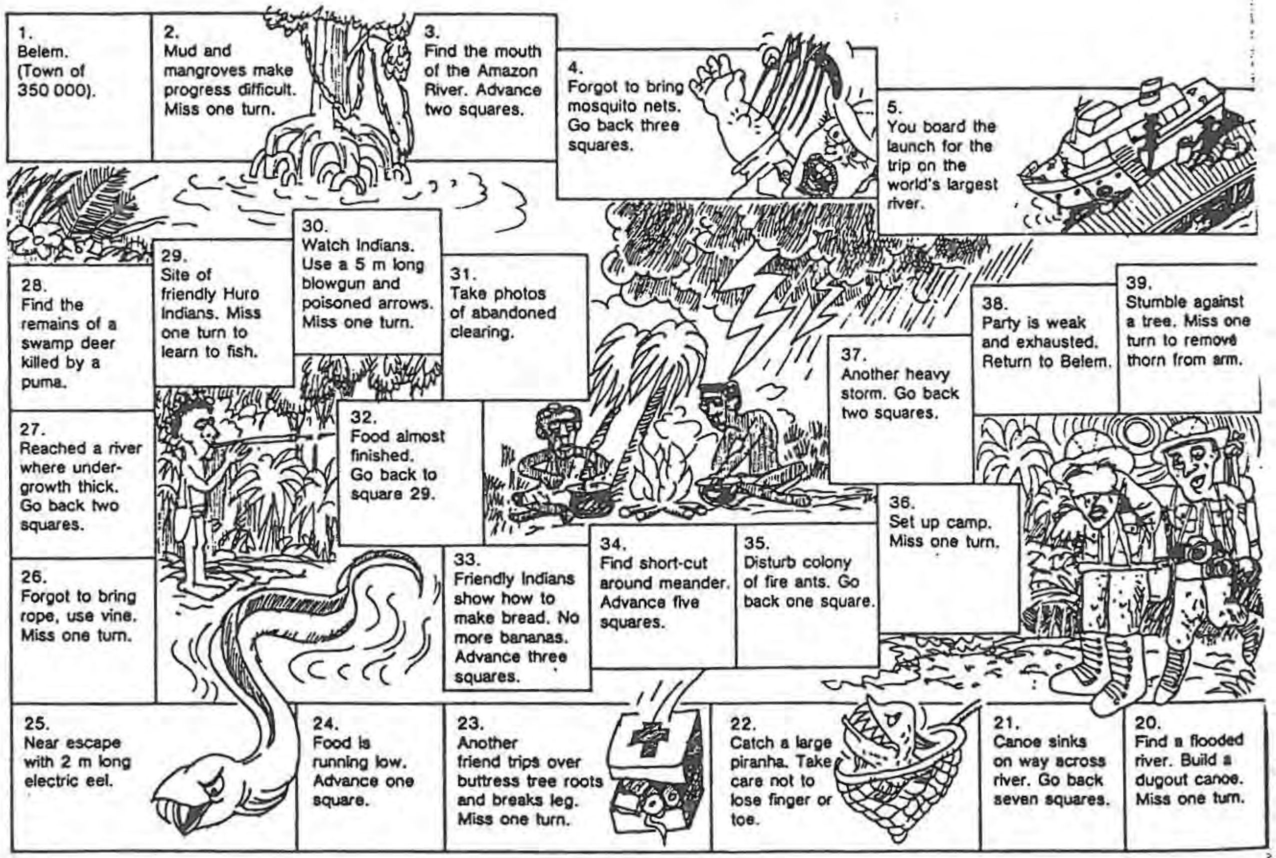
Introduction

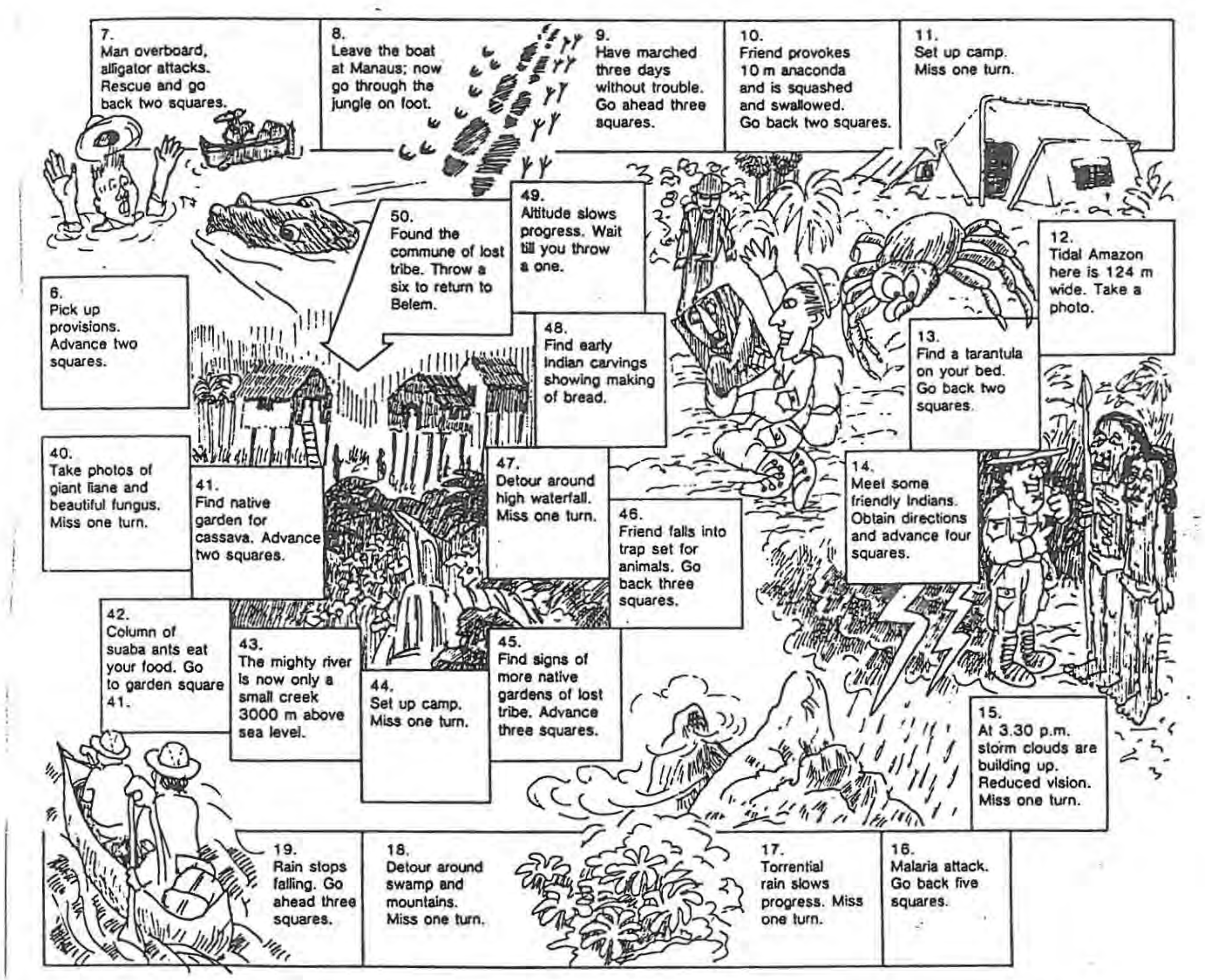
In this game, students 'explore' the Amazon Rainforest in the hope of finding a commune inhabited by a lost tribe of Indians.

Information

To start, each player must throw a 'five' or a 'six'. After starting, the players take turns to throw the die, following the instructions printed in each square of the game board reproduced below.

The first player to return safely to Belem after reaching the commune wins the game.





Fien, Hershell and Hodgkinson (1984) p.11

APPENDIX 4A

TEACHER SURVEY: QUESTIONNAIRE

INDEPENDENT STUDY IN HIGH SCHOOL GEOGRAPHY

A questionnaire for teachers of Geography in C.E.D. High Schools

This research aims at:

I. ascertaining how groups of Geography teachers in the Cape Province interpret the recent guidelines pertaining to independent study topics as stated in the 1985 Revised Geography Syllabus for Standards 6 - 10, as set out below:

"3.2.7. encourage individual and group research techniques:

(a) Pupil involvement, independent activity, initiative, creativity and independence should constantly be extended.

(b) Pupils should learn to rely on personal observation in the field (primary source) and to make use of secondary sources such as: reference books; maps, photographs and diagrams; films, tapes and slides; computers as well as television, the radio and the press.

(c) Pupils need to develop worthwhile attitudes towards learning such as: respect for evidence; a critical appraisal of reporting; a suspicion of simplistic explanations; and a willingness to engage in rational discussion.

(d) Pupils need to distinguish between central issues of importance and peripheral issues.

NOTE: Pupils should undertake short independent study topics throughout the year on work related to the requirements of the syllabus."

II. analysing how these interpretations accord with the aims embodied in the Core Syllabus and with the recent trends in Geography;

III. examining problems encountered by Geography teachers in the application of these guidelines with a view to finding meaningful solutions.

INDEPENDENT STUDY IN HIGH SCHOOL GEOGRAPHY

A questionnaire for Teachers of Geography in C.E.D. High Schools

For office use only

CARD ONE

Respondent No [ ][ ][ ] 1 - 3

PLEASE ANSWER THE FOLLOWING QUESTIONS:

A. GENERAL.

1.1. Are you the subject head of Geography at your school?

(Please tick the appropriate block)

YES	4
NO	5

1.2. Please indicate your training experience in Geography.

(a) One to five years. [ ] 6

(b) Six to ten years. [ ] 7

(c) More than ten years. [ ] 8

(Please tick the appropriate block)

1.3. Please indicate to which groups you have taught Geography.

(a) Standard 6. [ ] 9

(b) Standard 7. [ ] 10

(c) Standard 8. [ ] 11

(d) Standard 9. [ ] 12

(e) Standard 10. [ ] 13

(Please tick the appropriate block)

2.1. Is your school:

(a) Dual medium. [ ] 14

(b) English medium. [ ] 15

(c) Afrikaans medium. [ ] 16

(Please tick the appropriate block)

2.2. Is your school:

(a) Co-educational. [ ] 17

(b) Boys only. [ ] 18

(c) Girls only. [ ] 19

(Please tick the appropriate block)

2.3. Is your school:

(a) A day school only. 20

(b) A day school with a boarding establishment. 21

(Please tick the appropriate block)

3. Please record the requested totals in the appropriate blocks. e.g. 0 4 2

(a) The total number of Standard 6 pupils. 22/23/24

(b) The total number of Standard 10 pupils. 25/26/27

(c) The total number of Standard 10 pupils taking Geography. 28/29/30

(d) The total number of Standard 10 pupils taking Geography on the Higher Grade. 31/32/33

(e) The total number of Standard 10 pupils taking Geography on the Standard Grade. 34/35/36

(f) The total number of Standard 10 pupils taking Geography on the Lower Grade. 37/38/39

(Please use one digit per block)

4.1. Please tick the items listed below which are freely available to you as a Geography teacher.

(a) Blank video cassettes. 40

(b) Prepared video cassettes. 41

(c) A television set. 42

(d) A video recorder. 43

(e) A video camera. 44

(f) Blank tape recorder cassettes. 45

(g) Tape recorders. 46

(h) Photographic film. 47

(i) A 35mm camera. 48

(j) Prepared photographic slides. 49

(k) A sound-tape projector. 50

(l) Prepared overhead transparencies. 51

(m) An overhead projector. 52

(n) A media or resources centre. 53

(o) A technical assistant in the resources centre. 54

4.2. Does your school library contain:

(a) A <u>more than adequate</u> collection of printed material for independent study? 55

(b) An <u>adequate</u> collection of printed material? 56

(c) A <u>less than adequate</u> collection of printed material? 57

(Please tick the appropriate block)

CARD TWO

B. <u>THE VALUE OF INDEPENDENT STUDY.</u>

5. Please indicate <u>your personal</u> attitude to independent study in High School <u>Geography</u>.

(a) It is an essential and integral part of the Geography curriculum. 1

(b) It is a reasonably important part of the Geography curriculum. 2

(c) It is of little value in the Geography curriculum. 3

(d) It is actually a waste of time. 4

(Please tick the appropriate block)

6.1. The following claims have been made with regard to the benefits of independent study. Please rate each of the following claims from 1 to 3 as follows:

1 indicates that you attach little importance to the claim.

2 indicates that you attach some importance to the claim.

3 indicates that you attach great importance to the claim.

<u>Independent study:</u>

Insert rating <u>1 - 3 here</u>

(a) develops creativity in the pupil; 5

(b) develops a pupil's sense of responsibility; 6

(c) trains a pupil to be self-sufficient; 7

(d) develops a positive self-image in the pupil; 8

(e) develops a pupil's interests and talents; 9

(f) develops a pupil's awareness of his environment. 10

Insert rating 1 - 3 here

(g) develops a pupil's interest in the community; 11

(h) develops a pupil's ability to work with other people; 12

(i) develops a pupil's powers of observation; 13

(j) develops a pupil's skill in using primary and secondary resource material; 14

(k) develops a pupil's skill in using statistical data; 15

(l) develops a pupil's skill in using audio visual equipment; 16

(m) develops a pupil's understanding of language; 17

(n) develops a pupil's ability to use geographical terms; 18

(o) increases a pupil's ability to solve problems; 19

(p) develops a pupil's ability to formulate and test hypotheses. 20

(Please check that the above all have a 1 - 3 rating.)

6.1.2. Please indicate whether there are any other ways in which <u>you</u> believe that independent study can benefit the pupil.

6.2.1. Please rate from 1 to 3 the importance of the following statements as they apply to the <u>teaching of Geography</u>.

1. is of little importance;
2. is of average importance;
3. is very important.

Independent study can benefit the teacher of Geography because it enables the teacher:

Insert rating 1 - 3 here

(a)	to assess the pupil's understanding of the subject;		21
(b)	to measure the pupil's progress in the subject;		22
(c)	to assess the pupil's aptitude for the subject;		23
(d)	to assess the pupil's potential for tertiary education;		24
(e)	to gain a better insight into the pupil's personality;		25
(f)	to establish a better rapport with the pupils;		26
(g)	to motivate the pupils towards a better attitude to the subject;		27
(h)	to spend more time with individual pupils;		28
(i)	to link the theoretical aspects of the subject to the 'real world' situation;		29
(j)	to deal more effectively with problematic areas in the syllabus.		30
(k)	to deal more effectively with mixed ability groups;		31
(l)	to prepare the pupil more effectively for examinations;		32
(m)	to enhance the co-operation between the different subjects in the school.		33

(Please check that the above all have a 1 - 3 rating.)

6.2.2. Please indicate any other ways in which you feel that independent study can benefit your teaching.

6.3.1. Please rate from 1 to 3 the importance of the following statements as they apply to Geography.

1. is of little importance;
2. is of average importance;
3. is very important.

Independent study may enhance the subject because it:

	Insert rating 1 - 3 here	
(a) increases the 'popularity' of the subject;		34
(b) develops a wider interest in the subject;		35
(c) creates a greater awareness of the central issues within a subject;		36
(d) improves the pupils' attitude to the subject;		37
(e) develops better learning techniques within the subject;		38
(f) improves the teaching of the subject;		39
(g) enhances the status of the subject;		40
(h) gives the community an opportunity to develop an awareness of the subject.		41

(Please check that the above all have a 1 - 3 rating.)

6.3.2. Please indicate any other ways in which you believe independent study can enhance Geography as a subject.

C. THE ORGANISATION AND MANAGEMENT OF INDEPENDENT STUDY TOPICS.

7.1. How often do your pupils do independent study topics:

EITHER (a) once or twice a year? 42

OR (b) as often as the subject matter lends itself to independent study topics? 43

OR (c) within each unit of the syllabus as it is taught? 44

(Please tick one block only)

7.2. Do you believe that:

EITHER (a) all pupils must do a set number of independent study topics each year where each pupil does the same topic? 45

OR (b) all pupils must do a set number of independent study topics each year BUT that the topic choice be left to the pupil, guided by the teacher? 46

OR (c) all pupils must do a set number of independent study topics each year within the same framework or area, BUT that the range of topics within this framework allow for individual interests and abilities? 47

OR (d) the number and choice of independent study topics must depend on the individual pupil, taking into account each pupil's interests and abilities? 48

(Please tick one block only)

7.3. Do you believe that:

EITHER (a) the completed piece of individual work should be the same length for each child in the standard? 49

OR (b) no limits should be set on the length of the completed work, each pupil being free to choose how much time he/she wishes to spend on the topic? 50

OR (c) topics should be so designed that some are a set length, whilst others are more flexible in this respect? 51

(Please tick one block only)

7.4. Do you believe that independent study topics are most valuable when done:

EITHER (a) at Junior Secondary level, i.e. Standard 6 and 7? 52

OR (b) at Senior Secondary level, i.e. Standard 8 to 10? 53

OR (c) throughout the High School? 54

OR (d) throughout the High School BUT excluding Standard 10? 55

(Please tick one block only)

7.5. Do you believe that independent study topics should be done:

EITHER	(a)	in class time?	[ ]	56
OR	(b)	only as "homework"?	[ ]	57
OR	(c)	partly in class time and partly as "homework"?	[ ]	58

(Please tick one block only)

D. THE ASSESSMENT OF INDEPENDENT STUDY TOPICS. CARD THREE

8.1.1. How do you believe that assessment of independent study topics ought to be done?

EITHER	(a)	by means of a numerical mark?	[ ]	1
OR	(b)	by means of a symbol?	[ ]	2
OR	(c)	by means of a written comment only?	[ ]	3
OR	(d)	by means of a mark or symbol AND a written comment?	[ ]	4
OR	(e)	by means of peer-evaluation by the pupils in the group?	[ ]	5

(Please tick one block only)

8.1.2. In cases where a numerical mark has been given for independent study topics, do you:

EITHER	(a)	incorporate these marks into term marks only?	[ ]	6
OR	(b)	incorporate these marks into examination marks only?	[ ]	7
OR	(c)	incorporate these marks into the year mark only?	[ ]	8
OR	(d)	incorporate these marks into the year mark and term marks?	[ ]	9
OR	(e)	not incorporate these marks into any of the above?	[ ]	10

(Please tick one block only)

8.2. Do you believe that independent study topics in Standard 10 should be marked internally by the teacher concerned, but moderated by an external examiner for inclusion into the Senior Certificate Examination?

(Please tick the appropriate block)

YES	11
NO	12

E. PROBLEMS IN APPLYING INDEPENDENT STUDY TOPICS IN GEOGRAPHY.

9. The following twelve sections broadly cover the High School Geography syllabus. In your opinion to what extent does each section of the syllabus facilitate the introduction of independent study topics? Please use the following rating:

1 indicates that the section has little potential for the introduction of independent study approaches.

2 indicates that the section has some potential for the introduction of independent study approaches.

3 indicates that the section has great potential for the introduction of independent study approaches.

	Insert rating 1 - 3 here	
(a) Map reading and interpretation.		13
(b) Climatology and meteorology.		14
(c) Geomorphology.		15
(d) Natural regions.		16
(e) Economic Geography.		17
(f) Developing and developed countries and the economic development of such areas.		18
(g) Urban settlement Geography.		19
(h) Rural settlement Geography.		20
(i) Population Geography.		21
(j) South Africa.		22
(k) The regional Geography of Africa.		23
(l) The Geography of regions outside Africa.		24

(Please check that all the above have a 1 - 3 rating)

10.1. The problems listed below are ones which could arise in the conducting of independent study topics. Please indicate by placing a tick in the appropriate block whether you consider each of the problems to be a major one, a minor one or not a problem in conducting independent studies in Geography.

	Major Problem	Minor Problem	Not a Problem	
(a) The limited time at the pupils' disposal.				25
(b) The pupils' lack of motivation.				26

	Major Problem	Minor Problem	Not a Problem	
(c) The limited time at the teacher's disposal				27
(d) The length of the syllabus to be covered in each standard				28
(e) The constraints of the examination system				29
(f) The lack of primary and secondary research resources				30
(g) The lack of previous teacher experience in applying independent study topics				31
(h) The size of the classes				32
(i) The diverse abilities of the pupils				33

10.2. Please indicate any other problems which you have encountered in conducting independent study topics.

APPENDIX 4B

SURVEY: QUESTIONNAIRE ACCOMPANYING LETTERS

2 Elizabeth Road
Cambridge
East London
5247

5 May 1986

Dear Principal

Questionnaire : Independent Study Topics in High School Geography.

It would be greatly appreciated if your school would assist me by taking part in a survey being conducted for the purpose of research for the M Ed degree of Rhodes University on the organisation and management of Independent Study Topics in High School Geography. Your school has been selected as you offer Geography to Standard Ten.

The enclosed questionnaire is, with your permission, to be answered by a member of the Geography Department at your school.

The questionnaire has been approved by the Cape Education Department (see extract from letter attached hereto) and by Mr Willem Diepeveen, Chairman of the Cape Education Department's Geography Study Group and at present Chief Superintendent of Education in the Border Area.

I should appreciate it if this matter could be dealt with as soon as possible during the third term. I enclose a stamped, addressed envelope with the questionnaire for its return.

As I feel that my research will benefit both individual teachers of Geography and the pupils, I shall make relevant results available to the S.A.T.A., the S.A.O.U. and the Teachers' Centres for use if they so desire.

Thank you in anticipation for your assistance.

Yours faithfully

Ursula van Harmelen (Miss)

2 Elizabeth Road
Cambridge
East London
5247

5 May 1986

To: The Subject Head of Geography.

Dear Colleague,

Questionnaire : Independent Study Topics in High School Geography.

I should sincerely appreciate it if you or some other member of the Geography Department at your school would spare some time in answering this questionnaire which is part of the research towards an M Ed degree of Rhodes University on the organisation and management of Independent Study Topics in High School Geography.

Realising how busy teachers are, I conducted a pilot survey and the average time taken to answer the questionnaire is 30 minutes. I hope, therefore, that this will not place too much of a burden on either yourself or your staff. I enclose a stamped, addressed envelope with the questionnaire for its return.

I should very much appreciate the return of the questionnaire as soon as possible.

As I believe that my research will be of benefit to all teachers of Geography and pupils, I shall make the relevant results available to Teachers' Centres in the Cape and to the S.A.T.A. and the S.A.O.U.

Thanking you in anticipation for your assistance.

Yours sincerely

U van Harmelen

Ursula van Harmelen (Miss)

APPENDIX 4C

C.E.D. REGULATIONS: ADMINISTRATION OF QUESTIONNAIRE

EXTRACT FROM DEPARTMENTAL LETTER OF APPROVAL

DEPARTEMENT VAN ONDERWYS

PROVINSIALE GEBOU, WAALSTRAAT,
POSBUS 13, KAAPSTAD, 8000

DEPARTMENT OF EDUCATION

PROVINCIAL BUILDING, WALE STREET,
P.O. BOX 13, CAPE TOWN, 8000

TELEKS TELEX	522368
TELEGRAM	EDUCATION
TELEFOON TELEPHONE	45-9218
NAVRAE ENQUIRIES	Dr G. de Villiers
VERWYSING REFERENCE	L.15/73/7
DATUM DATE	19 May 1986

Miss U. van Harmelen
2 Elizabeth Road
Cambridge
EAST LONDON
5247

Dear Miss van Harmelen

THE ORGANISATION AND MANAGEMENT OF INDEPENDENT STUDY TOPICS IN HIGH SCHOOL WITH SPECIAL REFERENCE TO GEOGRAPHY: M.ED. STUDY

1. With reference to your letter of 27 April 1986 the Department wishes to inform you that

2. Your application is granted subject to the following conditions.

2.1 No teacher/principal or head of teachers' centres is under any obligation to provide the information required, or to co-operate in the research in any other way.

2.2 No teacher, principal, head of teachers' centre, teachers' centre or school may be identifiable in any way, either from the research results or the questionnaire itself.

