# AN ANALYSIS OF PROBLEMS ARISING OUT OF ENGLISH MEDIUM INSTRUCTION OF PUPILS IN TEN CISKEIAN SCHOOLS, WITH PARTICULAR REFERENCE TO GEOGRAPHY IN STANDARD EIGHT.

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# CHAPTER ONE

## BACKGROUND TO THE STUDY

Helm (1979) prefaces his study on First Language medium of instruction among black population groups in Africa and more specifically the Republic of South Africa, with two quotations which concisely define an issue which has enjoyed considerable debate in recent years among educationists and educational authorities.

> "Given that a child is fit and well, the gravest handicap he can suffer in school is to be unfamiliar with the language of instruction."
>
> (Brier and Pauli: 1970 p 99)

> "To teach a child in a language he does not know is the best way to kill his interest in both the new language and the subject he is to learn."
>
> (Hall : 1969 p 81)

Pupils in the Republic of South Africa in the T.B.V.C. States (Transkei, Bophuthatswana, Venda and Ciskei) are expected to commence study in all school subjects, except the first language (Xhosa, Tswana, Venda etc) and the third language (Afrikaans), through the medium of English at the Std. 3 level. English thus is the official medium of instruction for the greater part of the pupil's school experience. All examinations in all subjects (except those mentioned above) are set and answered through the medium of English. School textbooks from Std. 3 upwards, in all subjects, are written in English. It is fairly safe to assert, therefore, that English should be the language life of the Higher Primary and Secondary School classroom.

In 1953 a UNESCO report of proceedings of a conference held in 1951 maintained that the best medium for teaching a pupil was that of the mother-tongue. The report pleaded for mother-tongue instruction to be extended to as late a stage as possible in a pupil's school life (UNESCO 1953).

While such a plea may be grounded on sound psychological and pedagogical reasoning, it is often ignored because of the realities existing within the educational system. The R.S.A. and the T.B.V.C. states are a case in point for as I have already mentioned,examinations, textbooks, and for that matter tertiary education at the post-matriculation level, all employ English as instructional medium. Pragmatism carries the day and the black pupil is compelled to use English. Other factors applicable to the South African context are the existence of many different ethnic groups, each with its own language, and the fact that a shortage of qualified and experienced teachers in many subjects and different levels within the schools has meant that often teachers whose first language is English are involved in teaching pupils from these various language groups.

In many spheres of life (e.g. Commerce, Science, etc) the universality of English has led to its adoption as possibly the most convenient medium of communication between different language groups.

It is not my intention to embark on a lengthy discussion of the issue of mother-tongue versus second or foreign language instruction. Such a discourse would extend far beyond the limits of a half-thesis such as this present study. In any case Helm, in his study, has handled this topic at great length.

## THE OBJECTIVES OF THE STUDY

It is against the background such as the one I have outlined above, that I approach my area of study. While working among teachers in the Ciskei in In-Service Training and while visiting various schools in the course of my duties the convictions that I have regarding the overwhelming problems facing pupils who have to use a language other than Xhosa, their mother-tongue, for virtually all their schooling, have been deepened.

While some South African writers have considered aspects of the language medium influences in schooling (De Wet 1967 )(Dreyer 1969)(Hartshorne 1967 ) very little appears to have been done in the Ciskei. Duminy (1972) addressed himself to such issues in his research project dealing with language as the medium of instruction in certain secondary schools in the Ciskei.

It is my intention in this study to go beyond simply subscribing to the widely held belief that Ciskei pupils under-achieve in the present educational dispensation because among the many and varied problems that they face is that of having to cope with the demands of this schooling through an unfamiliar language.

I have sought to address the extent of this language problem at the Std. 8 level and have considered one aspect of one of their school subjects, viz. Geomorphology section of the Geography syllabus.

The questions that I pose are as follows:

> To what extent are Std. 8 Geography pupils likely to under-achieve because of shortcomings in their verbal ability and understanding of certain geomorphological concepts?

> Should this be viewed as purely a language issue in its broadest sense or should one not perhaps look deeper into the problem by considering the language of the textbooks authorised by the Ciskei Education Department and by considering the classroom language of the teachers concerned?