2.3 All arrangements in connection with your project must be undertaken by yourself.

2.4 No research or data collection may be carried out in schools during the fourth term.

2.5 The conditions 2.1 - 2.4 above must be quoted in full when you approach the principals of the schools or heads of teachers' centres involved.

APPENDIX 4D

CRITERIA FOR CLASSROOM RESEARCH BY TEACHERS

The essence of what I am advocating is the development of a teacher's professional expertise and judgement. Although many teachers are in broad agreement with this general aim, some are quite rightly concerned about how far involvement in classroom research activity will impinge upon their teaching and on their personal time. Concerns are also raised as to the utilitarian or practical value of classroom research. With these concerns in mind, let me suggest the following five principles for classroom research by teachers.

The first is that the teacher's primary job is to teach, and any research method should not interfere with or disrupt the teaching commitment. This rule of thumb should serve to quell immediate concerns, but it also points to certain ethical considerations. In some instances, it may be inevitable that the adoption of a new and barely internalized teaching strategy is initially less effective than the way one previously taught. Is it ethical, therefore, some may ask, for a teacher to subject students to an inferior performance when the original behaviour was perfectly adequate? These are questions which ultimately can only be answered by the individuals involved. For my part, I

am prepared to stand behind the teacher's judgement, particularly if the teachers involved are so concerned about improving the teaching and the learning experience of their students that they have broken the mould and are experimenting with new models. In becoming a teacher–researcher, the individual teacher is deliberately and consciously expanding his or her role to include a professional element. It is almost inconceivable then that he or she would do this and at the same time ignore the primacy of the teaching/learning act.

The second criterion is that the method of data collection must not be too demanding on the teacher's time. As a corollary, the teacher needs to be certain about the data collection technique before using it. The reasons for this are obvious. Teachers already consider themselves overworked and there are continuing demands for increased preparation and professional development time. It is naive to assume that the adoption of a research role will make no inroads on a teacher's private time. This can be reduced, however, by judicious use of specific data collection techniques, and the utilization of easily analysed diagnostic methods. For example, the tape recorder is widely regarded as a very useful tool for the classroom researcher. It is, however, extremely expensive to use both in terms of time and money. It takes approximately 50% longer to listen to a tape than to make it, and on top of that transcription (which is necessary if full use is to be made of the method) is both time consuming or expensive. Given this, it is advisable to use another method for broad spectrum diagnosis and reserve such intensive techniques for specific and finely focused enquiries. A taxonomy of data collection techniques is presented in chapter six, and in chapter seven a number of techniques for classroom observation are discussed.

The third criterion is perhaps the most contentious. The methodology employed must be reliable enough to allow teachers to formulate hypotheses confidently and develop strategies applicable to their classroom situation. Traditional researchers hold a poor opinion of action research. In many cases, that opinion is well founded particularly if it is based on individual pieces of research. It behoves all researchers, be they psycho-statisticians engaged in large

scale research or a primary teacher testing Piaget's theoretical hypotheses, to be rigorous about their methodology. It is no excuse at all to claim that rigour is unnecessary because the research is practitioner oriented, small scale, or used solely to improve individual practice. If a change in teaching strategy is to be made, then that decision needs to be based on reliable data. These issues form the substance of chapter eight.

The fourth criterion is that the research problem undertaken by the teacher should be one to which he or she is committed. Although this sounds self-evident, it is difficult enough, given all the pressures on a teacher's time, to sustain energy in a project even if it is intrinsically interesting and important to the teachers' professional activities. As a corollary, the problem must in fact be a problem; that is, the problem must be capable of solution, else by definition it is not a problem. If a teacher chooses a topic that is too complex or amorphous then frustration and disillusionment will soon set in.

The fifth criterion refers to the need for teacher–researchers to pay close attention to the ethical procedures surrounding their work. Ethical standards for classroom researchers have been worked out over the past decade by researchers associated with the Centre for Applied Research in Education (e.g. Macdonald and Walker, 1974 Simons 1982). A summary of ethical procedures for teacher–researchers is found in Appendix B.

In the chapters that follow, these criteria will be dealt with in more detail. In the next chapter, problem formation and the ways to initiate classroom research projects are discussed.

Commentary

In this chapter, I have discussed and critiqued the concept of educational action research. The importance of action research is not to be underestimated, because it provides teachers with a legitimate and more appropriate alternative to traditional research designs. And in its present form, it also provides a guide to action. We must, however, be aware of the problems associated with too prescriptive

(Hopkins, 1985 pp 41-43)

APPENDIX 6A

SCHOOL TRAIL

THE SCHOOL TRAIL - TEACHERS INTRODUCTION

A. The school trail, is any trail around any school, no matter how large or how small, designed to develop a knowledge about field work especially for the younger pupils in the High Schools.

AIMS: The aims of such a trail are as far as the teacher is concerned:

1. To train the Std. 6 and 7 pupils in the arts of field work.
2. To prepare them for more sophisticated field excursions either later in the std. 6 and 7 year or in the Senior classes.
3. To allow them to develop, in a practical manner, the skills they learn in the classroom.
4. To enable them to put their theoretical knowledge into practice.
5. To teach them simple problem solving with regard to Geography and the environment.
6. To teach them team work and the value of team work.
7. To teach them responsibility towards their team and to learn to work without constant close quarters supervision.
8. To enable them to develop leadership qualities.
9. To develop within the pupil a sense of the environment and a sense of responsibility towards the environment.
10. To make the pupils conscious of the value of Geography as a discipline.

B. ADVANTAGES AND USES OF THE SCHOOL TRAIL

The school trail as a field-work exercise has many advantages.

1. It is easy to design.
2. Does not necessitate taking the pupils away from the school with all its attendant hassles.
3. Can be done during class periods.
4. Selectively can be practiced as only those sections which apply can be used at a time.

5. One class at a time does the work and this makes control and organization easier.
6. As much or as little time as required can be spent on the trail.
7. It can be adapted to suit different age groups or levels of ability and can be as complex or as simple as is desired.
8. It lends itself to a great deal of follow-up work which can form the basis of year marks, either as separate exercises or as a full scale project.

The School Trail can be utilized in a variety of ways:

METHOD 1

Using the trail to introduce different sections of the syllabus to the pupils.

a) Where the trail is used for this purpose, sections of the trail are chosen, a period is spent in the field and follow up work is done.

b) At the same time a number of practical aspects are covered, which will both allow for class discussion and practical application of skills.

c) Where this method is used the trail could stretch across as much as 2 terms (where 2 lessons a week are allocated for the subject).

d) When the work is completed a project can be done which incorporates both the practical aspects of the trail and the theoretical work done in the classroom.

METHOD 2

Using the trail as revision of various sections. This method follows basically the same pattern as in 1, except that sections are selected after the theoretical work has been done.

METHOD 3

Using the trail as a sing field-work assignment after all the Geomorphology, mapwork and natural regions have been taught.

a) Where this method is used the preparation and organization of the field-trip follows much the same lines as for any field excursion.

b) Class periods can still, however, be used and it would take about 6 periods to complete.

c) The follow-up work would again take the same format as for any the field work excursion.

d) The project or follow-up exercises would then be done as for any project of this nature.

METHOD 4

Use as a simplified introduction to the year's work.

In this case the trail would be presented to the pupils right at the start of the year, and they would be given 4 or 5 periods in the field.

A project could then be set. The trail used in this way is a useful way to get to know the pupils abilities and weaknesses right from the start.

A. The trail covers the following areas:

1. The "waste-land" next to the school hockey field.
2. The Hockey field.
3. The netball field.
4. The swimming bath.
5. Tennis courts.
6. The compost heap.
7. The music rooms area.
8. The weather camp.
9. The shrubbery.
10. A general view of the school.

B. You will need the following:

1. Clipboard and paper, pencil and rubber.
2. Small plastic sample bags with sticky labels.
3. Old tape measure.
4. 2 metre sticks per group.
5. 1 clinometer per group.
6. 2 compasses per group.
7. Soil test kit.
8. Apparatus for trampling experiment in the Biology lab.
9. Small digging tool.
10. "Homemade dumpy-level".
11. Maths set.
12. String.
13. A pair of scissors.

AIMS

i) Train you to observe.

ii) Teach you to solve everyday practical geographical problems.

iii) Teach you to apply skills you have learnt in the classroom to reality.

iv) Teach you to apply your theoretical knowledge to the real situation.

v) Teach you that Geography is an integral part of an everyday lives and not simply a textbook subject.

1. The "waste-land" area

1. a) Are the trees in this area indigenous or exotic?

b) Are they evergreen and deciduous?

c) Identify these trees.

d) Take leaf samples from the trees and press them for mounting later on.

2. Notice the vegetation differences between the school hockey field and the embankment area.

a) Account for the differences.

i) In the grass types.

ii) For the differences in the variety of vegetation.

b) Roughly mark off a square metre of ground at the base of the filter beds and collect plant samples from this area. Make sure that you get a small sample of each plant in your square metre. Place these in a plastic bag and label.

NB i) Do not break-off the samples - cut them.

ii) Be very careful not to break plants or damage the roots.

REMEMBER A GEOGRAPHER IS ALSO A NATURE CONSERVATIONIST.

iii) Press these samples for later identification and remember to describe each sample as to colour and texture as you do with the tree leaves before pressing, attempt also to identify as many as possible.

iv) Describe any adaptations these plants have made to suit their environment.

v) Also take a SOIL SAMPLE of this area.

c) Consider all the vegetation types in this area and :

i) Describe the seed dispersal methods which are noticeable in the area.

ii) Sketch the seeds/or collect as many as you can.

iii) Discuss any details you may have noticed with regard to either plan successions or to competition for light and air.

d) What is the function, if any, of these trees?

2. The Hockey Field

1. Why is the drain necessary along the edge of the Hockey field?

2. Why are soil particles found in this drain?

3. Take note of the soil particles in the drain and compare their size and texture with that of the embankment where the trees are situated. Explain the reasons for these differences.

4. a) What erosion process is active on this embankment?

b) What has been done to slow the erosion process?

STANDARD 7 SCHOOL TRAIL

5. What is the function of the trees surrounding the Hockey field?

6. a) Identify these trees. Are they exotic or indigenous, deciduous or evergreen? Compare the leaves of these trees with those of the trees along the filter beds and note observations.

b) Study these trees and explain the following:

i) Why does fungus grow on the trunks?

ii) Which side of the trunks is covered most by the fungus?

---

iii) Is there any evidence of secondary growth on these trees? If so, what has caused it?

---

7. Take a soil sample from the embankment and label it.

8. Take note of the path that has formed on the embankment along the Netball fields and Hockey fields.

a) What has caused this path to form?

---

b) How could this affect erosion in the area?

---

c) How does this type of erosion develop on farms?

---

d) Take a soil sample from the path and label it. (See follow-up exercise later.)

3. <u>The Netball Fields and Swimming Bath</u>

1. Take note of the growth of weeds on the ground surface and Netball fields.

a) What do you notice regarding the PATTERN of weed growth?

---

b) Why has this pattern developed?

---

2. Take a soil sample of the Netball field (just a few grains off the top surface.)

3. Take note of the embankment and wall area next to the swimming bath area.

a) Note the deposit of soil in the drain along this area.

i) Where is there more deposition? Account for the differences.

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b) Measure the width of the top of the embankment, where the wall is, and where the natural grass area is.

1) Why is there such a difference in this width?

---

c) Study the grass embankment here and describe what miniature landform/s has/have developed here.

---

4. Study the concrete apron alongside the swimming bath and note the brown rusty patches on the concrete. Explain what has caused them and describe the weathering process which is active here.

---

5. What other evidences of weathering are there on the wall of the swimming bath? Describe the processes.

---

6. What type of rock is the brick of which the wall is made?

---

7. Go into the swimming bath enclosure. Note the wavelets which have formed on the surface of the water.

i) In which direction are they moving? ---

ii) Where are they largest and why?

---

4. <u>The Tennis Courts</u>

1. What evidences are there of weathering on the courts?

---

2. What other factors are involved in the break-up of the surfaces of the courts?

---

5. <u>The Compost Heap</u>

The compost heap may be considered to be an ecosystem.

1. What is an ecosystem?

2. Which elements are associated with the maintenance of this ecosystem?

3. Describe the process which is occurring here.

4. Compare the material on the street side of the compost heap with that of the pool side. Describe what you notice here.

5. Take a sample of the material on the pool side.

6. <u>The Music Rooms Area</u>

1. Explain why fungus growth occurs on the roof here.

2. Which side is most covered with fungus? Why?

3. Move to the school side of the Music Rooms, and take note of the effect of the prefab on the vegetation. Describe what has happened here.

4. Note the appearance of fungus underneath the prefab. Explain why it grows here.

5. Move to the weather camp. Why has the camp been erected here?

6. Note the vegetation on the top of the drainpipe. Give TWO reasons for its appearance here and explain why it is able to grow in the drainpipe.

7. The Shrubbery

1. Take leaf samples from the plants and trees in the shrubbery (be careful not to break branches - just one leaf.) (Follow-up exercises later.)

2. Write a note on the different plant levels here and compare this area to an equatorial forest area. Explain the effect of these different levels with regard to competition for sunlight.

3. Why is ground cover absent under some of the plants?

4. How did the miniature alluvial fan develop at the base of the slope here?

8. General

1. Take note of the driveway in the front of the school. What is causing the asphalt (tar) surface to break up?

2. Take note of the slope from the weather camp to the school gate.

a) Calculate the gradient of this slope by doing a gradient exercise.

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b) What effect will this slope have on the water draining off the driveway rain and what consequences can this have?

----

3. Study the school building and describe which side shows signs of weathering. Explain the reasons for your findings.

----

4. What evidence, other that the above, are there of prevailing winds in the school grounds?

APPENDIX 6B

FIELDWORK EXAMPLES PRIOR TO 1986

STD 7 : HORSESHOE VALLEY ASSIGNMENT

AIM: The aim of this assignment is to make a Biogeographical analysis of a riverine ecosystem and the adjacent slopes. To this end the following objectives are important:-

(i) To analyse the valley slopes, relating the biotic and abiotic components to the broader ecosystem and to assess the effect of the valley slope processes on the riverine ecosystem.

(ii) To analyse the river valley floor and the river in order to assess the stability of the ecosystem.

(iii) To analyse the effect of man's activities in the area to ascertain whether these activities are influencing the ecosystem of the area and if so to what extent.

GENERAL

1. The assignment, this year, may take the form of EITHER

   a) a written report

   OR

   b) a written report with a poster campaign to make the public aware of the dangers in this area related to the ecology

   OR

   c) a scientific investigation relating to a specific aspect of the area and its problems and solutions.

The written section can either be done in your nature study books or can be done in a looseleaf folder. If a poster campaign is to be undertaken there must be no less than three posters and the report will naturally be less detailed. A scientific investigation will need to have a written section, with possibly a model or some other visual evidence of the study undertaken.

2. Marks will be allocated as follows:

   a) Content 40: Here we will be looking for depth of detail and understanding of the material presented.

   b) Illustrations 30: Marks will be awarded for the relevance and visual impact of the illustrative material. The way in which the illustrations are presented will naturally depend on the format chosen. It must be remembered though that

      i) NO pictures will be allowed from books or magazines

      ii) Graphs, tables, diagrams are extremely valuable illustrative material

      iii) Photographs, if used, must have headings and captions and must not be merely decorative

      iv) Labelling, framing, etc. must be done neatly and CORRECTLY.

   c) Innovation 10 - 20: Here we are looking for original ideas and original scientific investigations and results.

   d) Language and presentation: 10 - 20: WATCH spelling, grammar, etc.

3. The format you choose will obviously affect the way in which the project is presented, but whichever format is chosen the following aspects must be included in the written section:

   i) A TITLE page
   ii) Acknowledgements (behind the title page)
   iii) A table of contents)
   iv) A list of illustrations) on separate pages

   v)/ ....

v) A proper introduction which sets out your aims.
vi) A proper conclusion which draws together the threads of the assignment.
vii) A bibliography.

4. N.B. NO extension of time will be given. The due date is 20 AUGUST.

GUIDELINES TO HELP YOU

The following guidelines are suggestions and need not be followed absolutely, but it must be stressed that the assignment requires thought, hard work and application.

1. Valley Slope Analysis:

This should include

a) a description and explanation of the two slopes studied with regard to

i) aspect, gradient, ~~height above sea-level~~
ii) vegetation and soil - here an analysis will be made with regard to vegetation types, variety, density, height and also soils with regard to colour, texture and moisture
iii) the geology of the area - rock types and weathering processes

b) an analysis of the processes active on the slope:

i) mass wasting
ii) work of water
iii) man's influence

c) ~~a brief look at the tectonic history of the area.~~

In this section you will include (i) photographs, (ii) gradient exercises and (iii) graphs.

2. The River Analysis and Flood Plain:

Here you will need to

a) describe the type of river
b) describe the valley floor and the flood plain
c) describe the geology
d) analyse the vegetation and its role with regard to the drainage of the area, the way it provides a buffer zone between the river and the slopes, etc.
e) analyse the erosive action of the river and determine the effectiveness of the river as an agent of erosion.
f) look at the processes related to the stage of river development
g) analyse the biotic and abiotic components of the river ecosystem
h) analyse the effect of man on the river: the Nahoon Dam, the weir, the causeway, the pumping of water, etc.

In this section you will include photographs, diagrams, graphs and the water watch analysis.

3. The effect of man in the area:

Here you will need to examine the possible effect of the settlement type, the roads, the dump, footpaths, and consider how and to what extent they affect the area.

4./ ....

4. Results:

Are there problems in the area? What are they? What possible solutions can be found?

N.B. If you are doing a scientific investigation, some of the following aspects may interest you:

i) The flow pattern and its effect on erosion and the effectiveness of the river

ii) Man and the river with regard to flow pattern and the ecosystem and river effectiveness

iii) The effect of slope steeping on the drainage and flow pattern of the river.

iv) The effect of the geology on the shape and formation of the Horseshoe Valley.

N.B. If you do a poster campaign with the report you will only need to describe the area and include the relevant graphs, etc. (perhaps on the posters).

i) One poster should create an awareness impact

ii) One poster should inform of the problem

iii) One poster should offer solutions.

- o0o -

STD 10 HOGSBACK EXPEDITION

SATURDAY

Aim:

(i) To study the effects of microclimatology on a mountain area and to generate a better understanding of the inter-relationship between the physical aspects of the area and man's use of the land's natural phenomena.

(ii) To consolidate the theoretical knowledge of maps and to relate particular examples to the actual topographical features.

(iii) To make a specific study of the morphology of a Hamlet.

Equipment required:

General

Each group is to be equipped with the following:
Clinometer, compass, camera.

Each girl to have

Haversack, clipboard, pencil, ruler, paper, sample bags (small plastic); also water bottle, mac and jersey; map.

Questionnaire and instructions:

A. Map of the area:

1. What is the name of the map (1:50 000) that covers the particular section which is being studied? Give its date of surveying and publication. What does this immediately warn you of?
2. What is the contour interval?
3. Take note of any new developments which have taken place since the publication of the topographical sheet? List as many as you can from the various vantage points.
4. Take note of the position of any trig beacons we pass and indicate them on your map.
5. Take note of the various vegetation and land use types and indicate them on the map (sketch) so that you may correlate them with the 1:50 000.
6. Take note of altitude readings on the map from the various vantage points so that you may do a gradient calculation later of the route which was followed. Substantiate them with slope readings.
7. Mark the route followed on your map.

B. Geology and Geomorphology (General):

1. What types of rock are found in the area? Take a few small samples. Describe their colour, both when weathered and fresh and explain the weathering processes which have been active.
2. Take note of selective weathering, if any, and account for it.
3. Take note of the pebble sizes in the various streams and account for the weathering which has occurred along the stream beds and account for the size of the bed load.
4. What evidence is there of mass wasting on the slopes? Describe it and account for the phenomenon.
5. Do at least three random soil profile studies along the route. Take note of the soil horizons, different colours and depths. Account for differences. Do these along the top road, along the central zone and at the Hamlet.
6. What evidence is there of a dome, free face, inclined strata, columnar weathering? Take note of where these exist and account for their presence and formation.

7. Describe and explain the development of the waterfall at Kettlespout.

8. Do a sketch of the Hog from Hobbiton showing the various slope forms which are evident.

9. What evidence is there of soil erosion? If any, to what can it be related?

10. Take note of the drainage of the area through which we pass. Indicate the streams on the map, also indicate direction of flow and flow speed. Study the drainage of the Tyumie River and describe the density of drainage.

11. Is there evidence of seepage at any place along the route? Can you account for it?

C. Vegetation:

1. Study the soil and vegetation at selected spots along the route and answer the following:

   (a) What relationship is there between the soil type and depth and the vegetation?

   (b) What adaptations to the microclimate have been made by the natural vegetation?

2. Describe the plant communities which you note.

3. Describe the ecosystem of the sponge area.

4. Comment on the situation and arrangement of the afforested areas. Describe the forestry activities of the region.

5. Take note of the exotic plants of the area. Is there any indication that these could become a problem later on?

6. Why do mosses and lichens grow on trees, etc. where they do?

D. The Hamlet:

1. Draw a sketch map of the area between The Arminel and the Hogsback Inn.

2. Indicate the settlements along the route.

3. Indicate the structures along this route which are used for purposes other than private residences.

4. Comment on the position, size and appearance of the above.

5. Write a brief report on the Arminel and Hogsback Inn as resorts.

6. What do you consider to be the function of this Hamlet.

7. Briefly describe the settlement pattern.

8. What factor/factors do you consider to have influenced the pattern?

. . . .

WORKSHEET 4. SOIL STUDY

1. A fresh pit has been dug, and this should expose the soil horizons and enable a thorough study to be made.

2. EQUIPMENT

Tape
Camera
Hydrochloric acid.
pH test kit
Soil sampling bags
Clipboards, etc.

3. PROFILE DESCRIPTION

(i) Site description:

(a) location
(b) topography and slope
(c) drainage
(d) present material
(e) climate
(f) vegetation and/or land use

(ii) Measurements of Horizons and Boundaries:

Depth and thickness

Transition	Sharp	- almost a line
	Distinct	- less than 2,5 cm
	Indistinct	- 2,5 - 7,5 cm
	Diffuse	- greater than 7,5 cm.

(iii) Soil colour:

Uniform? Speckled? Mottled?

Pattern of mottling recorded thus - abundance, size, contrast.

(iv) Soil Texture:

Sand - individual grains can be seen or felt.
Silt - soapy or slippery feel
Clay - lumpy or sticky when wet.
Lots of humus gives a greasy feel to the soil. Sandy soils are heavier than clay soils of equal amount.

(v) Soil Consistence:

Refers to the general handling of the soil and results from the combined effect of structure, texture, organic matter, porosity, moisture content, mineral bases. Gives indication of drainage and leeching.

Sticky? -

Plastic? - will form a roll when rubbed between thumb and forefinger.

Friable? - crush and cohere again.

Soft? - breaks up easily and will not cohere.

Loose? - non-coherent.

Firm? -

Compact? - good consistency, digs cleanly.

Hard? - resistant to pressure.

Very hard? very resistant.

The sticky and plastic soils are poorly drained often, while hard and very hard soils are over dry.

(vi)/ ......

(vi) Cementation of Soil Material:

Weakly cemented - can easily be broken up.

Strongly cemented - cannot be broken by hand but with a hammer.

Indurated - extremely hard. Indication here of clay content and calcium carbonate or oxide of iron.

(vii) Soil Structure:

Refers to the massing of primary soil particles whether mineral or organic.
Can be divided into:
Platelike
Prismlike
Blocky
Spheroidal.

(viii) Soil pH:

To test the balance regarding acidity and alkalinity.

(ix) Soil Carbonates:

See Table attached.

FOLLOW UP EXERCISES:

Correlate notes which have been taken in the field to assess the soil classification.
Drainage
Fertility, etc.

APPENDIX 7A

STD 7 WORKSHEET I986
("Ecocide")

"ECOCIDE"

N.B. Read the following instructions carefully before completing this study called "ECOCIDE".