## THE METHOD OF THE STUDY

In this study various research activities were used.

a) **Literature study**

A consideration of aspects relating to matters such as:

( i) Language in learning:
( ii) Instruction through an unfamiliar language medium (Non mother-tongue instruction):
(iii) Concept formation in general and the role of language in this regard:
( iv) Concept formation in Geography:

as discussed in various publications. This study should in no way be seen as exhaustive. Rather it should be viewed simply as a means of clarifying certain points of the general theories relating to the issues listed above.

b) **An empirical study involving Std.8 pupils at certain Ciskei Schools.** This involved the following stages:

( i) Construction and administration of a suitable questionnaire in which pupils were asked to give their understanding of a selection of terms and concepts taken from the geomorphology section of the Std. 8 Geography textbooks. The formulation of the questionnaire stemmed from an analysis of terms used in the textbooks approved for use in the schools. At the same time a short readability study was done of the books concerned. Comments are also made on other aspects of the books insofar as these aspects are likely to influence pupil understanding of the subject.

( ii) Visits to classrooms at two schools in the sample of 10 Ciskei schools. The purpose of these visits was to record a series of lessons. In transcribing these recordings, attention was focused upon the language used by the teacher, and the extent to which the teacher involved the pupils in questioning in the classroom as part of the lesson presentation.

(iii) Administering a geomorphology test to the classes involved in step b (ii) in which some questions were set in the official medium of instruction (English), and some were set in the pupils' home language (Xhosa).

c) **A discussion of the results of the questionnaire and the geomorphology tests.**

A discussion of the language usage by the teachers recorded during the lessons in b (ii) above.

d) **Implications of the above discussion for:**

a) Educational authorities:

b) Further research.

# CHAPTER TWO

## LEARNING THEORIES AND LANGUAGE

At the end of the nineteenth century, James (1890) described Psychology, then a very new discipline, as the science of mental life. Since then various theorists and researchers have attempted to investigate and construct theories of cognition. Names such as Piaget, Skinner and Chomsky are synonymous with various stages in the development of a body of learning which could well be entitled, **'Learning theories'.**

Very much as a centre of interest in such theories has been the relationship between language and cognitive development (Piaget 1926; Vygotsky 1962; Bloom 1973; Luria 1976; Nelson 1977; Halliday 1975; Bowerman 1981).

The reader is doubtless acquainted with the various theories of the above writers. I feel I need only highlight one or two aspects which are particularly pertinent to this study.

Bloom ( 1973 ) supports a view currently in vogue by suggesting that cognitive development takes place before language development. Also this cognitive growth is quite independent of language development.

Halliday ( 1975 ) prefers an alternative perspective by suggesting that children use language from very early in their cognitive growth to assist themselves in constructing their own conceptual framework.

Unfortunately very little work appears to have been done on the inter-relationship between language and cognitive development beyond the early years of childhood (Encyclopaedia of Educational Research EER). Much of what little has been researched has been in the direction of the application of 'schema' theory. Cognitive schemata, (sometimes termed 'scripts'), developed in the individual through personal experience, enable the individual to go beyond

interpreting linguistic texts (as in the process of reading) by extending this interpretation to behavioural texts as well in personal interaction settings. In the same way as the process of reading can be viewed as an interaction between a text and a reader, cognitive schemata are brought to bear on a range of interactions. To the extent that these schemata are shared by readers or hearers, and these reader-hearers are able to detect any shortcomings or gaps in a spoken or written text, and to the extent that these reader-hearers are able to repair such gaps; to this extent will the communication intended be successful or otherwise (Di Vesta 1982).

A theory gaining increasing support is that proficient hearers or readers of a language do not apply themselves to every word that they hear or read. Rather they utilise a sample of the received text to enable them to understand what is being said or written. Only if such an understanding is lacking will they return to the text via repetition, re-reading etc., in an attempt to obtain clarification. Hearers, however, are at something of a disadvantage, for they have no text to return to. They can only do as readers have done by asking of a speaker, "Could you repeat all that please?". If as the theorists propound, the use of cognitive schemata is vital to interpretation and subsequent cognitive growth then a major responsibility is placed upon the formal education sector to help pupils internalise these schemata. It is imperative that pupils develop such schemata.

Now in most industrialised nations formal education is to a large extent linguistically mediated so the relationship between language and cognitive development is of great importance (Troike 1982). Because school is a fairly late cultural invention, and because the thinking processes, as well as the language used, are specific to a particular context, the failure of pupils to achieve in school may be partly attributed to a failure on the part of these pupils to acquire the linguistic structures necessary for the learning

of cognitive skills. Troike quotes Cummins ( 1979) who argues that the acquisition of 'academic language' is vital for academic achievement, (this achievement, rightly or wrongly, being viewed as a surrogate measure of cognitive development) Cummins emphasized that much of academic language is what can be termed 'context-reduced' language as opposed to 'context-embedded' language. The latter is seen as language with which the pupils are familiar because of interpersonal interactional settings. Context-reduced language, on the other hand, demands that the pupil form mental constructs largely from the language itself, as the actual context of the situation cannot be used to interpret what is being said. Thus, Cummins maintains, this ability to handle information contained in 'context-reduced' texts is at the centre of the educational process.

Oller (1980) identified a general factor of language proficiency that had to be taken into account when considering education. He went so far as to suggest that in essence measures of intelligence (i.e. scores on tests) were but measures of language proficiency. What such intelligence scores did was to reflect his subjects' general language ability relative to a particular body of context-reduced language used in schools and in testing.

It is language which unlocks the intellect and permits people to achieve what they do across a wide range of activities. Marais (1975) supported the above contention with the claim that unless a person possesses an adequate language system he can be likened to a stranger in the world within which he lives. He will be unable to accept or manage the ever-increasing flood of new knowledge, things and happenings that engulf him. (Marais p 14)

Du Toit and Van der Merwe (1966) suggest that a person's whole cognitive life is governed by the general system of symbols

and words that we term 'language'. Helm (1979) supports Dreyers' contention that language and thinking are dependent upon each other for their very existence. He quotes Saunders ( 1971)

> "Language enables us to make sense out of reality... Our perceptions, to the extent that they represent anything more than crude sensation, are organised around concepts, each of which is represented by one or more verbal symbols." (p 189)

Duminy ( 1975 ) tied functional knowledge and its application to various situations in which an individual may find himself to language. It is through language that man is enabled to transport ideas and knowledge in abstract. Therefore the whole educative process is based on language.

As far as schooling is concerned it means that if pupils are to make sense of their school experience they must have the linguistic capabilities to facilitate this. They must be fully conversant with the language of the school. Not only must there be this ability on the part of the pupil, but attention must be given, by the educators, to the way this language is used in the processes of school learning.

Largely through the influence of writers such as Barnes ( 1969 ) there has been movement away from conceiving of language simply as a communicative tool and towards thinking of language as the means whereby children not only communicate but also learn and understand. Language is used for learning. It is, to use the Bullock Report terminology;

> "The linguistic process by which pupils acquire information and understanding"
>
> (p 529)

Marland ( 1977 ) refers to F R Leavis's assumption about the function of language. To Leavis it was a vehicle for discovery and not merely a means of communication. Language is used to put new ideas into words; it is used to combine new ideas with ones that already exist, and it can be used to test this new thinking on other people.

As Barnes suggests, language should be viewed as 'language for learning'. The role of verbalisation is that of assisting pupils to modify and reform their existing ideas. He sees language as a heuristic device whereby new knowledge penetrates to the source of a pupil's actions. This knowledge is gained through exploratory talk in which pupils are able to formulate ideas and concepts for themselves. Such knowledge, which can be termed 'Action Knowledge' is far removed from the situation which exists in many schools at present where the only talk is 'functional talk', where pupil comment and discussion is usually in direct response to teacher solicitation. This functional talk, according to Barnes, leads to what he identifies as 'School Knowledge'; knowledge which is learnt but not necessarily understood.

## NON-MOTHER TONGUE INSTRUCTION

The discussion in the previous section of this chapter focused on the role of language in learning. In this regard no attempt was made to differentiate between this language as the learner's First Language (1 L) or Second Language (2 L).

I wish to discuss some aspects of the issue of non-mother tongue instruction. The work of numerous writers (Cingo 1967) (Dreyer 1969) (Helm 1979 ) would have me believe that attempts to teach a child through a 2 L are fraught with pitfalls. Other researchers (McConkey 1951, Juarey 1975) appear to refute this by emphasizing studies in which they found no real evidence that this is indeed the case.