1. Attempt all the questions.
2. Complete the answers in your independent study workbooks.
3. Before answering the questions, read through the worksheet and UNDERLINE (IN RED) any words with which you are unfamiliar.

* * *

SECTION A

This section refers to the attached diagrams 1 and 2. Diagram 1 shows a farm where farming malpractices have caused accelerated soil erosion. Diagram 2 shows how these poor farming practices can be corrected and how the soil, as an element of the Biosphere, can be rejuvenated after destruction.

1. Identify the farming malpractices that are shown on diagram 1. (6)

2. By comparing the two diagrams, show how these malpractices have been corrected on the second diagram. Use the key given and match this with the arrows on the diagram. (6)

SECTION B

This section refers to the attached diagrams 3 and 4. Diagram 3 represents a rural scene, while diagram 4 depicts the same area once it has been urbanized.

3. Study Diagram 3 and identify the SIX elements which make up the biosphere as shown by this picture. (6)

4. Explain how these six elements could be linked together to form an eco-system. (9)

5. In the second diagram a number of factors are polluting the biosphere.

   (a) Name THREE ways in which the area is being polluted. (3)

   (b) Explain how each of these forms of pollution can upset the ecological balance of this ecosystem by destroying certain elements of the biosphere. (9)

   (c) Describe how, you feel, this destruction is affecting the quality of life of the human inhabitants of the area shown.

   (d) Choose any ONE of the causes of pollution and explain how you would eradicate it.

SECTION C

6. Give a detailed description of the experiment you have done to test the following HYPOTHESIS and assumptions.

   HYPOTHESIS: "Soils which have been compacted are more prone to erosion than soils in well grassed or cultivated areas."

   ASSUMPTIONS: (1) Compacted soils retard the free passage of water in the soil causing rapid saturation.

(2)/ ....

(2) Compacted soils therefore have a higher surface run-off of water than soils in well-grassed areas or in cultivated areas.

Show your aim, indicate apparatus, method, observations made and the conclusion reached. Also include the graph you made to illustrate the results.

10 + 8 = (18)

7. Using the above experiment, explain to a farmer why it is wrong to allow his cattle to return to the cattle kraal each night after grazing in the veld. Suggest an alternative solution.

SECTION D

Explain why YOU think that this worksheet has the title "ECOCIDE".

DIAGRAM 3

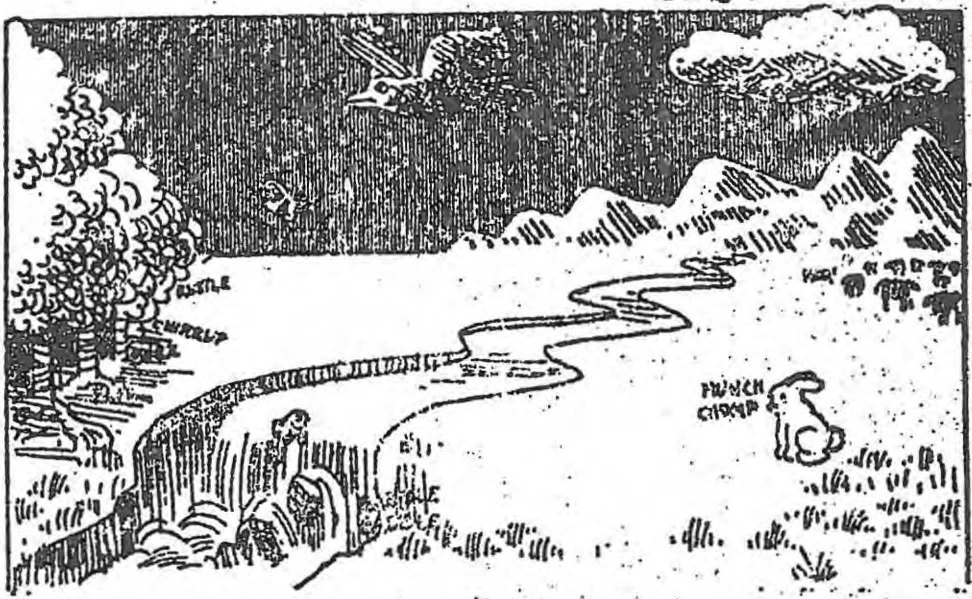


DIAGRAM 4

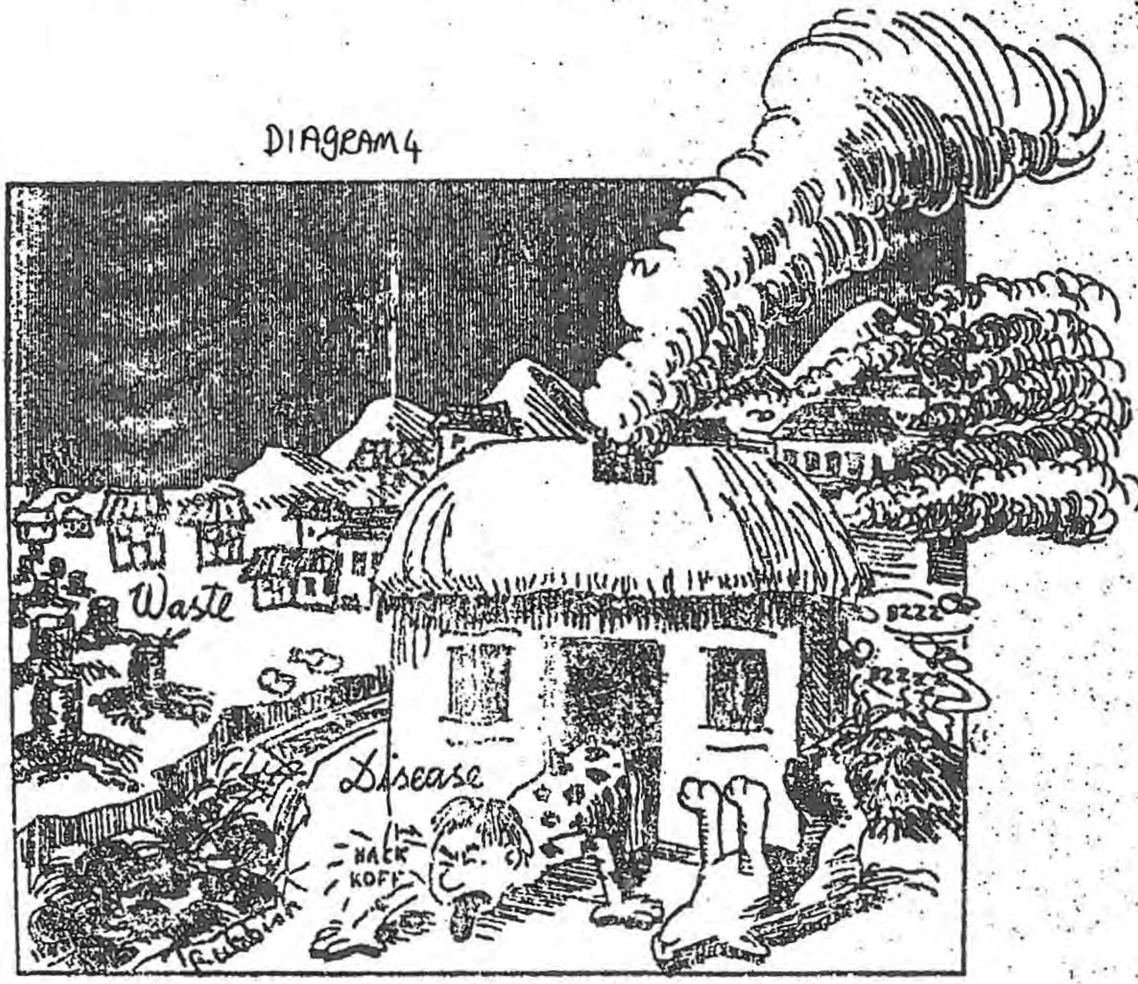
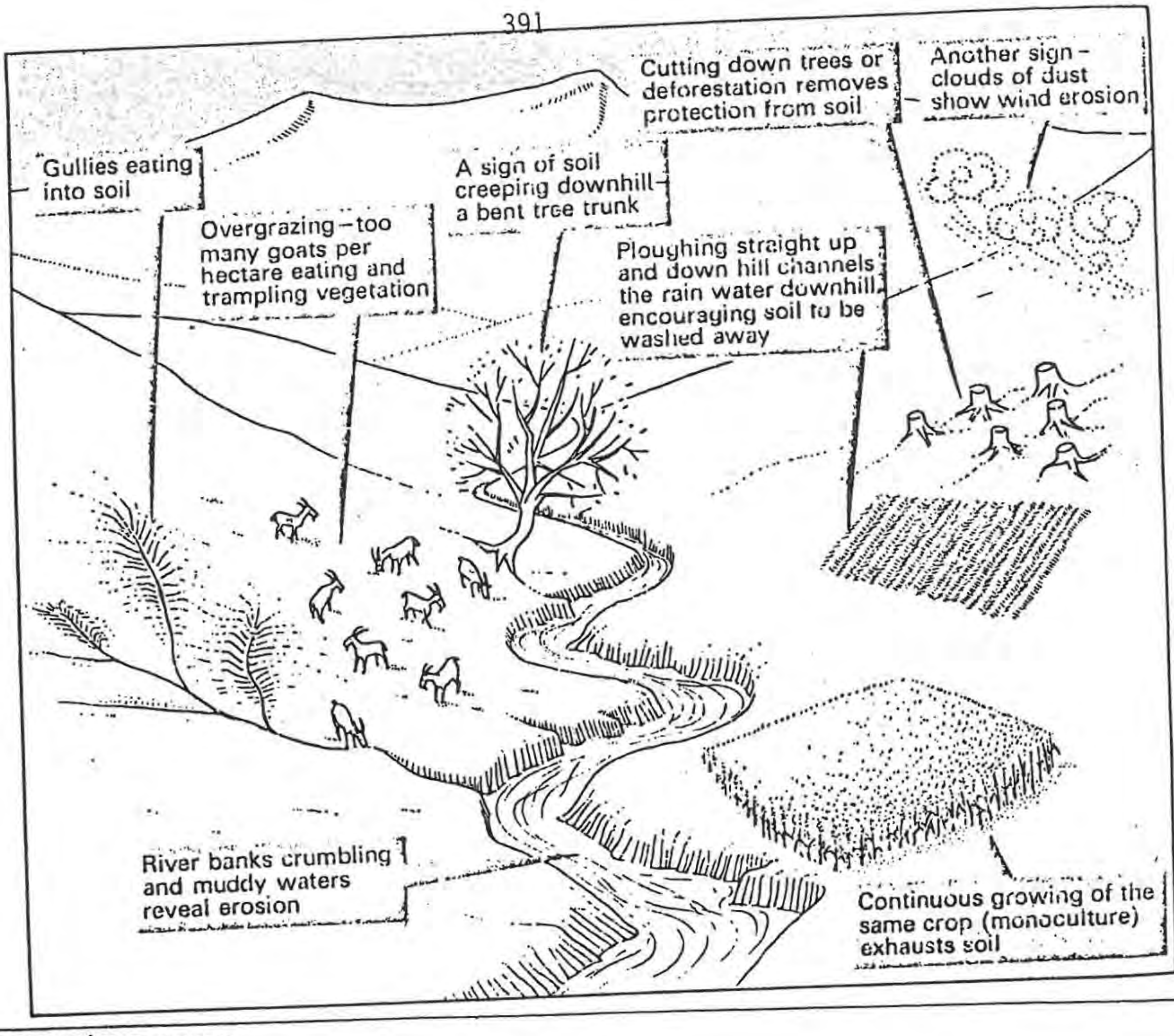


DIAGRAM 1



…oil conservation measures

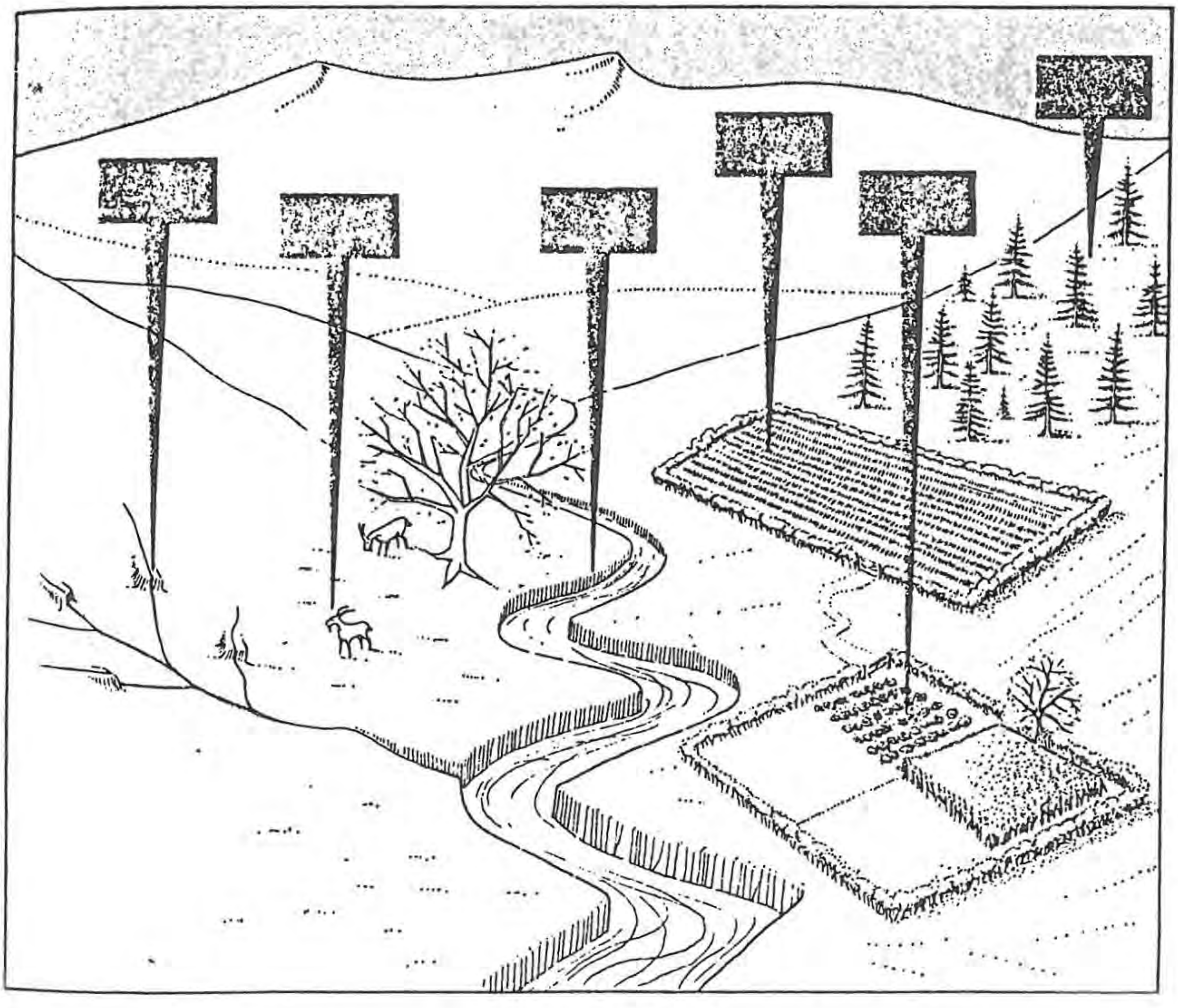


DIAGRAM 2.

Key
A Crop rotation
B Controlled grazing
C Reforestation
D Small earth dams
E Reinforced river ba…
F Contour ploughing

APPENDIX 7B

STD 9 WORKSHEET I986
"RAIN: EXCEPTION RATHER THAN THE RULE"

STANDARD 9 CLIMATOLOGY ASSIGNMENT

A. INTRODUCTION

Rain is a subject which concerns every South African to a greater or lesser extent. "Sunny South Africa," a slogan which sells our country abroad, has a rather more sinister connotation when considering the implication of drought it carries.

The Republic is characterised by a rainfall that is not only generally low, with 475 mm being the coverage for the country as a whole, but it is also erratic and unevenly distributed. Added to this is the high evaporation rate because most of the rain falls in summer when the land surface is hot, which further reduces the effectiveness of our rather meagre rainfall. Each year the Hendrik Verwoerd Dam, a major storage dam, loses enough water through evaporation to supply 10 cities the size of Port Elizabeth with water.

In this assignment you will be introduced to some of the aspects of rain which pre-occupy not only meteorologists, but a vast sector of the population from farmers to industrialists, from conservationists to town planners. Factors such as the weather patterns and systems that may bring rain, the vagaries of the rainfall and the implications of these vagaries will be introduced here.

B. INSTRUCTIONS

1. When reading through this material would you PLEASE UNDERLINE IN RED any words with which you are unfamiliar.
2. Be aware of your use of language when answering questions - sloppy language use detracts from your answers.
3. Take care with the presentation of diagrams, etc.

C. RAINFALL AND THE SYNOPTIC MAP

This section applies to the two synoptic maps that have been supplied. Map 1 depicts conditions as they were summarised for 14h00 on 11-07-1977 and is therefore a winter map. Map 2 depicts conditions on 20-11-1981, and therefore this is a summer map.

1. (a) i. Identify the phenomena marked from 1 - 3 on the two synoptic maps. (3)
   ii. With which weather system is 1 associated? (2)
   iii. Name the High Pressure System which dominates the interior of Southern Africa on both the maps. (1)

   (b) What evidence is there on EACH of the synoptic maps to substantiate that 1 is depicting winter conditions, while 2 is depicting conditions common to summer? (8)

   (c) With the aid of clear diagrams, indicate the situation of the upper air inversion layer as it would appear on each of the maps, then:
   i. Explain how this inversion layer is affecting the circulation of air in each case. (4)
   ii. Explain how this circulation of air will influence the rainfall over the Republic. (4)
   iii. HG ONLY: Consider your previous answers and then explain the apparent anomaly of cloud cover along the Mozambique Coast and in the Mozambique Channel. (4)

D. Carefully study the feature No. 1 on synoptic map 1. Then answer the questions which follow:

2. Explain the effect this system is having on the P.G. and the wind speed of the Republic south of the Transvaal. (4)
3. HG ONLY: Account for the absence of a warm front in system No. 1. (4)
4. HG ONLY: Explain why such a system (No. 1) does not bring GENERAL rain to all parts of the country but confines it to the SW Cape and the adjacent coastline. (6)
   (A study of the rainfall figures of Port Nolloth and Cape Town will help to confirm this factor!)
5. On map 1, Port Elizabeth is experiencing a Berg wind. From the map, quote evidence to substantiate this statement. (4)
6. Describe the link between Berg winds and feature No. 1. (4)

E. The following section refers particularly to Map 2.

1. Thunderstorms are recorded at Bulawayo and are likely to develop east of the line marked 3, and in the areas of Lesotho. For each of these three areas, explain the TYPE of thunderstorm which will develop. (3)
2. Explain the EXTENSIVE cloud cover over the Republic as shown on the map. (3)
3. HG ONLY: Cloud cover in the SW Cape is an anomalous situation at this time of year. Explain the presence of cloud cover here. (4)
4. HG ONLY: Consider the following 3 areas: Bulawayo, Lesotho, Kimberley, by studying the conditions depicted on the map.
   (a) Which of these three places would have the greatest intensity of thunderstorm should they develop on this day? (2)
   (b) Motivate your answer in 1 by applying your theoretical knowledge of thunderstorms to the actual conditions depicted. (6)

HG /80/

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SECTION D : RAINFALL - PATTERNS AND VAGARIES

This section applies to the three sets of rainfall figures you have been given and to the two synoptic maps.

(a) 1. "East London has a summer rainfall maximum, Cape Town has a winter rainfall maximum."
   Study the figures and quote evidence to either prove or disprove this hypothesis.
   2. What other factor or factors can be used to test this statement?

(b) If you wish to visit Cape Town for sea, sun and fun, which month of the year would you choose? Explain by quoting evidence from the figures provided why you would visit at this time.

(c) "Good rain in the South West Cape means dry conditions for the eastern half of the country."
   Do the figures you have substantiate this hypothesis? Explain.

(d) "Rainfall in South Africa has a cyclic pattern."
   Study the figures you have and explain your findings in this respect.

(e) Compare the figures you have for Port Nolloth with those of East London.
   1. In spite of the uniformly low rainfall of Port Nolloth, can it be said that this place has a "rainy season"? Motivate your answer.

2. The differences in the amount of rainfall between these two towns is dramatic. Explain the factors that are responsible for this.

(f) These questions pertain to the figures for East London.

1. What is generally the wettest month in East London?
2. What is generally the driest month in East London?
3. In which month and year was the HIGHEST rainfall recorded in East London?
4. In which month and year was the LOWEST rainfall recorded?
5. Using these figures from 1970 - 1986, plot a graph to compare the rainfall of October with that of March and July.

NOTE: Mark allocation for Section D will be based on the following:

Content: logic, clarity and aptness to the question

Language: clarity, grammar and spelling, degree of competence in using geographically correct language

Form: neatness, illustrative technique and results, originality and aptness.

A scale from 1 - 5 will be used.

1 means VERY POOR
3 means AVERAGE
5 means EXCELLENT

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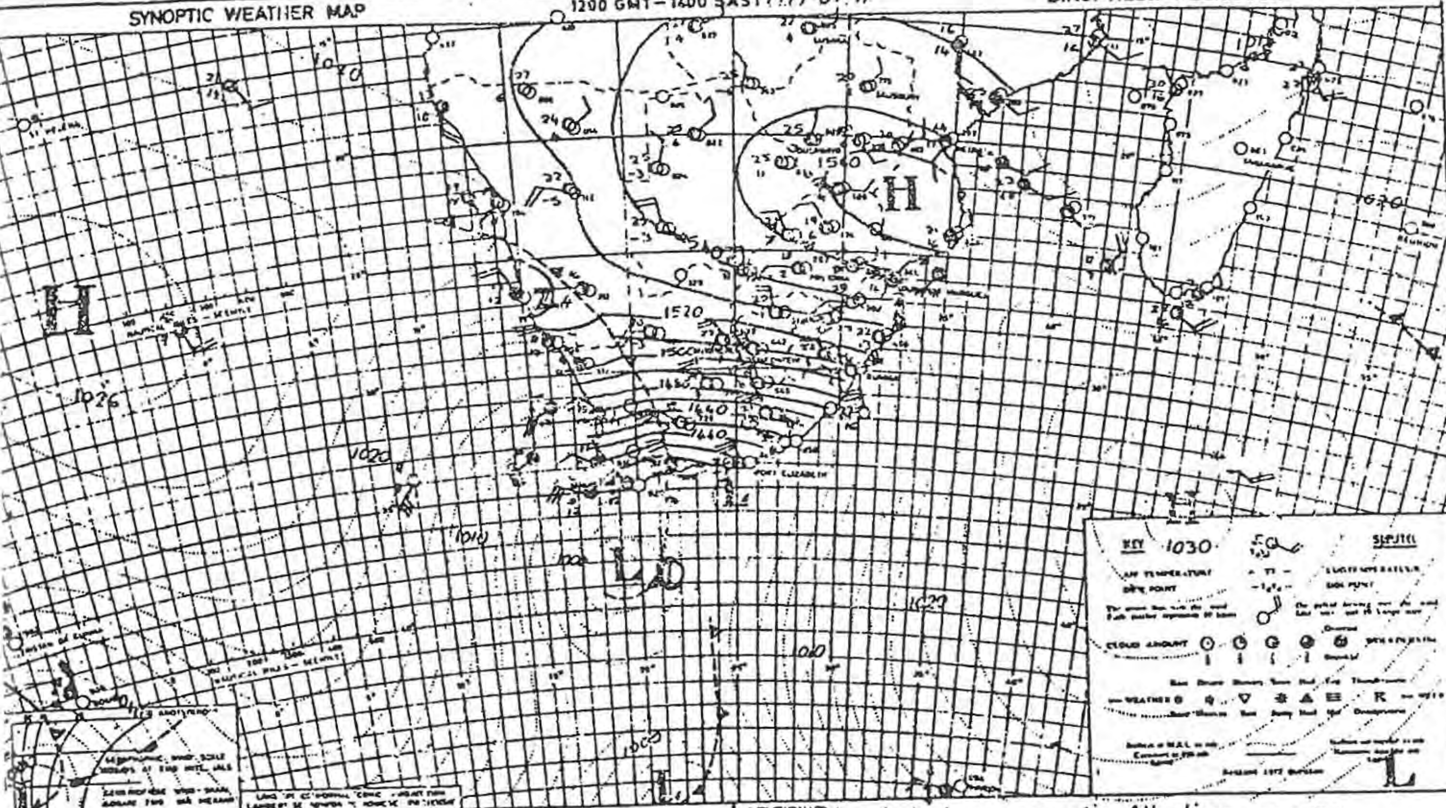
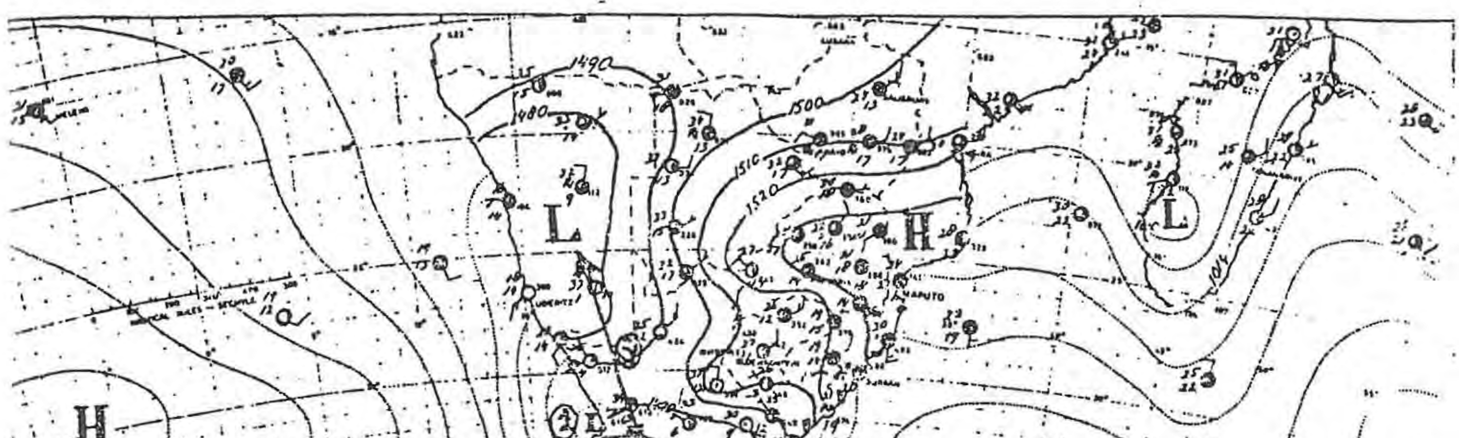
SYNOPTIC WEATHER MAP — 1200 GMT – 1400 SAST 1977-07-11 — SINOPTIESE WEERKAART



INFERENCE The strong high over the Atlantic ocean is moving rapidly eastwards. Cold air will spread over most parts of the country overnight and during tomorrow, with showers and snowfalls over the southern half of the Cape Province.

AFLEIDING Die sterk hoog oor die Atlantiese oceaan beweeg vinnig ooswaarts. Koue lug sal oornag en môre oor die meeste dele van die land instoot met buie en sneeuneerslae oor die suidelike helfte van die Kaapprovinsie.



FERENCE The low near Cape Town will move towards Port Elizabeth. The trough over the interior will also move eastwards, and scattered thundershowers can be expected east of this trough. The cold front will reach Cape Town tomorrow night.

AFLEIDING Die laedruk stelsel by Kaapstad sal ooswaarts beweeg na Port Elizabeth. Die trog oor die binneland sal ook ooswaarts beweeg, en verspreide donderbuie kan oos van hierdie trog verwag word. Die koue front sal Kaapstad more nag bereik.

APPENDIX 7C

"COMETS": ASSIGNMENT
STD 7, I986

INDEPENDENT STUDY: HALLEY'S COMET

1. Write a report on one of the topics listed below. It is suggested that your report

   (a) be between 480 - 720 words (2 or 3 foolscap pages)
   (b) contain some diagrammatic or graphic illustrations.

2. The following references may be used:

   (a) Resource material provided in the "jackdaws" in the Library.
   (b) Your own notes and material.
   (c) The videos in the School Library.
   (d) The encyclopaedias and other books in both the School Library and Public Libraries.
   (e) Newspaper clippings which can be photocopied at the Central City Library. Dates are listed for the days on which articles on Halley's Comet, etc. appeared in the Daily Dispatch.

   1985: 22 January, 11 April, 25 April, 21 May, 19 July, 8 August, 18 September, 30 September, 8 October, 10 October, 13 November, 14 November, 23 November, 29 November, 5 December, 21 December, 31 December.

   1986: 15 January, 5 February, 8 February, 25 February (4 articles in this edition), 1 March, 7 March, 10 March, 15 March.

* * *

TOPICS

1. Who was Halley?
   A biographical sketch of Halley, the man, his times and the astronomical instruments used and his link with the comet.

2. Comet Spotters
   Comets and the people who have found them and named them. Plus a short discussion on each of the famous comets with respect to their history, past, present and future.

3. The History of Halley's Comet
   Trace its history through time and discuss its future.

4. Halley, one of many comets
   Explain what a comet is; look at the orbits of comets and what happens to them.

5. Halley's comet and the myths and legends that surround it
   Look at some of the myths which surround the appearance of this comet.

6. Famous Historical events that co-incided with the appearance of Halley's Comet

7. Halley's Comet 1986
   Describe the appearance of this comet this year. When, where, how bright, etc.

8. Comets and Meteorites
   Describe each and explain whether there is any link.

9. Halley's Comet - a personal diary
   What special efforts have you made to spot this comet? How successful have you been?

10. A Journey through space with Halley's Comet
    Trace its pattern through space and describe some of the constellations of stars, the storms and the dangers encountered by a comet.

11. Instruments and Observatories
    Their role in spotting comets and enlarging man's knowledge of the universe.

12. Halley's Comet, 1986 and 2061
    A look at the world visited by Halley's Comet this year and a projection of the world in 2061 when next you see the comet

APPENDIX 7D

STD 7 FIELD REPORT I986

STD 7 NAHOON BEACH STUDY

FOLLOW-UP PROJECT

GENERAL

1. The follow-up project of the above field trip must be completed in the Workbook and handed in on 1 August.

2. Set out your work neatly and avoid cramped presentation. Make use of diagrams, graphs, sketches, photographs.

3. Include sand samples, vegetation samples, etc. but please note:

   a) Make absolutely sure that your soil sample is contained in a plastic container which will NOT leak sand. Do NOT use plastic surrounded by sticky tape.

   b) Vegetation samples must be correctly pressed and mounted.

4. All samples and photographs should be mounted, e.g. on coloured paper and/or framed. Do not forget the HEADING or captions which make them relevant to the text.

5. Diagrams must be properly labelled in black fineliner, framed and headed. Work neatly.

6. Your first page should contain the title of your assignment. Page 2 could be the Contents page. You may also have a photo or diagram.

7. Write only on the lined pages of the book and use the drawing pages for sketches, diagrams, samples, etc.

8. If you use any books, remember to include a Bibliography at the end of your work. Remember to note the title, author, publisher and year of publication.

9. Choose ONE of the following sections. Make use of the suggested headings and information.

(A) THE ROCK PLATFORM

1. Introduction
   Set out the aims of the excursion and your assignment.
   Describe the area studied and include your Field Sketch.

2. The Rock Platform
   a. Mention the size of the Rock platform and explain why so much of it was visible. (i.e. explain Spring Tides and draw a diagram showing Spring tides.)
   b. Briefly list the different regions found on a rocky shore.
   c. Explain how the rock platform was formed - diagrams.

3. The Rock Pools
   a. Give a brief description of your 3 chosen rock pools with regard to:
      - position e.g. Littorina.
      - types of creatures and seaweeds found in each pool.
      - depth and size of pool.
   b. Describe how the creatures in the pool have adapted to the conditions in the pools.
   c. Discuss the Food Chain and Ecosystem evident in a Rock Pool.
   d. Describe the effect of Man's activities in the area, e.g. litter.
   e. General - include anything you would like to discuss not included in the other sections.

(B) GEOMORPHOLOGY OF THE CLIFF AREA

1. Introduction - same as Question A, number 1.

2. The Rock Platform - same as Question A, number 2.

3. Weathering & erosion

   a. Describe all the types of weathering and erosion of the rocks evident in the vicinity of the cliff areas.
   b. Explain how each type of weathering occured.
   c. Describe the dolerite boulders in the Mermaid's Pool area and explain their characteristics.
   d. Explain how the Marine cave was formed.
   e. Include sketches, diagrams, photographs, samples.
   f. Describe the vegetation the cliff and mention how this has adapted to withstand the conditions.
   g. Describe the effect of man's activities in the area. e.g. litter, eroding a pathway etc.
   h. General - include anything you noted or saw or would like to discuss that is not included in the other sections.

(C) THE SAND DUNES, SANDY SHORE AND VEGETATION TYPES

1. Introduction - same as Question A, number 1.

2. Explain why so much of the beach was visible. i.e. explain Spring tides. Include diagrams.

3. Sandy Shore
   a. Describe Beach migration.
   b. Describe the types of creatures likely to be found on a sandy shore and mention ways in which they have adapted to the conditions found on the shore.

3. Sand Dunes
   a. Draw a Gradient Graph of the two sand dunes you measured.
   b. Describe how dunes are affected by wind.
   c. Compare the sand samples you found at the waters edge, the bottom of the dune and the top of the dune. You may do a sand drainage experiment if you wish. (The sand type will have some bearing on the vegetation type or creatures living in that sand.

4. Vegetation Types
   a. Describe the vegetation types found on: -the cliff, -the dunes, -the "baby" dunes.
   b. Explain how and why these plants have adapted to prevailing conditions.

5. Include sand samples, plant samples, photographs etc.

6. General - include anything you noted that is not included in the other sections. e.g. Man's invasion.

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APPENDIX 7E

STD 9 FIELD EXCURSION I986
(WORKSHEET)

STANDARD 9 CLARENDON HIGH SCHOOL FOR GIRLS GEOGRAPHY

EXCURSION TO COVE ROCK

MONDAY 21 JULY 1986

Parents and girls are kindly asked to note the following general instructions regarding the proposed Beach Excursion.

1. TIME: 8h15 - 14h00
2. VENUE: Cove Rock
3. TRANSPORT: The girls will travel by Municipal bus and will be returned to school by 14h00. No girls will be allowed to leave the bus before returning to school. We ask that the girls pay R1,50 towards the hire of the buses.
4. TEACHERS IN CHARGE: Miss Van Harmelen, Mrs Bergman, Mrs Donald
5. DRESS: Girls will be allowed to wear "civvies". Please ensure that you wear practical clothes - no jewellery or scarves.
   N.B. Wear sensible shoes, e.g. tackies. Slip-slops are not permitted.
6. EQUIPMENT:
   a) Each girl is to have her own
      - school lunch and something to drink
      - warm jersey
      - raincoat if the weather looks cloudy
      - shoulder bag or rucksack in which to carry equipment
      - clipboard, paper, pencil, rubber, pen
      - worksheet and information sheets
      - plastic bags and sticky labels
      - camera and film, if possible
   b) Each group is to have
      - clinometer
      - 2 metre sticks
      - string (to be used as a tape measure)
7. GENERAL:
   a) NO LITTERING will be permitted. Remember, Geographers are Conservationists!
   b) PLEASE do not collect living creatures - you might be instrumental in disturbing the delicate ecosystem!
   c) Girls will not be allowed to wander off alone.
   d) It must be remembered that field trips and the skills which are learned on these trips are all part of the syllabus and this is not a free day or a picnic.
   e) Girls are reminded that if they have sport or other commitments on Monday afternoon, they will be expected to attend practices or extra lessons. (N.B. Remember your sports kits, etc.)
8. BEHAVIOUR:
   Girls are to be on their best behaviour, both on the buses and at the beach. Remember you are the ambassadors of your school. No rowdiness or bad behaviour will be tolerated.
9. FOLLOW-UP PROJECT:
   The work done at the beach will be assembled in the form of an individual project which will count towards your Year Mark. These projects will be completed by 18 August.

J.V. Stuart-Watson

STD 9 GEOGRAPHY FIELD TRIP GENERAL WORKSHEET

Each girl is asked to complete this worksheet and ONE other.

What will you learn from this field trip and proposed project?

* to understand and appreciate the delicate ecosystem of the coastal area
* to consider waves as agents of marine erosion
* to understand the formation of landforms by marine erosion and deposition
* how to find the animals on the rocky shore and learn to identify them and explain their adaptations

A. THE TIDES

a) Today we are experiencing a Spring tide.

i) What is a Spring tide? ______________________

ii) How often do we have a spring tide? ______________________

iii) What causes a spring tide? ______________________

iv) Note the time: __________
Is it low or high at the moment? __________

B. THE ROCK PLATFORM

1. Measure the distance between the high water mark and the waves in the platform area. (Either measure it with a string or pace it out and measure it at home. Estimate seaward side.)

Length: ______________ Width: ______________ 401

2. Explain how this platform has been formed.

____

3. Zonation is an obvious feature of shore life. Draw a cross section of the platform and up onto the promontory dunes. Indicate where each zone is showing the dominant flora and fauna.

____

C. FIELD SKETCH

Climb carefully right onto the top of Cove Rock itself. (Carefully avoid the blow holes which have been fenced off.) Draw a field sketch of the area looking northwards.

a) i) Label all landforms clearly. (This need only be a quick sketch — it can be finished off neatly later for your field project.)

ii) You are a seagull flying over the area. Draw a map from the river mouth to the car park.

b) Which areas are being prograded and which are being retrograded? Label with an R or a P on your field sketch.

c) Cove Rock which you are standing on is a specific feature formed by marine deposition. With your back to the sea, try to identify it and say how it was formed.

d) Look around you for any signs of man's activities. List a few:

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e) List any bird life in the area.

---

f) With your back to the sea, determine the lie of the sand dunes. Which two winds predominate as evidenced by the dunes.

D. THE CLIFF AREA

1. What evidence is there to show that the whole headland or cliff area has been cut back?

---

2. Study the rock masses at the base of the cliff (if any).

a) Do you think the waves in this area are constructive or destructive?

---

b) Is there any evidence of mechanical and chemical weathering, e.g. honeycomb weathering? (How does this type of weathering take place?)

---

c) Explain what factor has caused the layered effect of the rocks (for this look from the promontory (see map) towards the Cove Rock itself.)

---

d) Measure the normal sea-level at the base of the cliff with the level ground on the beach area.

---

e) What factors indicate the normal sea level? Give reasons for your answer.

---

f) Take samples of beach sediment in this area and label carefully for analysis back in town.

g) Is there any evidence of recent collapse?

E. Collect any evidence on the following essay question while you are on the field trip so that you include this essay as part of your write-up. EVERY girl must do this question.

Each time people visit this beach its shape and size are different. What effect do seasonal changes of weather have on beaches? In essay form discuss the statement:

"Beaches are in a state of dynamic equilibrium."

F. While returning to the bus every girl must do at least two beach transects including the following:

1) Measure the gradient of the dune from the water's edge to the top of the dune with a clinometer.

2) Collect samples of the sediments at the water's edge; in the middle of the beach; at the base of the dune; at the top of the dune. (Label these carefully.)

3) Take note of the vegetation at the top of the dunes. Is this different from the vegetation on the promontory?

WORKSHEET: WAVES

From the top of the primary dune

1) sketch the pattern of waves approaching Cove Rock, and the head of the bay (northwards). Imagine that you have taken a photograph – show the pattern of wave crests as it would appear on the photo. Is there any wave refraction? Is the pattern of waves within the bay regular?

2) Compare the amplitude (height) and wave-length of waves breaking on the promontory and the head of the bay. Where are these waves constructive, and where destructive?

3) ON THE SOUTHERN SIDE of Cove Rock, by careful timing, determine

   a) the frequency of the waves – time the successive wave crests passing a fixed point.

   b) the speed of a wave – (between 2 specific rocks which will be pointed out on the day of the excursion.)

4) a) Estimate the wind direction and wind SPEED.

   b) Are the winds onshore or offshore?

   c) How are the size and shape of the waves affected by:

      i) the strength of the wind
      ii) the direction of the wind
      iii) the fetch of the waves?

5) a) In this area, where would you surf? (Show on the map.) – in terms of wave action in the open sea compared to the action of the sea near the coastline.

   b) Why do waves curl at the coast?

6) NORTH of Cove Rock, observe where the waves are breaking at different points along the coast. Are they "spilling" or "plunging" breakers? (Consult a reference before the excursion.)

7) a) Study the movement of beach material. Determine whether the swash and backwash are eroding or depositing. Is the swash carrying material further up the beach than the backwash is carrying it down or vice versa? Explain why.

   b) From the the high level of the promontory, throw a float into the breakers and note the direction in which it moves. Draw a diagram to show the path followed by the float and label the swash, backwash and where applicable the drift movements.

8) Indicate the position of rip currents on the map. Explain how these rip currents are formed. Rip currents are responsible for the majority of drownings on sea coasts. What advice would you give to a swimmer who might get caught in rip currents?

WORKSHEET - STUDY OF A BEACH

Equipment: Clipboard and paper; levelling equipment; sample bags, ties and labels; table showing index of roundness; magnifying glass; pebbleometer or callipers and ruler.

1. Make a number of accurate beach profiles, by levelling at right angles to the coast. Draw these. Annotate all the significant features and explain how they have been formed. Are there any marked breaks of slope? How do they lie in relation to high water and low water and to any changes in beach material?

2. On a sketch map of the beach plot the high tide mark and the level reached by storm waves. Indicate berms (storm ridges) by means of hachures. Show such features as beach cusps. Explain why berms may appear above the level reached by the tides.

3. How does the steepness or slope of a coast affect the processes of erosion and deposition?

4. Examine samples of beach sand under a microscope.

   (a) Is the sand coarse or fine?
   (b) What is the index of roundness of 10 randomly selected grains?
   (c) What are the main components of the sand?

5. Compare this sand with samples from other beaches and account for differences you may note.

6. Collect different types of pebbles on the beach.

   (a) Account for the shape of the pebbles. Give an index of roundness.

   (b) Identify the type of rock and suggest the possible origin of each of these pebbles.

7. Test for size gradings of pebbles.

   (a) Sample pebbles along three separate transects running up the beach: these should be located at both ends and near the middle of the beach. Take the pebbles from the water's edge to above the storm berm noting both their long and short diameters. Is there any indication of a change in pebble size down the beach? Record your results on the sheets provided for later statistical testing, and plot the

STUDY OF A BEACH 2.

(b) Dig holes to find the depth of material, the height of the water-table, and any changes in material as you go down. For each hole draw a profile.

(c) Sample pebbles at 10 metre intervals along the high water mark in order to test for grading of material along the beach. Measurements, recording and testing to be carried out as indicated above. Attempt to explain your results after considering the results of your analysis of the wave patterns. (See worksheet on waves).

8. At low tide, examine any ripples left in the sand. Are these parallel to the coast or at an angle to it? Draw a sketch to illustrate this. Is there any relationship between this pattern and that of wave approach?

9. On low-lying sections of the coast, dunes may be found.

(a) Identify as may different types of dune as you can in the area.
(b) What shape are the dunes? How high are they?
(c) Mark their position on to the base map.
(d) How do they lie in relation to the prevailing wind? To the coast?

10. Make a list of the fauna (mussels, birds, etc.) which occur in the area. Classify them according to their habitat listing them under the headings: swash zone, beach, dunes. State what each feeds on.

11. Attempt to draw up a food chain for the beach environment. What part does rotting seaweed play in this food chain?

12. If you can, identify different types of birds; list the names of the birds seen on and in the vicinity of the beach using the headings: in the sea, on the beach, among the dunes. Is there any evidence of the zoning of these birds? Account for any pattern you may note.

WORKSHEET: ROCKY SHORE ECOLOGY

1. It is difficult for seaweeds to grow far out of the water on this exposed rock surface. Suggest reasons for this. Large seaweeds grow in the deeper water. How are the seaweeds adapted to withstand the wave motion?

2. Limpets often live in crevices if they live far up the rock face. Give reasons.
Barnacles feed on plankton (microscopic plants and animals floating in the water). Which barnacles will be able to feed for the longest periods of time? What part does plankton play in the food chain?

3. These rock pools are excellent examples of an ecosystem. Describe the ecosystem evident in one of your chosen rock pools.

4. Which zone on the rock platform is subject to most wave action?
   a) What effect will this have on the creatures?
   b) What effect will this have on the rocks in this area?

5. What factors could threaten the rock pools?

6. Choose two rock pools at different levels on the rock shore. Note the approximate heights of the pools, how they were formed and their character (e.g. depth/rockiness/sandiness).

7. Barnacles do not live in pools. It seems they cannot survive pool conditions. What prevents them from living high up the rock face or in pools?

8. Sea anemones are soft-bodied with tentacles which can engulf their prey. Why are sea-anemones found only within pools?

9. Which pool has the more ABUNDANT and which the more VARIED animal life? Suggest reasons for this.

10. DUNE ECOLOGY

Walk from the sea-side to the top of the primary dune (the promontory) and down into the secondary dune area recording as you go major zonation of vegetation. Sketch the plants briefly. How is the zonation environmentally determined?

WORKSHEET: GEOMORPHOLOGY

1) Draw a sketch of the area north of Cove Rock showing a sea cliff, a promontory, a wave-cut platform and a probable former shore line.
Continue the section a short distance out to sea showing the probable configuration of the sea-bed along the line of your section. Label.

2) Walk alongside the promontory north of Cove Rock. What evidence is there of former marine levels? At approximately what height above sea-level do these occur?

3) a) What type of rock does Cove Rock consist of? Give logical reasoning to justify your decision.

b) Why are these rocks hard and jagged?

4) a) Estimate the height and steepness of the cliff. Why is it steeper on the one side?

b) In which direction do the strata dip? Has the angle of dip influenced the profile of the cliff?

c) Is there any evidence of folding or faulting in the cliff face?

d) Describe the development of the sea-cave in the cliff face.

e) How have the blowholes on Cove Rock developed?

f) Describe the angle of the cliff looking out to sea, indicating high and low water marks.

6) "Stack"

7) a) Walk along the top of Cove Rock from the sea side westwards towards the secondary dune area and record the zonation of vegetation. Draw the plants and give their common names. How is the zonation environmentally determined?

b) Go down to the secondary dune area and compare the slope and formation of these dunes to those found near the changing rooms.

c) Take sand samples from the dune itself and from the "dune street" between the dunes. Which has the bigger grains? Why?

d) How are dunes toward the land formed? How will they change with a shift in wind direction?

APPENDIX 7F

PUPIL EVALUATION WORKSHEET I986 PILOT PROGRAMME

PUPILS' EVALUATION SHEET

"ECOCIDE"

Please answer the following questions by making a tick in the block next to the answers YOU choose.

1. How long did you take to do this worksheet?

   (a) Class time: o 1 lesson ☐
   o 2 lessons ☐
   o More ☐

   (b) At home o ½ hour ☐
   o 1 hour ☐
   o 2 hours ☐
   o More ☐

2. Did you find the questions

   o generally easy to understand ☐
   o generally difficult to understand ☐
   o too easy ☐
   o too difficult ? ☐

3. Which questions did you find difficult to do?

   [1] [2] [3] [4] [5] [6] [7] [8]

4. Which questions did you find the most interesting?

   [1] [2] [3] [4] [5] [6] [7] [8]

5. Which questions did you find the least interesting?

   [1] [2] [3] [4] [5] [6] [7] [8]

6. Do you prefer working

   o on your own ☐
   o in a group ☐
   o partly in a group and partly on your own ☐

   when doing worksheets of this type?