Cingo (1967) maintains that it is extremely important that children be taught through the medium of the mother tongue. Dreyer (1969) reasserts this contention in his viewpoint that no other language medium can take the place of the mother tongue. In Helm's review of the literature on non-mother tongue instruction most writers consulted asserted the importance of mother-tongue instruction as the best means possible to achieve the highest levels of conceptualisation, not merely because people communicate by means of language but because people think and understand through language. And it is this understanding which is vital for as Helm points out by quoting Mursell ( 1954 ), the crucial point about all learning is not only to remember but also to understand. Kolesnik's (1963) findings support such a contention. He stated that clear thinking has been shown to depend upon an understanding, not only of the meaning of words but also on an understanding of the meaning of meaning and any deficiency of such an understanding of meaning caused by 2L instruction could well lead to mechanical or rote learning. One does not have to have much first hand experience of schools in the Ciskei to realise that such mechanical learning is a widespread phenomenon. In terms of Kolesnik's reasoning such rote learning is probably a response by the pupils to their failure to grasp and understand

what they have been taught through the medium of their 2 L, English. This "manipulation of word tokens without meaning" (Gudschinsky 1977) is the pupil's attempt to solve the whole problem of a lack of understanding. It is the obvious futility of learning words without the meanings which is at the heart of the problem.

Duminy ( 1975 ) referred to this type of learning firstly as artificial knowledge. Secondly he described it as superficial knowledge. This type of knowledge arising from mechanical learning, Helm suggests, is characteristic of most societies where pupils are taught through a second or foreign language medium.

Another criticism that can be levelled at the use of the 2 L as instructional medium is that such an approach does not keep pace with the pupil's experiences of life. This leads to the pupils existing in two linguistic spheres - the language world and experience of the home and the language world and experience of the school. That there is a connection between the two worlds cannot be denied (as my discussion below will illustrate). These two areas exert great pressure on the pupil and inevitably a gap opens up between the two. On the strength of the findings of Dil and Gudschinsky, Helm suggests that this gap is precisely the reason for the seemingly high drop-out rate of pupils who have to study through a 2 L.

It was the growing awareness of such problems that led to moves in the United States of America to compensate for such problems by the introduction of bilingual education. In 1968, the U.S.A. Bilingual Education Act was based on the premise that in principle as well as legally the rights of an individual to educational opportunities are in effect violated when students who do not understand English are taught entirely in English. This Act gave rise to the highly controversial bilingual education programmes in which pupils are taught through both English and a home language. While the Ciskei does not have

circumstances which warrant such a bilingual approach, my personal experience over a period of five years of prolonged contact with classroom practice leads me to suspect that perhaps the incidence of a teaching approach which could be included under the descriptive title of 'Bilingual Education' is more widespread than is realised. The extent of such bilingual teaching from Std 3 upwards is an area worthy of research. Possibly the prevalence of this approach may go some way towards explaining the apparently low standards of English proficiency at all levels in Ciskei Schools.

This whole area of bilingualism in education has been commented on at length by Cummins (1979). In his examination of the whole issue he postulated 2 hypotheses. Firstly he suggested the 'Threshold hypothesis' which dealt with the effects 'per se' of bilingualism. Cummins argues that the level of competence children achieve in their two languages is the determining factor in whether the bilingualism they encounter in schools has a positive or negative effect.

> "Specifically there may be threshold levels of linguistic competence which bilingual children must attain both in order to avoid cognitive deficits and to allow the potentially beneficial aspects of becoming bilingual to influence their cognitive growth."
>
> (p229)

Their first threshold he sees is that which children must reach if bilingualism in school is not to have a negative effect. This point varies according to the child's stage of cognitive development and the academic demands that different levels of schooling make.

Cummins' second hypothesis is the 'Linguistic interdependence hypothesis'. Here he suggests that the level of competence a child reaches in a second language learned in school is a function of certain competencies reached in the child's first language. He explains that when the use of certain functions of language and the development of vocabulary and concepts in the 1 L are stressed in the child's 1 L linguistic

environment (particularly outside the school) then extensive exposure to the 2 L is likely to result in high levels of competence. Should children, however, have less well developed skills in aspects of the 1 L then extensive exposure to the 2 L in school, especially in the initial years of schooling, will not necessarily result in acceptable levels of competence in the 2 L. Furthermore, the actual continued development of the 1 L is likely to be impeded. This hypothesis is based on Cummins belief that the basic skills that a child must possess to benefit positively from a bilingual approach are:

( i) understanding of concepts or meanings embodied in words,

( ii) realisation that print is meaningful and that spoken language is different to written language,

(iii) ability to take language out of its immediate context.