7. Why do YOU think that you were given this worksheet to do?

   (a) To make you apply your knowledge of ecosystems and ecology to actual situations. ☐
   (b) To make you more aware of the role of man in disturbing the ecological balance ☐
   (c) To make you think about certain ecological problems we all face ☐
   (d) To teach you certain skills and new concepts which will be of value to you in the higher classes. ☐

8. Do YOU think that this worksheet succeeded in doing any of the above?

   YES ☐
   NO ☐

9. If your answer to 8 is "Yes", which of the reasons in 7 do you think was most valid.

10. If you answered "No" in 8, give TWO reasons (or more if you wish) why you think this worksheet did not succeed in any of the reasons in 7.

____

____

____

____

____

STD 7.

PUPIL'S EVALUATION SHEET

To be completed when worksheet is handed in.

1. Please indicate what class you are in. [ ]

2. Please indicate whether you are doing SG or HG. | HG | SG |

3. Please indicate how long this work took you to do. (Tick the appropriate block.)

   1 HOUR [ ]
   2 HOURS [ ]
   3 HOURS [ ]
   More than 3 HRS [ ]

4. Please LIST any questions you find difficult to understand in the space below. Just use the question number.

   ____

5. Please list any questions you find particularly difficult to do. (Just the question number.)

   ____

7. Please list any questions you find particularly interesting to do. (Just the question number.)

   ____

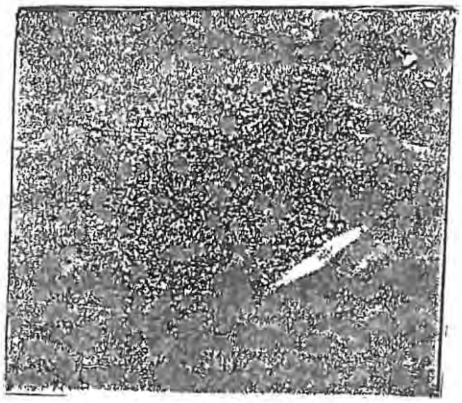
8. Please answer the following questions by ticking the appropriate blocks:

   1. Did you find this useful from a revision point of view? YES / NO
   2. Did this help you to understand and to analyse data better? YES / NO
   3. Did this make you apply your theoretical knowledge? YES / NO
   4. Did this give you a better idea of the STANDARD possibly required in the Std 9 and 10 examinations? YES / NO
   5. Did this teach you ANYTHING about how you will need to LEARN this section of the work in order to answer this type of question? YES / NO
   6. Do you feel more confident about using synoptic maps? YES / NO
   7. Did you understand the marking system? YES / NO
   8. Do you think this is a fair marking system? YES / NO
   9. Do you prefer this system to a general comment? YES / NO
   10. Do you prefer this system to a global or single mark for the whole assignment? YES / NO
   11. Please make ANY comments you feel would be ______________________________

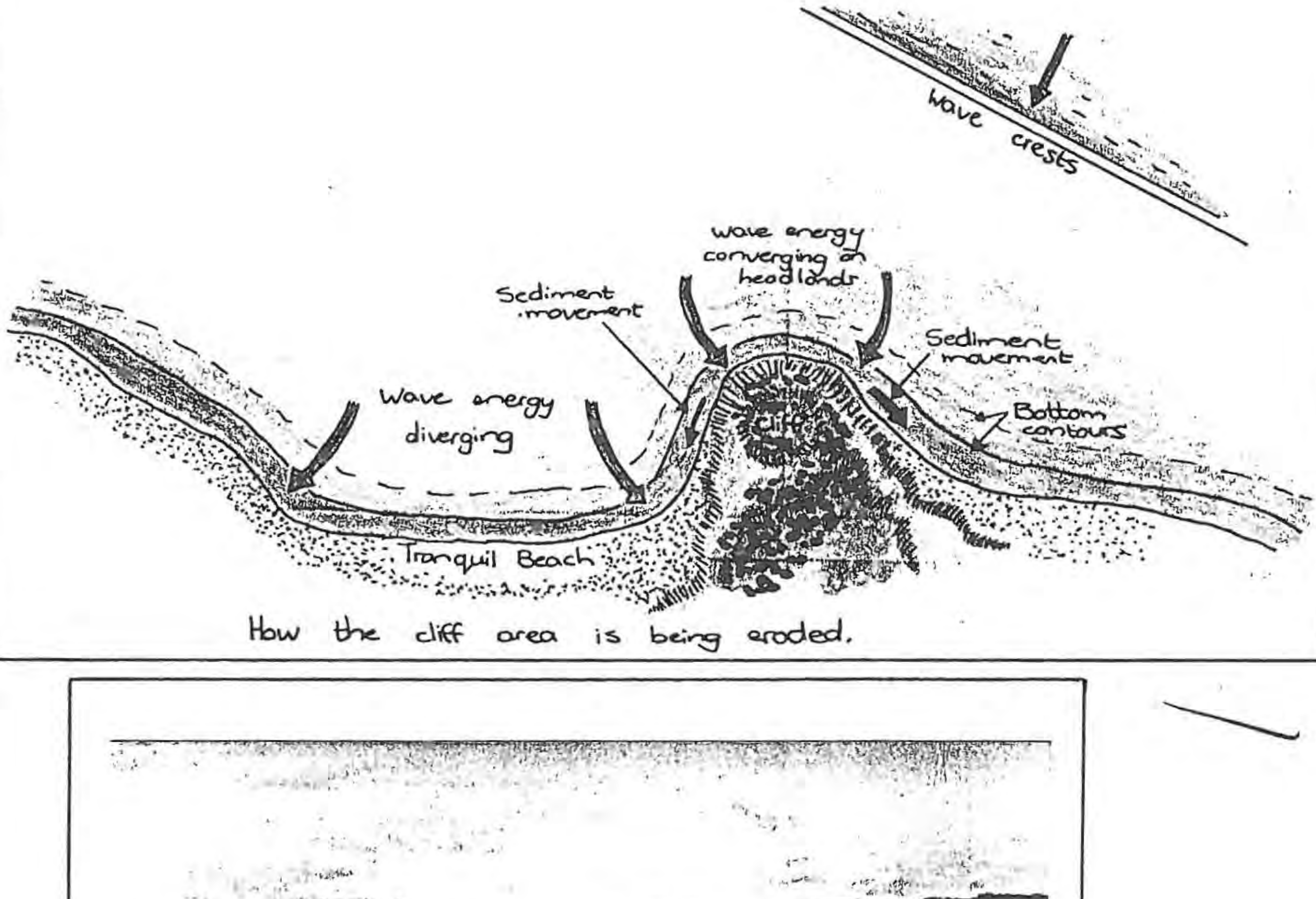
STD. 9

APPENDIX 7G

ILLUSTRATIONS STD 7
FIELD REPORT



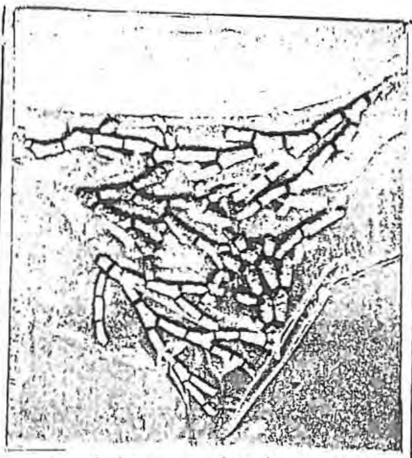
The hard sediment making up the cliff area



How the cliff area is being eroded.

Vegetation grows down the cliff area

Rock Pool 1

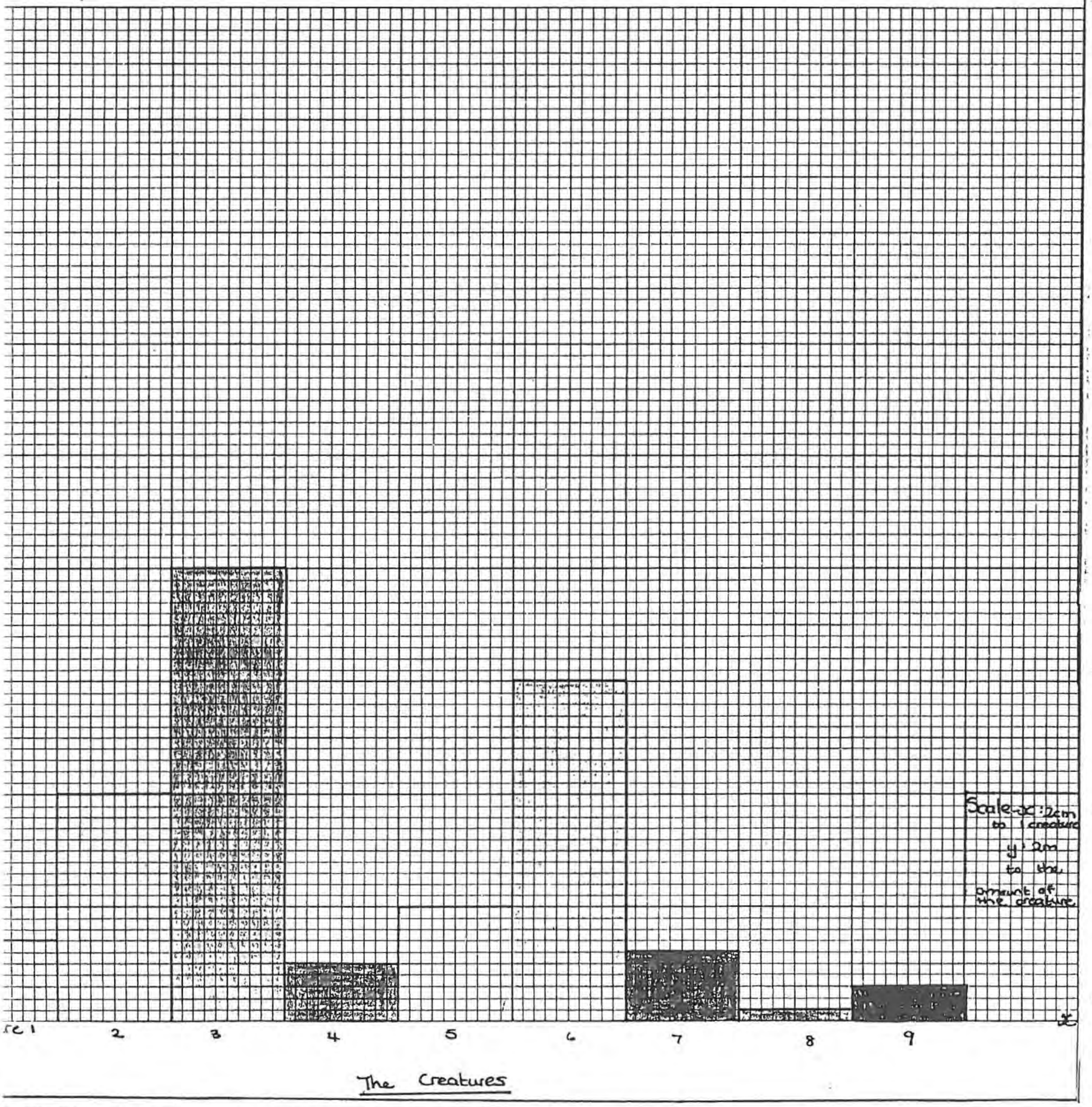


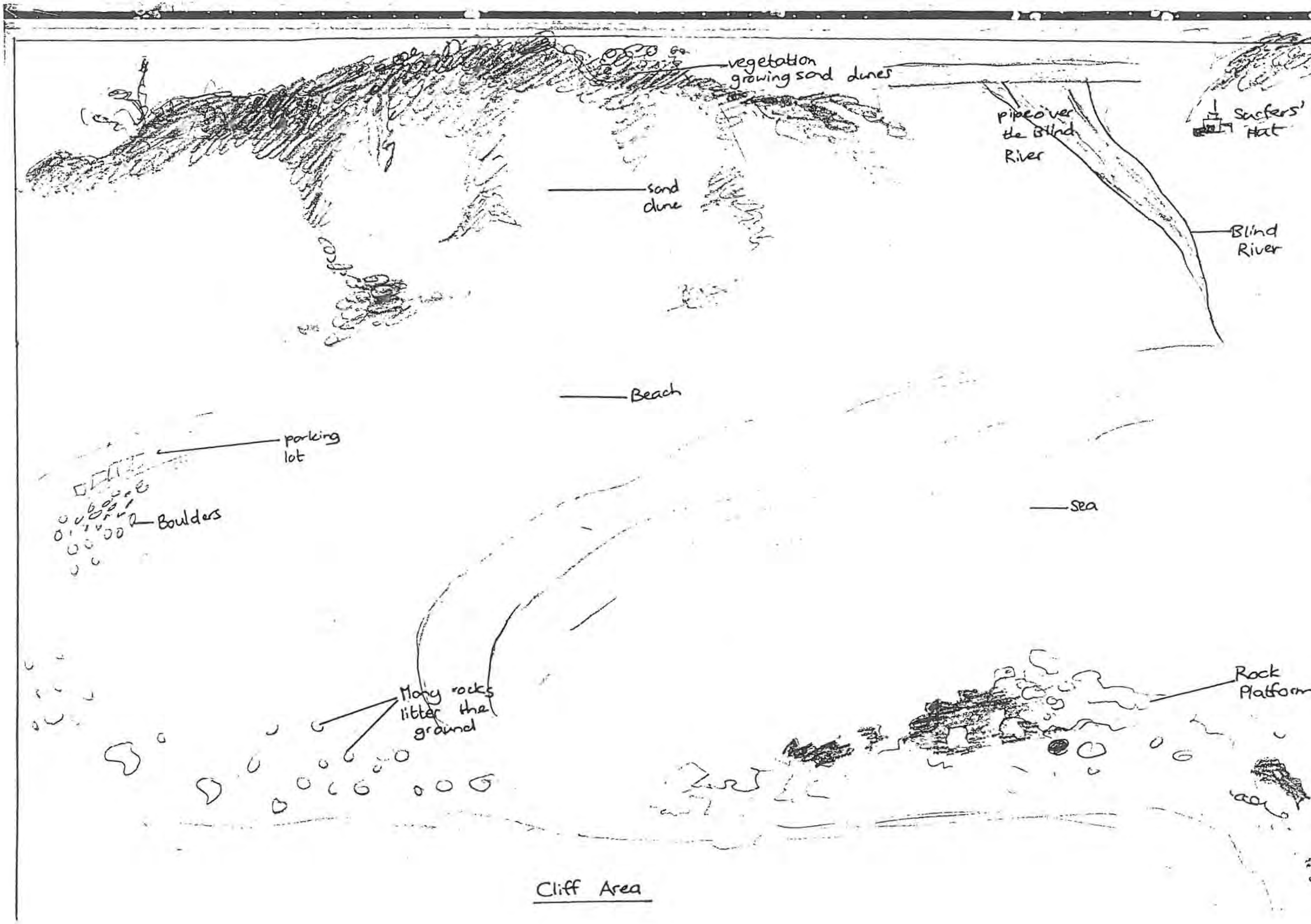
Amphiroa ephedraea

Key

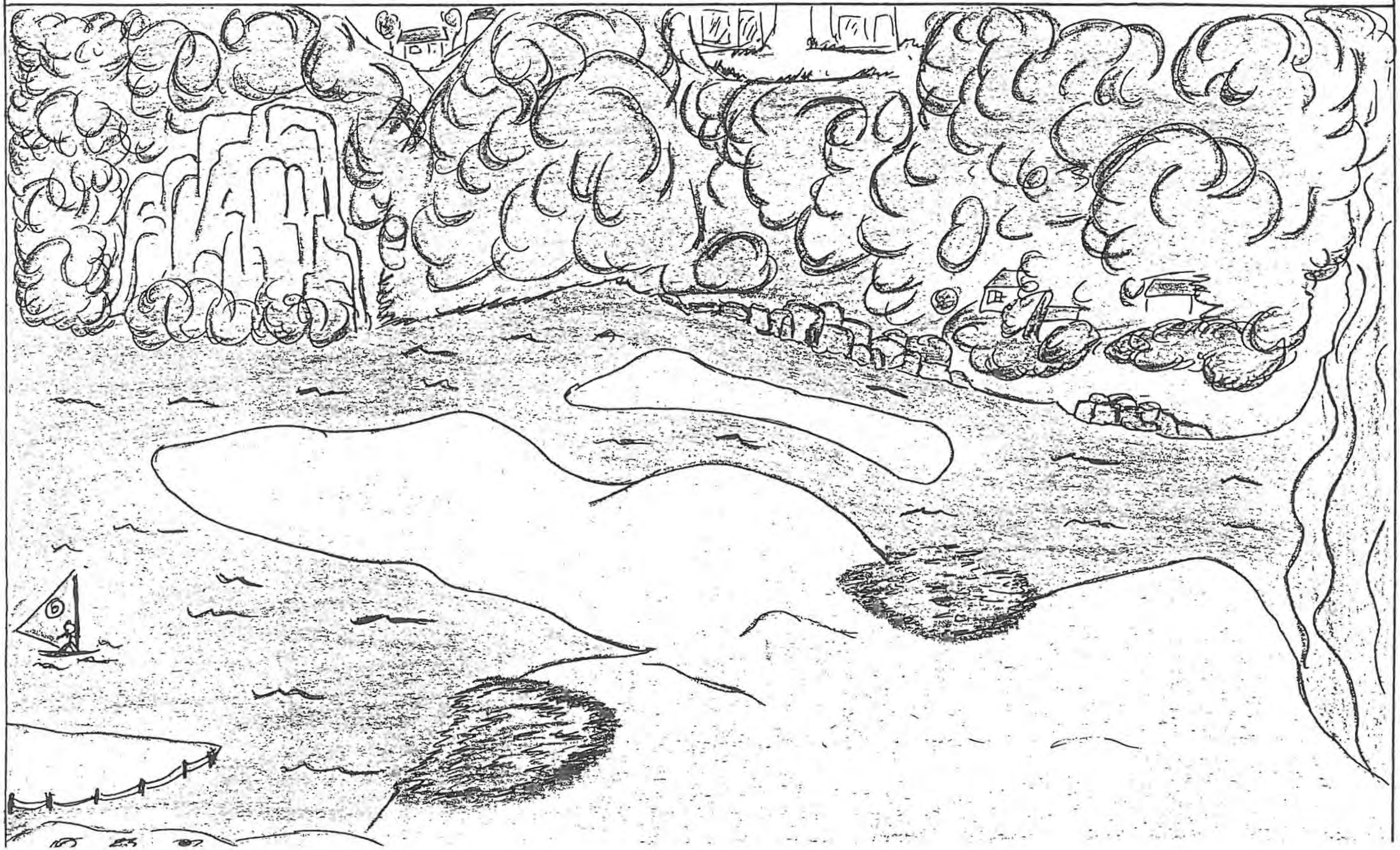
	Barnacles
	Starfish
	Periwinkles
	Whelks
	Seaslugs
	Pear limpets
	Hermitcrabs
	Mussel
	fanworms

The amount of creatures in rock pool 1




vegetation growing sand dunes
pipe over the Blind River
Surfers' Hut
sand dune
Blind River
Beach
parking lot
Boulders
sea
Many rocks litter the ground
Rock Platform
Cliff Area

FIELD SKETCH OF ESTUARY



APPENDIX 7H

EXAMPLES OF HYPOTHESES TESTED 1986
STD 9 FIELD RESEARCH

EXAMPLES OF HYPOTHESES TESTED IN STD 9 FIELD RESEARCH PROJECT 1986

1 The strata of the rocks of the cliff face at Cove Rock change direction as a result of faulting.

2 The rock platform at Cove Rock is formed as a result of wave action along a retrograding coastline.

3 Cove Rock is a cliff because of the effect of uplift and subsequent erosion by waves.

4 The height above sea level of the blow holes at Cove Rock are the result of coastal uplift.

5 Seaweed is better adapted than marine fauna to withstand constant wave action. The seaweed zonation found at Cove Rock is the result of the structure of the cove area rather than related to more general littoral development.

6 The greater concentration of detritus feeders at Nahoon than at Cove Rock is a result of the greater pollution by organic matter at Nahoon.

7 The height of seaweeds along the rock shelf at Cove Rock is directly proportional to the force of the wave action.

8 Gully depth is dependent on volume and velocity of water flow at Cove Rock.

9 The beach formation at Cove Rock is the result of the headland.

10 Gravity slide is instrumental in the development of bush clump relics in the parabolic dunes of the Cove Rock area.

11 The height and density of the plant growth in this area is in proportion to the force of the wind and the saline content of the moisture supply to the plants.

12 The size of thie rock pool determines the diversity of the ecosystem.

13 The present success of Cove Rock as an open beach is due to the fact that unlike the Eastern Beach its chief potential as a recreational area depends on day trippers who do not have to rely on public transport.

APPENDIX 8A

PROJECTS AND ASSIGNMENTS AREAS FOR INVESTIGATION

APPENDIX 8A

PROJECT AND ASSIGNMENTS : AREAS FOR INVESTIGATION

I IN THE EAST LONDON MUNICIPAL AREA

(a) The coastal resorts and adjacent beach areas.

(b) The dams and sections of the Nahoon and Buffalo rivers.

(c) The CBD and adjacent land use zones.

(d) Local shopping centres.

(e) Suburban areas, including blight areas such as the historical Westbank and Quigney areas.

(f) The harbour.

(g) Factories and commercial enterprises in the city, which included food packaging and processing plants, electronic and car assembly plants and textile plants.

(h) The local power station.

(i) The fish hatcheries.

(j) A large dairy enterprise.

(k) Pineapple farms.

(l) The pineapple research station.

(m) The Mtiza Forest Reserve and the Buffalo pass.

(n) The local tick-research station.

(o) The water purification plant.

(p) Retirement villages and old age homes for a study on the senior citizens of East London.

(q) Homes for the handicapped for a group study on the provision nmade for the handicapped in East London.

(r) The sewage farm and city dump (rather less popular studies).

2 **TOWN STUDIES** in settlements such as Grahamstown, Bathurst, Salem, Port Alfred and Port Elizabeth in the Eastern Cape; the Hogsback, Alice and Whittlesea in the Ciskei; King William's Town, Cathcart and Stutterheim in the Border areas; Port St Johns and Umtata in the Transkei; and Oudtshoorn and Graaff-Reinet in the Karoo and Little Karoo, were undertaken. These visits included a study of settlement patterns, location, site, function and urban hierarchy and morphology. These studies were integrated with history, architectural styles and local activities of interest in the district. Visits to these areas

also included a variety of environmental studies which encompassed geology, geomorphology and vegetation studies.

3 **THE KATBERG REGION AND THE HOGSBACK AREAS** were extensively used for ecological and environment studies, which included an analysis of the geology, geomorphology and natural vegetation of the areas.

4 **THE KATBERG REGION** is also most useful for the study of rural development projects.

5 **STUTTERHEIM** is the centre of a large complex of natural forests and plantations and is valuable as a case study for a wider study into the forestry, paper and pulp industry of South Africa.

6 **GAME PARKS, GAME RESERVES AND NATURE RESERVES,** as also game rances such as Tsolwana game ranch near Whittlesea in the Ciskei, are valuable not only for a study of environmental geography, but were utilized as part of a study on conservation strategies in Southern Africa.

7 **THE ESCARPMENT REGION** around Dordrecht, Rhodes and Barkly East was used as a study of high mountain areas, their climate, vegetation and geology. This area was also interesting from the point of view of the farming activities in the region.

APPENDIX 8B

URBAN TRAIL

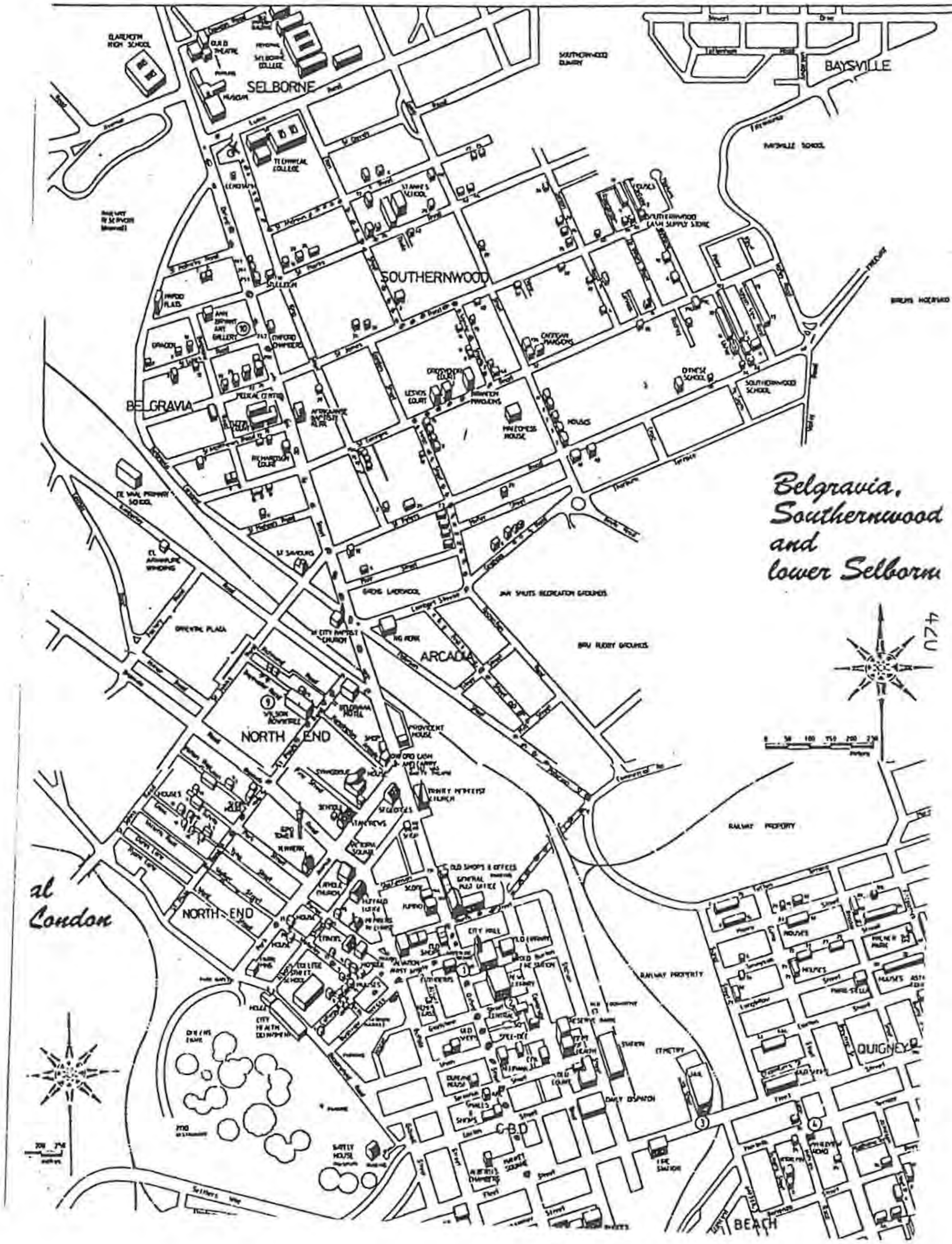
(B)

ORIGINAL ✓

EAST LONDON : URBAN TRAIL

Originally designed by

A D Montgomery, 1980
(Selborne College)



B

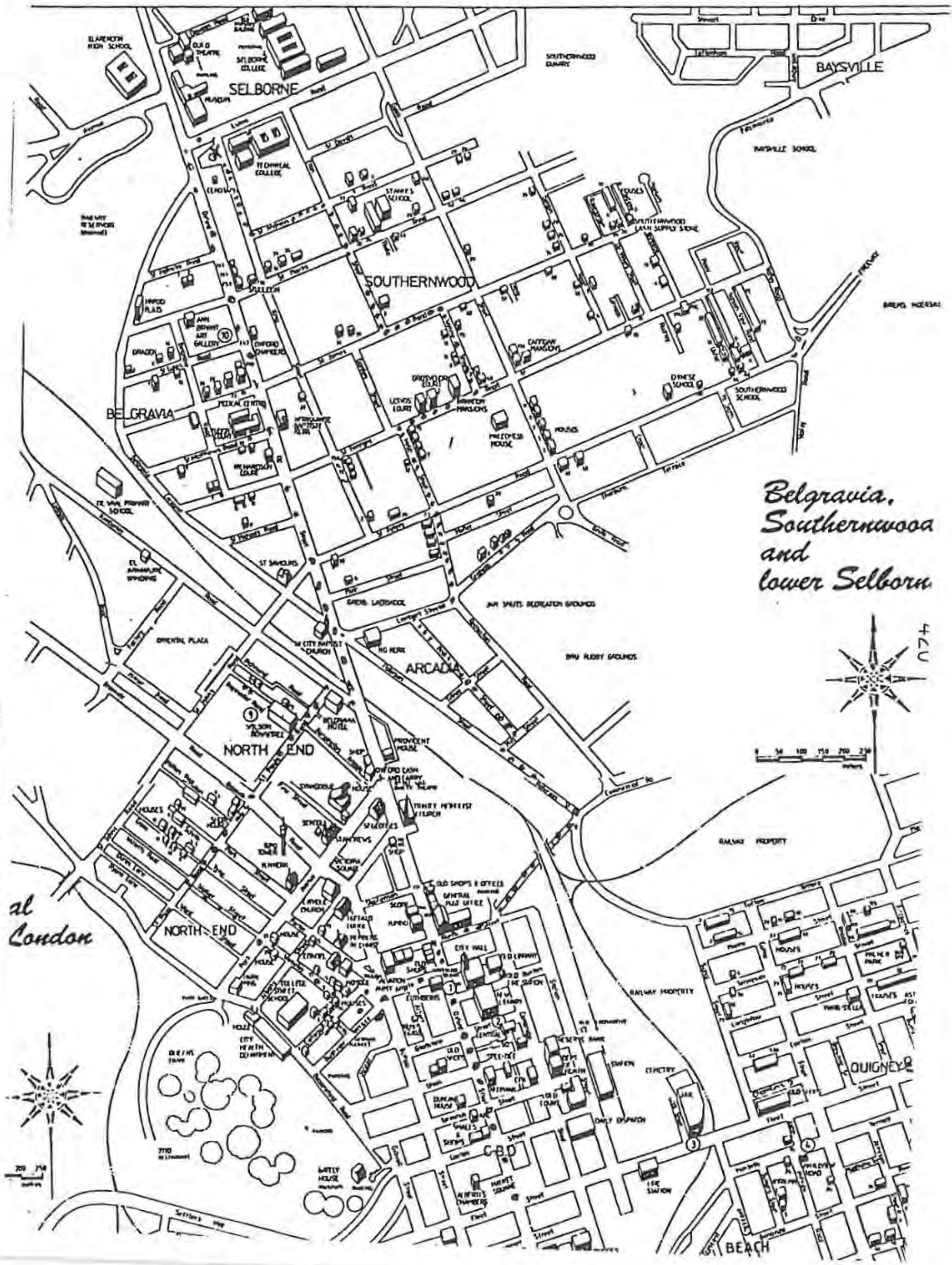
ORIGINAL

EAST LONDON : URBAN TRAIL

Originally designed by

A D Montgomery, 1980

(Selborne College)



CONTENTS

Map of the route

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List of figures and tables

Questionnaire

Environmental appraisal sheet

Appendix A	Architectural details
Appendix B	Traffic count
Appendix C	Land use survey
Appendix D	Pedestrian count
Appendix E	Buildings within the DBD which are of historical and/or architectural interest

Supplement

Historical background

Population composition (1978)

Central Business District

Recreational Business District

LIST OF FIGURES AND TABLES

Figure I	Land use survey - base map
Figure 2	Land use survey - street block
Figure 3	Pedestrian count map
Figure 4	Buildings of historical and/or architectural interest
Table I	Business land use classification key

EAST LONDON URBAN TRAIL

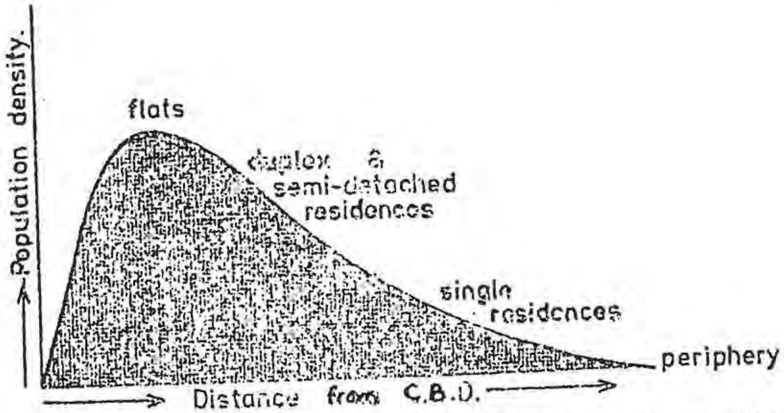
FOCUS ON URBAN GEOGRAPHY

I War Memorial opposite East London Technical College. Note the inscription - to whom is the Memorial dedicated?

\+ Intersection of Elton and St Andrews Roads. Looking east down St Andrews Road, fill in an environmental appraisal sheet.

2 Intersection Elton and St Marks Roads. Blocks of flats and boarding houses make their appearance as from St Marks Road. Besides the fact that this area is zoned as general residential, why do you think these flats are situated here?

When one considers the cost of petrol, and in terms of time, the optimal residential location is on the fringe of the CBD, this results in an increased demand for land, which in turn results in high land values in this region. The potentially high yield per unit area makes the location of flats in this region a better proposition than single residences. Consequently, this region has a high population density. In Johannesburg, Hillbrow is the obvious example.



Schematic Representation of Residential Density within the Ci
[Van der Merwe & Nel, 1975.]

3 Note the two old houses on the eastern side of Elton Street (Nos 3 and 5) between St Marks and St James Roads. Comment on their age and construction and say why you think the land on which they stand has not yet been redeveloped.

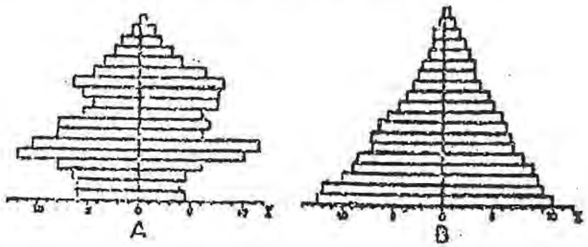
4 Intersection of St James and Wynne Road. See brochure on architectural styles. Appendix A.

5.1 What type of shops are present?

5.2 What type of commodities are offered for sale? Classify these in terms of their 'threshold value'.

5.3 Speculate on the possible size of its service area (compared with the CBD of the Vincent Park Centre)

6 Intersection of St Georges Road and Webb Street. The flats 'Beau Vallon' just west of Webb Street and St Georges Road intersection, together with the many blocks of flats down Muller Street, are evidence of a densely populated area just outside the CBD. Study the population pyramids and choose the one you feel best represents this area of Southernwood. Give reasons for your choice.



\+ Fill in an environmental appraisal sheet of the area while looking east down Muller Street.

7 Intersection of Webb Street and Lambert Road. South of Lambert Road, the land is zoned for industry.

7.1 Classify the industries into types, noting the company names and slogans.

7.2 Say whether they are involved in light or heavy industry (motivate your answer)

7.3 Guess at what these industries actually do.

7.4 What do you observe regarding the plot size here compared with that of the residential area you have just walked through.

7.5 What type of land use do you think prevailed here before industry 'took over'? Motivate your answer.

7.6 Give a better phrase for the expression 'took over'.

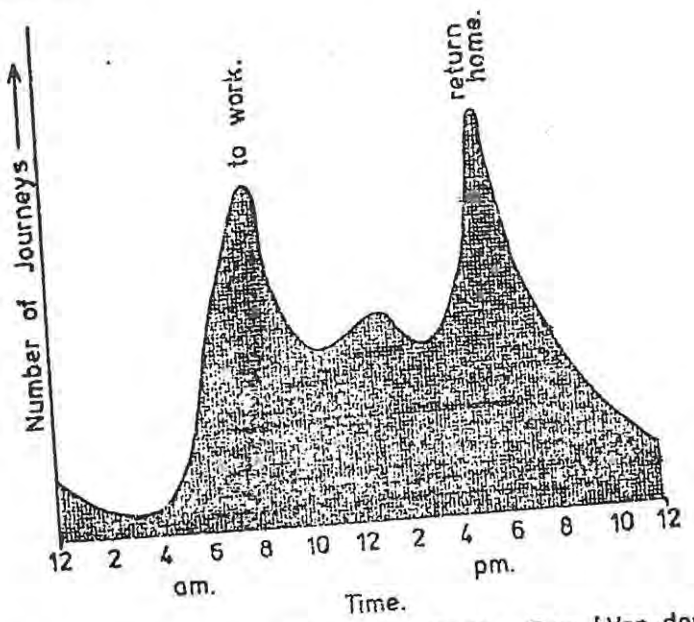
7.7 Where in this area are the purpose-built industrial buildings?

8 Railway Bridge over commercial Road. (See Appendix B). Located under or near the rail bridge, use the traffic count sheet to record the following:

8.1 Unit type
8.2 Direction
8.3 Sex of occupants

The aim is to determine the nature of the traffic on one of the main highways during the mid morning and to speculate as to the purpose of these journeys.

Traffic flow is governed by the time and purpose of the journey. There are basically 4 journey incentives: Work; School; Shopping or service and Social incentives.



Schematic Representation of Traffic Flow. [Van der Merwe and Nel, 1975.]

9 Surveillance from the top of the Trust Bank Building.

9.1 How high are you above street level?

9.2 How many floors does the Trust Bank have?

9.3 What are they used for?

9.4 Study the CBD from your elevated position and note any pecu phenomena or characteristics.

9.5 Count the churches in view and attempt to identify them.

9.6 Orientate yourself in relation to Selborne College. Locate the Gı Elevator.

10 Land use survey of the CBD.

Use the land use classification key when surveying a block. Note that one erf does not necessarily constitute the existence of ONE shop or office. These erven have often been sub-divided and you must therefore indicate these sub divisions on your map accordingly, each with its respective land use code. (See accompanying sheets, Appendix C).

\+ Standing near the Peak Land Value Intersection (PLVI) fill in an environmental appraisal sheet.

11 Pedestrian movement check.

The aim of this exercise is to determine pedestrian movement and area preferences. This information must then be mapped, using flow-lines. (See Appendix D for map and count sheet).

12 List of buildings of historical or architectural interest. (See accompanying list, Appendix E).

13 Intersection of Buffalo and Caxton Streets.

Note the location of shops such as Ellerines, Royal, Town Talk and various wholesale merchants.

Why do you think they are situated on the edge of the CBD and not in the centre where there are more people?

14 Intersection of Buffalo Street and Bush View Terrace.

Note the old General Dealer store, 86 Buffalo Street. Prior to 1898 the erven 18651 and 18652 (see base map of CBD. Figure I) were owned by Mr M Abdoola's uncle and he and his family lived on the premises. After his death in 1902 both properties were sold although the family still owned the business and continued to trade. In 1903 the erf No 18652 was purchased back and the present building was erected. Due to restrictive legislation he is unable to modify or rebuild his shop so although he owns the ground, the shops remain a relic from the past.

The legislation in question:

1940 The Broom Commission examined the 'infiltration' of white areas by non-whites (Indians).

1943 Pegging act, which prevented further 'infiltration'.

1946 Asiatic land tenure act. This was the first to proclaim group areas.

1950 Group areas act.

\+ Complete an environmental appraisal sheet while in the vicinity of the old General Dealer store.

15 Intersection of Porter and College Streets.

Note the age of the shops and houses in the region of Porter Street. It was in College Street that Panmure Public School, the forerunner of Selborne College, was situated during the years 1879-1901.

15.1 What commercial land use is found here?

15.2 Classify this area in terms of land use bearing in mind what you hav already seen.

16 Intersection of Porter Street and Park Avenue, North End.

This intersection was the centre of fashion in 1895 and home for th elite. David Rees, eight times Mayor of East London resided here today it is inhabited by members of the Indian community. In 1978 was proclaimed a business (including industry) area.

16.1 Why, do you think, has this area been reproclaimed?

17 Intersection of Wolesley Street and St Pauls Road, North End.

\+ Fill in an environmental appraisal sheet. Note the abundance of 'corn shops" (General Dealers).

17.1 Why do you think are there so many in this area?

17.2 What can you infer from a study of the names and dates of the stores?

17.3 Study the commodities for sale and comment on the socio-econom standing of the present customers.

17.4 Where are these people employed?

18 Intersection of Kimberley Road and Oxford Street, looking south dov Oxford Street.

The immediate area may be classified as the grey zone on the fringe the CBD.

18.1 What characteristics are apparent?

18.2 What land use types are found here? Why?

\+ Fill in an environmental appraisal sheet for this area

19 Oxford Street opposite Solly Kramers.

Note the ribbon arrangement of Commercial land use along Oxf Street as far as St Georges Road.

19.1 Comment on the advantages and disadvantages of a 'shop keep (owner of a business) in this area compared with the CBD.

19.2 For many years, the Majestic Bottle Store situated on the corner Oxford and St Georges Road, has done a lucrative trade in this ar How do you think has the opening of Solly Kramers in 1979, affec this trade? Why?

20 Area between St Matthews and St Lukes Roads on both sides Oxford Street. Although this area is zoned - residential, this is not present use.

20.1 Write down the names of at least five doctors, specialists and professional people and indicate in each case, the type of activity in which they are involved.

20.2 Why are they all clustered together?

Appendix A

ARCHITECTURAL DETAILS

In order to perform a detailed study in an urban area, a geographer needs to be informed of the area's history. However, to obtain the precise details for the area concerned can be a time consuming activity, since the history of each building in the area must be carefully studied.

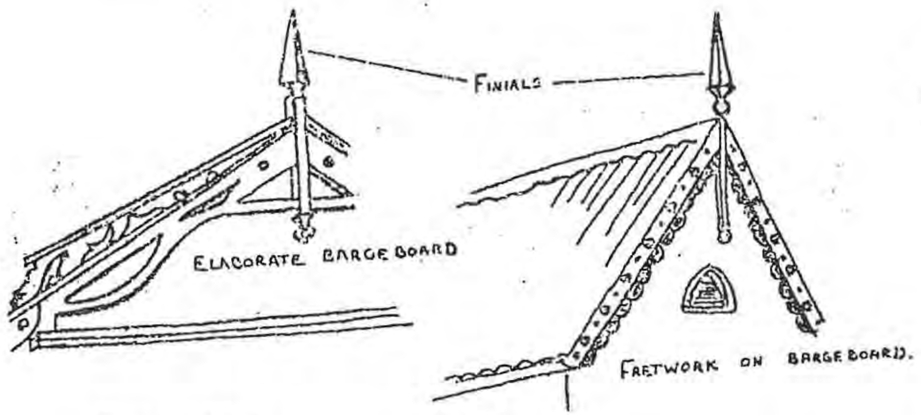
For our purposes, it is sufficient to know the approximate period from which the buildings in the area date, so that we might then understand the development of the particular urban environment.

To this end, a list of architectural details has been compiled. It must be stressed, however, that this list is only a guide, since by its very nature, architectural details can be misleading.

The following terms and their corresponding periods may be useful: Georgian 1714-1830; Victorian 1837-1901; and Edwardian 1901-1910. It must be borne in mind that any architectural fashion in Britain and Europe had, because of the great distance, a necessary time lag before it reached East London.

TASK

Study the houses in Southernwood (particularly those in Wynne and Webb Streets) and North End, and see if you agree with the datings attributed to these two areas.



Corrugated iron

In Britain, corrugated iron was first used on buildings in the region of 1838. An engineer, Walker, is claimed to be the inventor. By 1851 it is recorded as being the cheapest roofing material in Britain. The corrugations strengthened the iron considerably. To increase the strength still further, the sheets were curved. These curved sheets were fashionably used for verandahs.

Its durability and economy were largely responsible for its widespread use and during the 1870's and 1880's a large number of wood and iron houses were erected in East London. The name 'Corrugated-Iconic' style has been attributed to this type of building and many of them still stand today, particularly in the North End area. These buildings were brightened up by elaborate fretwork on the verandahs and finials on the roof and became fashionable cottages in their own right.

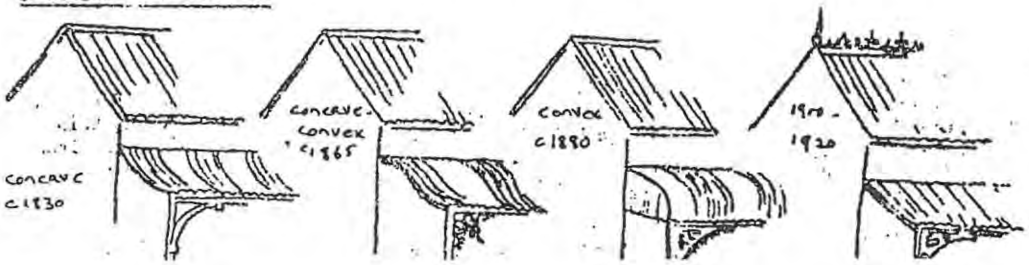
CORRUGATED - IRONIC STYLE 1870 - 1905.

Verandahs

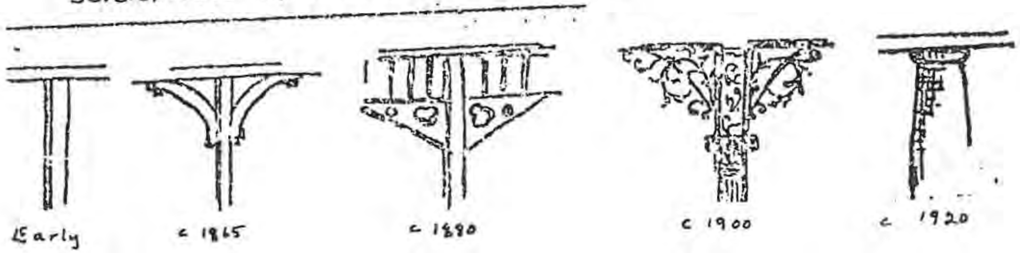
The South African climate dictated the need for light, inexpensive verandahs. They provided shady semi-outdoor spaces in which to sit, they stimulated the movement of cool air throughout the house, and they kept the hot sun off the north facing walls of the house. Despite its obvious function, verandahs also became very fashionable as they relieved the stark simplicity of a colonial house.

The verandah roof was supported on columns, set either regular or alternating to relieve the monotonous rhythm. The column at first had a single capital and base and the earliest timber posts were quite plain. The junction of the column and the roof was often achieved with a flat bracket or diagonal struts. However, during the I870's they developed as decorative items in themselves and later became part of the fascia. During the late Victorian and Edwardian period they were elaborately decorated with fretwork (fretwork machines were invented in America in the I850's). Cast-iron, which was first imported, became more popular after the I880's when local foundaries were established and began to appear on houses after the I900's. The concrete and brick and cement pillars appeared much later.

VERANDA DETAILS:



Development of verandah post junctions



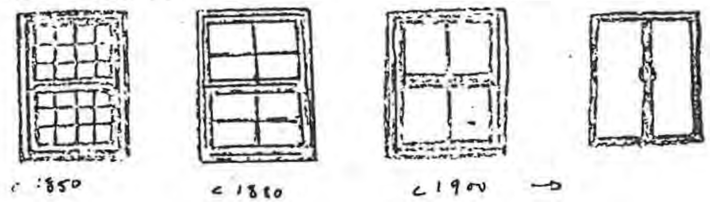
Windows

Plateglass was invented by the French in I773 but because of the expens commercial production only began in I838 (in Europe). Consequently, the ear settler houses either used wax coated calico or the more affluent ones ha windows made up of many small panes of glass. During the latter half of th I870's larger panes began to appear in the houses of East London (only panes to a window). The large plateglass windows of this time were restrict to shop fronts but as time progressed, windows with only two large pan made their appearance. The windows of the middle I9th century, and up un after the First World War, were mainly of the sliding sash type of caseme window.

Stained glass

The development of cheap tinting and texturing processes allowed even t poorest householder to have a small surrounding panel of coloured glass the doorway. This was very much the fashion during the late Victorian a Edwardian era.

Window Variations



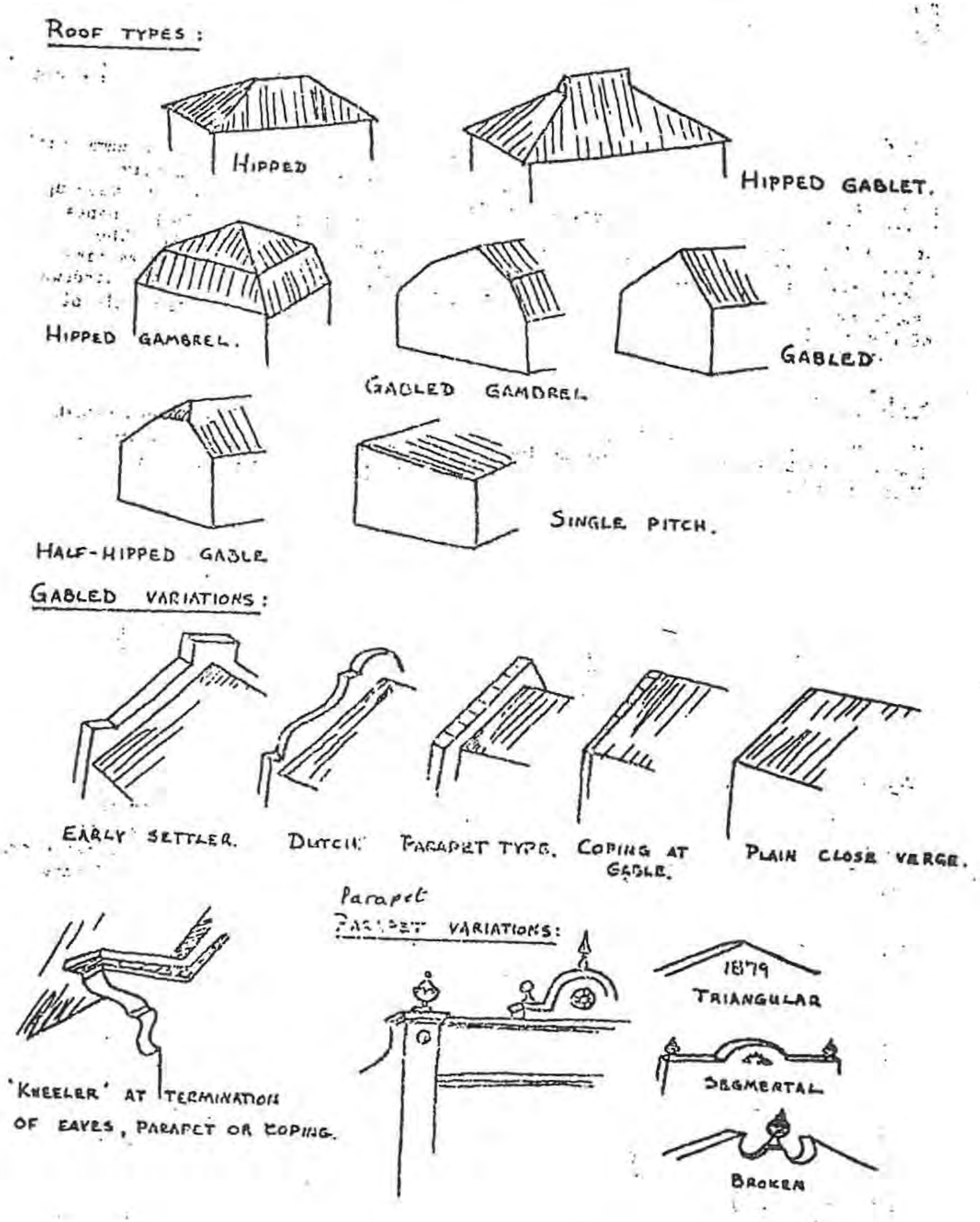
425

Doors

During I893, machine-made materials, e.g. doors, windows and fascias beg to emerge. Whereas previously they were hand-made on the site, according to the fashion of the day, the 'machine-made' finally took over. Many of earlier doors have had the letter-box added. The side viewing windo became a feature during the late Victorian period.

Door Variations

11 b.
Architectural Details.



In 1895 Park Avenue was the East London fashion centre where the elite of the town lived. (David Rees, eight times Mayor, lived here). However, the increasing demand for land close to the city centre and the lack of proper municipal regulations resulted in the owners subdividing their land and the laying out of the narrow streets (some a mere 14 ft across) which precipitated the ideal conditions for the development, in later years, of a slum area. These small erven, and consequently lower land values, resulted in this area becoming an Indian residential area. Today, because it lies in the path of expansion of the Central Business District, this land has been proclaimed for 'Industrial and Business use'. The high density settlement of the North End is in marked contrast to the more spacious arrangement of Southernwood.

During 1900-1902, the open ground in the Southernwood blocks was cut up into plots of 'oblong shape and reasonable size'. These were available after the Anglo-Boer war when money was more plentiful and the building regulations were of higher order (Moult, 1951). Consequently, a great many two-storeyed houses were built, many with lavish architectural designs. Anne Bryant Art Gallery and the Malcomess Childrens Home are the only remaining residences which have not had their plots sub-divided. Today many of these residences have either been converted into flats or boarding house establishments, or have been demolished to make way for modern flats. Board (1964) states that this is essentially a residential area populated by the young, perhaps employed for the first time in the city, and retired people who wish to be near the city central. Southernwood had an added advantage, unlike North End, its expansion to the north was neither hampered by the topography nor was it in any way prevented by the railway line. On the contrary, the land in the region of upper Southernwood and Selborne provided sites which, because of the topography, have commanding views and so became much sort after and consequently have a number of large two-storeyed houses with spacious gardens.

East London was raised to the status of a city on 1st June 1914.

APPENDIX C

SELBORNE COLLEGE

EAST LONDON URBAN TRAIL

LAND USE SURVEY

In order to acquire an accurate and detailed land use map of the city centre, the survey must be conducted on a 'building to building' basis.

Each group is required to survey at least one street block. This may be completed in less than ten minutes, by dividing the block into sections, with, for example, one group member per erf.

Procedure

Use the map, figure 1, to locate your block (figure 2). Then, on figure 2, fill in the appropriate details, for example, the code letters (see table I: Land use classification key), and indicate any sub-divisions within the erven.

N.B. Take special notice of the service shops (BC) for 'food and drink' and 'clothing'. The location of these two types of service shops along with their names must be clearly indicated as this information will be required by you at a LATER date, in order to determine the degree of clustering (index) in each case. This will be achieved using the statistical method of 'nearest neighbour analysis'.

In addition, indicate the exact location of robots and pedestrian crossings, as well as the arcades within the street blocks themselves.

It is important that all the relevant information be accurately and legibly recorded by each group member. This information must be collected within the group so that each member has a copy of the entire block in question.

The final result, i.e. all the blocks concerned, will, at a later date, be suitably coloured in and together with a key, will be displayed in your respective geography classrooms for later reference.

ANNEXURE E

BUILDINGS WITHIN THE CBD WHICH ARE OF HISTORICAL OR ARCHITECTURAL INTEREST

1 **CENTRAL POST OFFICE.** Erected in 1927 by the Public Works Department under J S Cleland, Chief Government Architect, in Transkei Sandstone.

2 **CUTHBERT'S BUILDING.** Building was commenced on 24 January 1901 It was originally built to serve as the premises of 'Cuthberts Boo Merchants' with offices above. The facade remains unaltered.

3 **CITY HALL.** The foundation stone was laid by the Mayor of Eas London, Councillor David Rees on February 20th, 1897 and it wa completed in May. The building, designed by Page and Cordeaux, is good example of Victorian Civic sculpture, belonging to the 'Fre Renaissance' category. A front porch which extended over the driv was removed in 1908 to allow for the erection of the Colonial Divisio Memorial.

4 **'OLD' PUBLIC LIBRARY.** The foundation stone was laid on June 17th 1905. This building, designed by Cordeaux and Walker, with it classical style facade, was used as a public library until 1958.

5 **OXFORD SQUARE.** Remnant of original building dated 1925.

6 **BUILDING OCCUPIED BY 'SPEEDEE' DRY CLEANERS.** Building facac has three 'roman' eagles and the initials G.T.C. (G.T. Carrington). Bu in 1880, this building was offered for sale on June 2nd of the same ye and described as having "solid concrete walls which are simp indestructable and there is no chance for any tenant having to mal good damage to the interior for 'tis impossible to effect injury to su work'." It certainly has withstood the test of time.

7 **OLD STANDARD BANK BUILDING.** Construction was commenced erf No 15468 on October 13th, 1900 and amended title was received the Standard Bank on November 3rd, 1902. In 1927 the corner porti on erf No 15467 was built to match the existing building.

8 **THE RESERVE BANK.** Designed by Farrow, Stocks and Farrow. T strong double doors of bronze on the west side of this building ha eight large South African coins belonging to different periods, modell in relief, beginning with one used by the Dutch East India Company.

9 **THE RAILWAY STATION.** This was the first station to open in E London and is one of the oldest buildings in the city. The date on facade is misleading since the lower storey dates from 1877 while upper storey which was only added three years later and so bears date 1880.

10 **SMALE'S BUILDING.** Occupied by 'Scotts off the Peg' and 'Paperb Shack' stands on the corner with the building on erf No 15524 be occupied by 'Walters Florist' and 'African Agency'.

11 **BUILDING OCCUPIED BY THE DEPARTMENT OF THE INTER OFFICES.** These are the only pre-1880 business premises in the which have retained their facade. The building was erected in 1879 was occupied by Henry Ellis, an auctioneer. The building was bought by Theodor Dreyfus.

MEMORIALS

12 **THE COLONIAL DIVISION MEMORIAL** (in front of the Town Hall).

The Mounted Colonial Division was comprised of loyal young South Africans under the command of General (later Sir) E Y Brabant. This Division fought and drove the enemy (boers) out of the Eastern Cape and fought through the Orange Free State and the Transvaal.

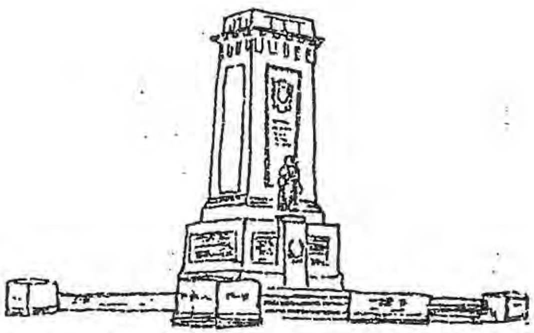
It was at a meeting one night that it was decided that each soldier would contribute a days pay for a memorial to be erected to the memory of those who lost their lives while serving with the Colonial Division during the Anglo-boer war, 1899-1902.

The sculptor was Mr W Reynolds-Stephens and the total cost of the monument was 3,102. The monument was unveiled by General Sir E Y Brabant, KCB, CMG, on 9th November 1908 on the occasion of the 67th birthday of His Majesty King Edward VII (Nettelton, 1980).

13 **THE IST WORLD WAR MEMORIAL.** Located at the top end of Oxford Street opposite the East London Technical College. This memorial is dedicated to those who lost their lives during the 1914-1918 war in Egypt, Palestine, Mesopotamia, Salonika, Flanders, France and German East and West Africa.

It was erected by public subscription in 1922.

The lych gate, which stands at the entrance of the memorial, is dedicated to the memory of those who lost their lives in the 2nd World War.



1st World War Memorial.

EAST LONDON URBAN TRAIL

ENVIRONMENTAL APPRAISAL SHEET

AREA:......................... DATE:............. ASSESSOR'S NAME:.........................

This exercise is designed to illustrate the widely differing opinions that people have about a particular environment. Give a score in each case (*where applicable) from 1 to 5. 1 means that something is very unsatisfactory, and a score of 5 means that it is so good it would be very difficult to improve upon.

Add up your total and compare your findings with someone else's and then discuss why your results may differ. Remember, a true reflection can only be obtained if you are completely honest.

A. BUILDINGS:

Age in years (state whether known or estimated). ....

Outside appearance. (Facade, paintwork, etc). [ ]

*Advertising, exterior & interior (quality of window displays & showrooms). [ ]

Quality of building materials. [ ]

*where applicable

sub total [ ]

B. PAVEMENTS:

Can people walk about freely? [ ]

Adequate street furniture (seats, lights, bins, etc). [ ]

Litter. [ ]

Danger from traffic. [ ]

sub total [ ]

C. ROADS:

Condition. [ ]

Accessibility to motor traffic (congestion). [ ]

Street signs. [ ]

Parking facilities. [ ]

Level of noise. [ ]

Smell. [ ]

sub total [ ]

D. GENERAL:

Availability of greenery (trees, shrubs, flowers or grass). [ ]

Pleasing view. [ ]

Air pollution. [ ]

Do people seem to enjoy themselves? [ ]

Would you like to live here/work here? (where applicable) [ ]

sub total [ ]

Could the area be improved? (If 'yes', motivate in the space provided

....

....

....

TOTAL [ ]

SELBORNE COLLEGE

EAST LONDON URBAN TRAIL

TRAFFIC COUNT SHEET

NAME OF RESEARCHER:..

SPECIFIC LOCATION:...

DATE:................. TIME: FROM.......... TO........... TOTAL TIME:..............

Record one stroke for each unit and group the strokes in fives for easy counting e.g. ~~1111~~ 11 = 7. In the case of motor vehicles, male or female refers to the sex of the driver.

UNIT		ENTERING CITY CENTRE		LEAVING CITY CENTRE	
		MALE	FEMALE	MALE	FEMALE
Pedestrians					
Bicycles					
Private Motor Vehicles					
Motor Cycles	Private				
	Commercial				
Light Commercial Vehicles					
Heavy Commercial Vehicles					
Buses					
Horse drawn vehicles					
Parked vehicles					
Other					

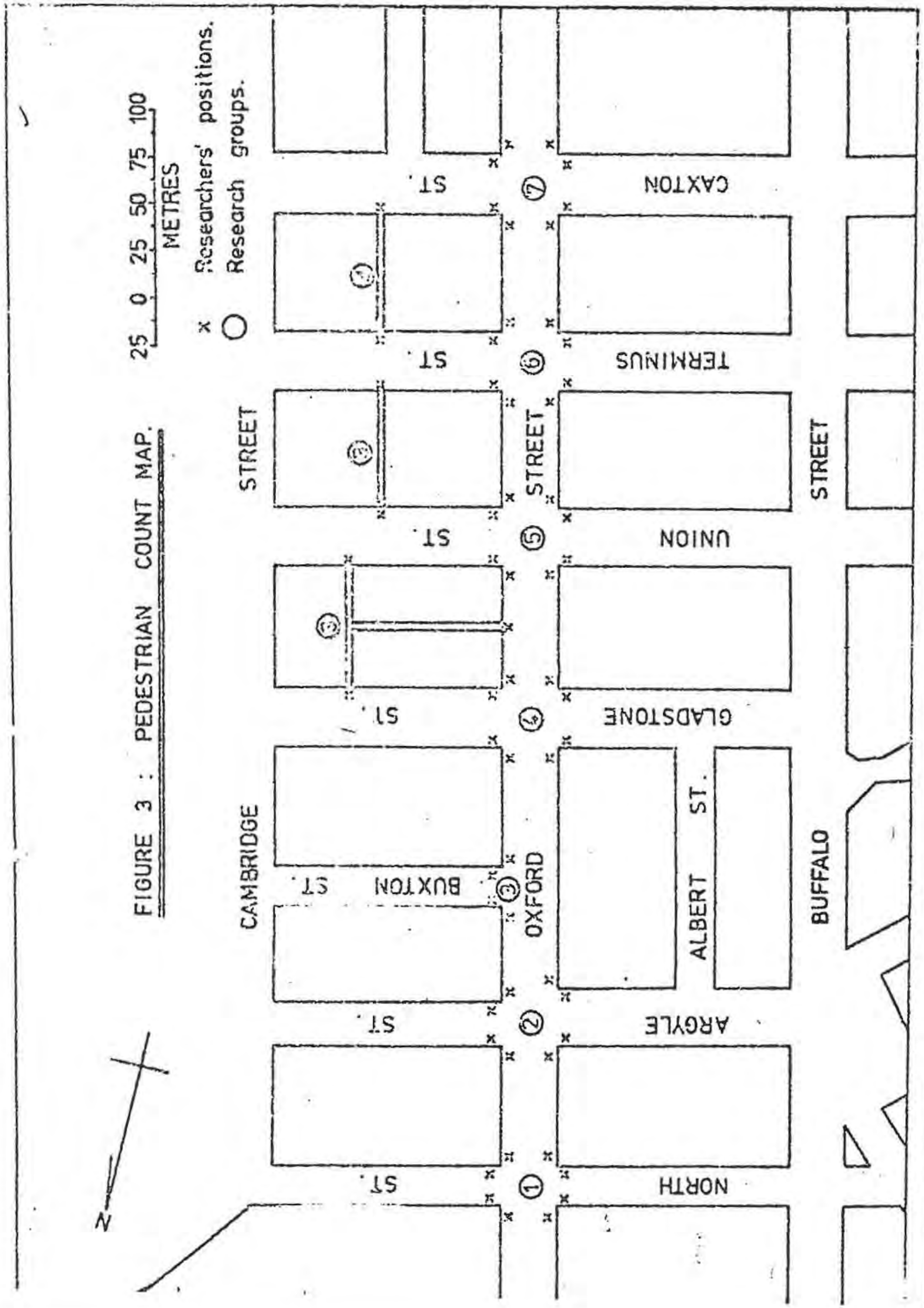


FIGURE 3 : PEDESTRIAN COUNT MAP.

SELBORNE COLLEGE

EAST LONDON URBAN TRAIL

PEDESTRIAN COUNT SHEET

DATE: .... RESEARCHER'S NAME: .... GROUP NO: .....

INTERSECTION: .... STREET: .... SIDE: (N, E, W or S)....

TIME OF CENSUS: From: .... to: .... TOTAL TIME: ....

Record one stroke for each person, and group strokes in fives for easy counting: e.g. ~~1111~~ 1 = 6

	ENTERING INTERSECTION	LEAVING INTERSECTION
WHITE	SUB TOTAL:	SUB TOTAL:
	ENTERING INTERSECTION	LEAVING INTERSECTION
NON-WHITE	SUB TOTAL:	SUB TOTAL:
	TOTAL:	TOTAL:

SELBORNE COLLEGE

EAST LONDON URBAN TRAIL

TABLE 1: BUSINESS LAND USE CLASSIFICATION KEY: (Natal Town and Regional Planning Commision, 1960.)

CLASSIFICATION			CODE		
CATEGORY	GROUP	KIND			
A. Private Office Space	A. Professional	1 Medical & Dental Rooms	A	A	1
		2 Legal Rooms			2
		3 Technical/Professional Consultants			3
		4 Miscellaneous			4
	B. Service Offices	1 Estate Agencies		B	1
		2 Miscellaneous			2
	C. Financial	1 Commercial Banks		C	1
		2 Building Societies			2
		4 Insurance Companies			4
		5 Miscellaneous			5
B. Shops	A. Wholesale	1 Wholesale Dealers	B	A	1
	B. Retail	1 Department Stores		B	1
		2 General Dealer			2
		3 Food Shops			3
		4 Bottle Stores			4
		5 Clothing Shops			5
		6 Pharmacies			6
		7 Electrical Goods			7
		8 Hardware Goods			8
		9 Book Shops			9
		10 Furniture Stores			10
		11 Jewellers			11
		12 Builders' Suppliers			12
		13 Agricultural Goods			13
		14 Auction Rooms			14
		15 Bicycle Dealers			15
		16 Florists, Nurserymen			16
		17 Office Equipment			17
		18 Miscellaneous			18
	C. Service Shops	1 Food and Drink		C	1
		2 Personal Service			2
		3 Clothing Service			3
		4 Household Service			4
		5 Display/Commercial Service			5
C. Places of Public Assembly	A. Places of Amusement	1 Theatres, cinemas, etc	C	A	1
D. Warehouse	A. Warehouse	1 Storage warehouses	D	A	1
E. Educational	A. Educational	1 Libraries, Museums	E	A	1
G. Governmental	A. RSA & Provincial	1 R.S.A. and Provincial	G	A	1
	B. Local Government	1 Civic Uses		B	1
H. Motor Services	A. Garages	1 General Sales and Service	H	A	1
		2 Specialised services			2
		3 Spares			3
I. Industry	A. Industry	1 Manufacturing	I	A	1
K. Fresh Produce	A. Market	1 Market	K	A	1
L. Residential	A. Hotels	1 Licensed Hotels	L	A	1
	C. Flats	1 Flats, Rooms		C	1
N. Vacant Land	A. Vacant Buildings	2 Buildings under construction	N	A	2
		4 Vacant office/shops			4

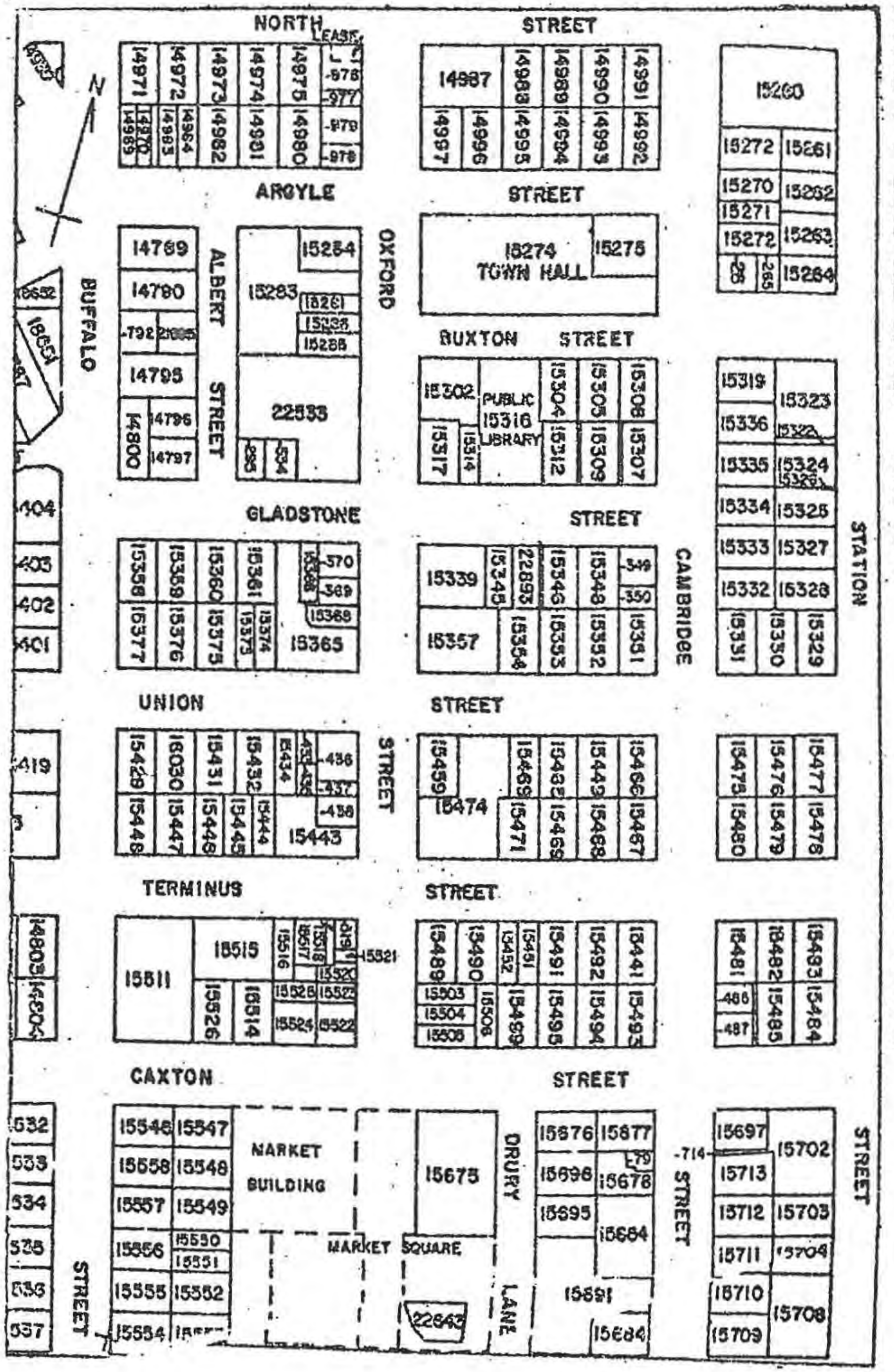
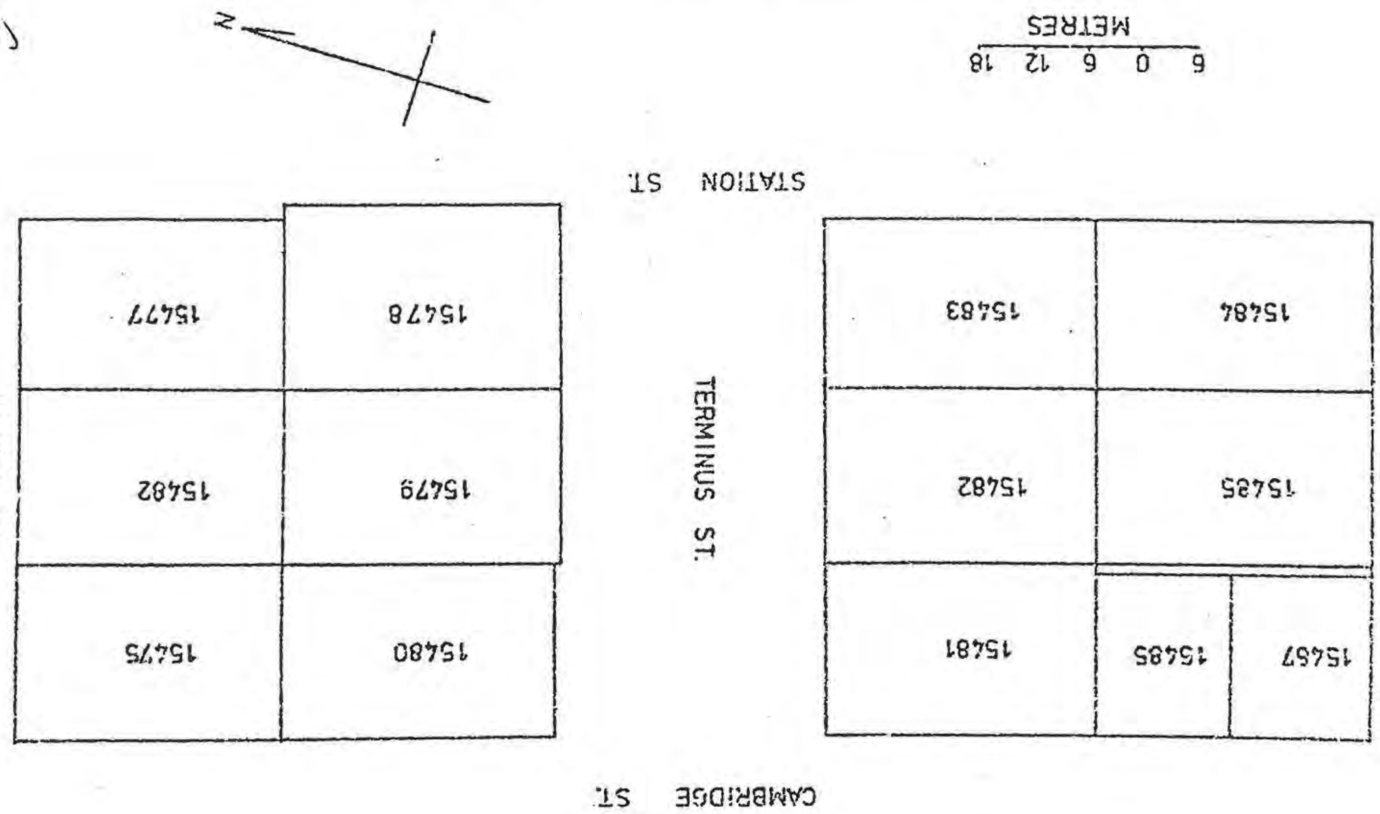


FIGURE 1: LAND USE SURVEY - BASE MAP.

FIGURE 2 : LAND USE SURVEY - STREET BLOCK.



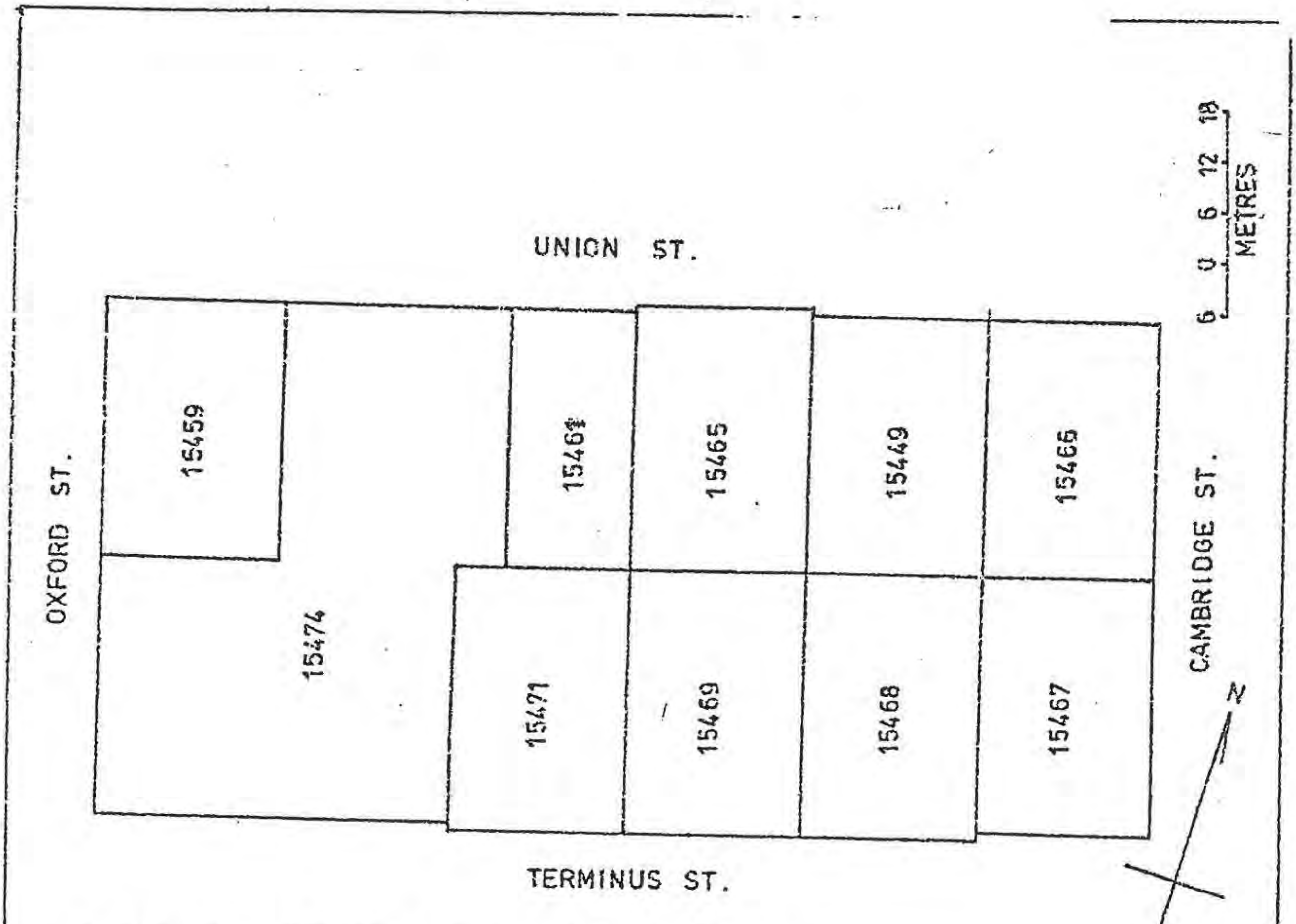


FIGURE 2 : LAND USE SURVEY - STREET BLOCK.

APPENDIX 8C

CLASSROOM "FIELD WORK"

EXAMPLES OF CLASSROOM "FIELD TRIP" - STD 9

(Nicholson and Morton - Working with Maps, p. 52)
(Map extract Broederstroom 2527DD)

Complete a hydrological analysis of the area depicted in the above map extract. Note the completed analysis should contain the following:

I A description of:

(a) The river types according to their flow pattern.

(b) The river types according to the direction of flow and in relation to slope.

(c) River patterns and their relation to the geomorphological processes in the area.

(d) Examples of river capture and how they may have occurred and the features related to the capture.

(e) Factors that affect runoff and drainage density.

(f) Features that have been formed as a result of the stream processes and erosion.

2 Calculations related to:

(a) Stream ordering and drainage density.

(b) Longitudinal profile of the Crocodile River.

(c) Cross-profiles of the Crocodile at points I, 2, 3 and 4.

(d) Hydrographs of the Hennops and Crocodile rivers.

3 The final analysis should combine conclusions related to the calculations and the description in order to give an overall picture of the drainage of this area.

4 Suggested procedures:

(a) Make a tracing of the streams on tracing paper and use this for calculations, etc., and for indicating features that have been identified, stream patterns etc.

(b) A clearer picture of the area will be obtained by using the Brits map (S A Landscape).

(c) Make notes on the various sections then when you have identified, calculated, etc., use the following outline for the completed analysis.

(i) Introduction: The situation of the area, the climatic factors that are relevant to the drainage of the area, the effect of man and man-made structures.

(ii) The geomorphological processes.

(iii) The river and stream analysis.

APPENDIX 8D

EXAMPLES OF GROUP PROJECTS (FORMAL AND EXTRA-MURAL)

EXAMPLES OF GROUP PROJECTS (FORMAL AND EXTRA-MURAL)

TOPIC	LINE OF ENQUIRY	RESOURCES
1 Analysis of beach ecology	Systematic scientific	* Printed: books, journals, almanacs, occasional papers * Investigation in situ to collect data * Museum personnel: conchologist and biologist and other natural scientists * Nature conservation (forestry)
2 Analysis of geomorphology and estuarine areas	Systematic scientific	* Printed material * Investigation in situ * Museum personnel * Nature conservator * Members of CLEO project * Geologists
3 Beach management strategies	Phenomenological and framework method	* Printed material * Investigation in situ * Town and regional planners both municipal and private * Members of the public using the beach area * Department of Tourism * Traffic Department * Nature conservation * Museum personnel

Beach studies of sensitive areas along the coast were done in two consecutive years by the Std 9 group at the request of the local nature conservator, each pupil choosing a particular aspect of study, either as their major or minor project. The Nahoon estuary project is being continued (1991) by the school as part of the national CLEO project (Appendix 8C)

4	An analysis of spread of "Reef worm" colonies in the East London area	Scientific	* Printed material * The biology teacher * Nature conservator * Museum staff * Investigation in situ

This project was exhibited at the 'Science-Expo' (Grahamstown, 1989) and pupils were invited to present their findings for publication in the **Naturalist.**

5	The redevelopment of the Quitney	Framework fieldwork/ scientific/phenomenological	* Printed material included: census data, archival material, occasional papers * Investigation in situ * Town and regional planners * City engineer * Traffic Department * Mayor and town councillors * Members of the public: residents, show-owners, hotel managers, tourists * Museum personnel

The above project was an inter-schools project, the working documents of which were presented to the Town Council and are at present in use with two other surveys of the area.

6	Conservation strategies in South Africa: a case study in the Border and Ciskei	Phenomenological	* Printed material * Investigation in situ of the Mpongu Park Nature Reserve, Mtiza forest area, Tsolwana game reserve and Cove Rock Beach * Nature conservator

			* Department of Environmental Affairs * Parks Board members * Park managers and staff * Members of the public using the areas * Headmen of the Tsolwana Tribal Trust area

Results presented at an 'open night' to members of the public.

7	Developmental strategeis for third world areas: a case study in the Katberg area of Ciskei	Phenomenological	* Printed material * Investigation in situ * Ciskei sawmills manager * Askei forestry * 'Lorraine' estate managers and researchers * Tenant farmers * Katberg Hotel management * Subsistence farmers * Ciskei Water Affairs - Kat-Fish irrigation scheme hydrologist

Results presented at an 'open night' to members of the pupblic,

8	Multi-discipline study of Hogsback	Framework fieldwork	* Printed material, including material for the area * Investigation in situ * Forestry personnel in the area * East London Nature Conservator * Museum personnel in East London * Prof M E Marker of Fort Hare * A local geologist * Village councillors

* Residents in the Hogsback area

* Hotel managers in the area

* Hobbiton Outdoor Education Centre personnel

* Tourists in the area

This study was completed by various groups over a period of years with individual groups studying aspects which interested them.

Other group projects included:

9 An investigation into the care of the senior citizens in the East London metropolitan area.

10 A study related to problems of teenage entertainment in East London.

11 A study of the provision for the handicapped in the East London area.

12 An analysis of Graaff-Reinet and Oudtshoorn to identify development in Central Place Areas in the hinterland.

13 A study of Historical Grahamstown and the 'Settler Country'.

14 An ecological analysis of the Double Mouth Coastal Reserve.

APPENDIX 8E

EXAMPLES OF INDIVIDUALISED PROJECT TOPICS COMPLETED BY STD 8 AND STD 9 PUPILS

EXAMPLES OF INDIVIDUALISED PROJECT TOPICS COMPLETED BY STD 8 AND STD 9 PUPILS

I Systematic scientific lines of enquiry were followed by pupils investigating the following areas:

* **Economic viability of a small farm**

  This study was done by two pupils where parents had recently purchased two farms each under 200 hectares. Each girl analysed the economic potential of the farms utilizing the local agricultural extension officers who provided guidelines for the study and helped with soil analysis. etc. The local nature conservator was also approached for help as were the local meteorology officers who supplied weather data.

* **Tick borne diseases in the East London area and its economic impact**

  The pupil made extensive use of the local tick research station where personnel made statistics available and provided guidelines for the study. The investigation centred on two local farms for the collection of ticks and data related to the frequency of tick borne diseases and the costs of eradicating these diseases.

* **The economic impact of various industries in East London**

  Individual pupils undertook studies of, inter alia, the following industries in East London, basing their studies on a single factory, Becketts, Mercedes Benz, Parker Pen, Textile factories, Wilson Rowntree, Koo fruit factory, among others.

* **The role of the harbour in the economic development of East London**

  The pupil made extensive use of archival material based in the East London Museum, various departments in the East London Municipality and the then S A R and H, representatives of the Unicorn line and harbour personnel.

* **A study of the Amalinda Forest Station and the restocking of rivers and dams in the area with various fish varieties**

* **A study of the pineapple industry in East London**: a case study of Shelford Pineries and the pineapple research station.

* **Sewage disposal and water purification in the East London municipal area**

2 Phenomenological or framework fieldwork was used by pupils engaged in studying areas such as the following:

* The role of the museum in the community.

* The role of the theatre in the East London community: a study of the Guild Theatre.

* The location and history of a variety of East London historical buildings (done by individual pupils each of whom did a study of a particular building).

* Architectural styles of East London CBD and surrounding suburbs.

* Suburban studies: pupils from various suburbs undertook a geographical and historical study of their own suburb area.

* The "lung areas" of East London: a study of the diminishing commonage and park areas of East London. This pupil mapped these areas over a period since the second world war, studying the percentage decrease of open areas as a result of development.

* The Mtiza Forest Reserve: a variety of studies were undertaken in this area, including:

    - trees of the forest reserve
    - the Mtiza tree
    - medicinal plants in the forest reserve
    - the history of the conservation of the area

* Individual resort or holiday areas were studied by various pupils who looked at the location of the resort, the tourism generated by the area and management strategies in terms of the resort's environment.

3 Theoretical studies based on problem identification and solutions related to mainly printed material, included topics such as:

* The geographical spread of AIDS and the implications for South Africa.

* Space exploration and whether it is justified in terms of the costs. (This was completed by a pupil who had visited the NASA headquarters in the USA in the year prior to doing the project.)

* Volcanoes and natural disasters - based primarily on the St Helens eruption in the USA.

* Tropical cyclones and their impact on Southern Africa - based on a detailed study of Domoina and other tropical cyclones which have affected South Africa over the past 20 years.

4 Semi-theoretical and field based studies were completed by pupils who accomopanied their parents on holidays in South Africa and abroad. As the project topics were discussed early in the first term, pupils who were visiting other areas of interest and who wished to incorporate their visits into their project work were given guidance in the theory and preparation. In this way the following areas were incorporated into the project component, among others.

* A comparison of the geology and geomorphology of the Northern Ireland east coast and the East Cape coastal area.

* A study of the Grand Canyon and the environmental implications of intense tourism at selected areas.

* The two faces of Mauritius: tourism versus the local population.

APPENDIX 8F

BASIC CRITERIA FOR THE ASSESSMENT OF IST

BASIC CRITERIA FOR THE ASSESSMENT IN IST (DESIGNED FOR THE TEACHERS' AND THE PUPILS' USE

I LANGUAGE

The following aspects will be considered:

* spelling, grammar and general competence
* correct use of geographical terms
* clear, coherent sentences, correct use of paragraphs
* logical sequencing of ideas
* clear introduction, conclusion which draws main ideas together

2 PRESENTATION

(a) Aptness with regard to the topic:

* use of correct conventions relating to report writing, essays, data presentation, data analysis, use of visual material (no decoration)
* use of correct conventions relating to captions, etc.

(b) Neatness

* simply means what it says - avoid sloppy, work

(c) Use of assignment conventions

* referencing; use the Harvard system you have been given
* acknowledge quotes
* use your own language
* acknowledge sources
* correct use of title page, contents page, lists of tables and illustrations
* reference in text to illustrations

3 ILLUSTRATIONS

(a) Presentation of illustrative material

* frame and number of illustrative material
* use captions
* when doing schematic diagrams, field sketches, etc., use black pen or pencil for drawing (no blue or red pens).
* use the conventions you have been taught for the labels of diagrams

(b) Acceptable illustrative material

* graphs
* maps
* tabels
* schematic diagrams
* field sketches
* photographs
* photostats (ONLY IF RELEVANT TO TEXT and has been referred to in text).

N.B. ensure that you develop and present the illustrative material correctly.

PICTURES ARE NOT ALLOWED -you will be penalised for including pictures from ANY SOURCE WHATSOEVER.

Remember: illustrations are there to highlight or to clarify a point you are making.

(c) Relevance of illustrations. Ask yourself:

* are they necessary?

* do they add to the text?

* are they in keeping with the theme?

* do they show originality, insight and creativity?

* are there areas in the text that need additional illustrative material to clarify the point being made?

4 CONTENT

(a) Reference to topic. Ask yourself whether you:

* have achieved the aims and objectives of the task?

* have you done precisely what you have been instructed to do or what is necessary in terms of the guidelines?

(b) Logical development

* does the content flow logically without being disjointed and bitty?

* have you given evidence for statements or assumptions you are making?

* check each timeyou use 'therefore' or 'thus'; this means that the point you are making is a logical and correct result or effect of the previous statement..

* watch sweeping statements.

(c) Insight

* is the text purely descriptive or have you answered the question, why? what? where? what implications? what effects? what do I think? why do I think? what ought to happen? what ought to be done, why?

* have you looked at all sides of the problem?

* have you weighed up the evidence?

* have you justified your position?

* have you considered all the possibilities?

* HAVE YOU THOUGHT ABOUT WHAT YOU HAVE PUT ON PAPER OR WHAT YOU ARE SAYING?

5 ORIGINALITY OF APPROACH

* have you looked beyond the obvious?

* is the text, the presentation, the illustrative material, innovative, creative and generally interesting?

APPENDIX 8G

CRITERIA FOR PEER GROUP ASSESSMENT

CRITERIA FOR PEER-GROUP ASSESSMENT OF GROUP AND INDIVIDUAL PRESENTATIONS

I Presentation techniques

(a) What aspects of the presentation do you think were particularly:

(i) interesting in terms of 'audience appeal'?

(ii) useful in helping to put across a section of the work?

Why do you think the aspects you identified 'worked'?

(b) Were the speakers audible? Did they speak clearly and was it easy to follow their presentation? (if a verbal presentation).

(c) Was the material easy to follow and clearly expressed? (if a written presentation)

(d) Did the visual material add to your understanding of the material? Why did it do so?

2 Content of the presentation

(a) What aspects did you find interesting? What made them interesting?

(b) What did you learn from the presentation? What helped you to learn?

(c) Were the material clear, logical and substantiated by evidence?

(d) Was there a balance between description and explanation in the presentation?

(e) How would you have improved the material?

N.B. On the basis of the above factors, rate the presentation as follows:

A - Excellent
B - Very good
C - Good
D - Needs to be improved in the following areas:

____

____

APPENDIX 9

PUPIL EVALUATION OF FIELD RESEARCH

PUPIL EVALUATION OF RESEARCH PROJECT

"...we have included brief notes under the subheadings 'personal development,' 'what we noticed in others involved in the project' and skills developed'."

Personal development

We developed the ability to communicate under pressure, since the time spent together as a group was limited and we had to make the most of each brief meeting so as to obtain maximum output and development in research. Working in a group situation also enabled us to achieve a better perception of different opinions and to set aside our own bias in the face of group conflict in order to allow others to be heard. We gained confidence in one-on-one as well as one-to-many situations, i.e. within the group, in interviewing and in presenting the final product to the public. Such exposure also developed our own leadership qualities. Each person in the group, however, benefited the same in this respect, since we all had heavy loads to bear and expectations to live up to. The project initiated a greater awareness and appreciation of the multi-faceted problems which face the modern urban environment.

Although sometimes strained, the group situation was pleasant and conducive to friendly interaction between group members, which would not normally have been possible.

What we notice in others

What was noticed was a transformation in others involved in the project, from virtual apathetic disinterest to committed and enthusiastic involvement as a result of persistent encouragement from our teacher. As a result of the extended duration of the project, interest in some members varied leaving a few others to continue the study.

We also noticed a gradual awareness of others of the serious problems facing the city and a realisation that they are in fact part of the problem and not yet the solution.

Skills developed

In addition to personal development, the project was beneficial in other ways too:

* The fact that the finding of the study would be presented to the City Council provided us with productive motivation to produce useful and intelligent contributions to the study. Motivation, therefore, bred enthusiasm and involvement and each member had a REAL (not imagined) responsibility not only to herself but to the city.

* Interpersonal communication between boys and girls, without sexual connotations and petty adolescent prejudices, proved beneficial to both sexes. We were required to function as a unit and we did so successfully.

Other skills included:

- Learning to function not as an individual but in a group and to lend support to other individuals and face the disintegration of the group structure.

- The ability to use creativity productively.

- By solving problems knowing that the consequences would affect real-life situations, not situations conjured up by a teacher-in-charge, we became actively infolved, enabling us to use our abilities to their fullest potential.

- Interaction with the public taught us to deal with the reactions and ideas of other people, i.e. we were given a taste of what the real world was like..."