What occurs is that in the school experience the child is brought into contact with decontextualised language; the language of the text, the formal language of the school. Therefore if a child comes to school with some experience of text, such a child is at a distinct advantage when compared to the child who does not have this experience. What the child then faces is

(a) learning the language of the school, and
(b) learning a 2 L.

If such a hypothesis were proved true it might hold out a part explanation as to why black pupils should have such language problems in the school environment.

Dawe (1983) attempted to do just this in his study of the ability of bilingual children growing up in Britain to reason deductively in English as 2 L. He tested Cummins' linguistic

interdependence hypothesis and also examined the implications for teaching of a child's ways of reasoning and the use of language to solve mathematical problems. Dawe concluded that whatever the medium of instruction it appeared that mathematical reasoning in a deductive sense was closely related to the ability to use language as a tool of thought. He emphasized that in the case of bilingual children this involved competence in both languages. He was able to show that,

> "....the ability of a child to make effective use of the cognitive functions of his first language is a good predictor of his ability to reason deductively in English as a second language." ( p 349)

The importance of this finding is that although the point at issue is the use of 2 L instruction and its effects on pupil achievement it appears that the maintenance of the L1 needs to be taken far more seriously as a means of developing the cognitive flexibility of bilingual children.

This interdependence of the 1 L and 2 L is recognised in the theoretical underpinnings of the Molteno Project of the Institute for the Study of English in Africa. Their starting point in the development of a programme designed to increase pupil proficiency in English as 2 L rests upon acceptance of the importance of a sound grounding in the 1 L. (Rodseth 1978)

Much has been written internationally on the whole issue of 2 L instruction. A few examples will be sufficient I trust to reinforce the point.

The Survey in 1979 by the American National Centre for Educational Statistics found that 90 per cent of foreign-born Asian-Americans were living in households whose dominant language was not English. It found that children of school

going age from these households encountered great difficulties in school when taught through the English medium.

R J Souvinay (1983) examined Mathematics Achievement and Language and Cognitive Development in Papua New Guineau schools. He established that measures of English reading ability and cognitive development correlated highly with mathematics achievement. Of local interest was the bilingual experiment carried out between 1946 - 1949 by the Cape of Good Hope Education Department. In sample schools the 2 L was used as a medium of instruction. The general conclusion was that in schools where the 2 L knowledge was weak the content subjects suffered but where the 2 L was fairly strong the content subjects did not suffer through 2 L instruction.

A similar study was undertaken in Natal schools in the late 1940's. McConkey (1951), Chief Inspector of Schools in Natal, was instructed amongst other things, to enquire into the measure of success achieved by pupils who had received their instruction through a second language. This study was in response to the Natal Provincial Ordinance which sought to encourage bilingualism by instructing that each child be taught some portion of the curriculum through the medium of his second language (Hauptfleisch 1975).

Unfortunately McConkey's findings have been invalidated by criticism by Hauptfleisch. This criticism focused on the use of a single vocabulary test as a test of proficiency. This to Hauptfleisch seemed rather limited. Also the failure to isolate other variables such as home influence, aptitude for learning languages, teacher abilities, sex differences and urban versus rural schools were identified as major weaknesses. The use of pre-war norms and the failure to include a full account of the results obtained were seen as further serious shortcomings.

McConkey did however report some interesting findings. He found that the standards of bilingualism of the pupils, and often the staff, was often inadequate for the 2 L instruction to be of benefit. Surprisingly he also found that generally there was no disturbing drop in achievement on the part of the pupils. This apparent contradiction is echoed in a later study by Jaurez (1975) who found that the teaching of Science-process skills did not gain transfer advantage by being taught either in English 2 L, Spanish 1 L or by means of a bilingual approach.

I trust that the close association between language proficiency, conceptualisation and pupil achievement is now obvious. What the above discussion has done has been to emphasise the very severe constraints often placed upon successful learning in schools by 2 L instruction. Helm (1979) pleads for this awareness on the part of educators,

> "op grond van die noue verband wat daar tussen taalbeheersing en verstand ontwikkeling sou bestaan, kan aangevoer word dat dit 'n essensiële voorvereiste is dat die kind op skool die taal waardeur hy onderrig ontvang, behoorlik moet beheer". p 22

Ciskei pupils have to study through English; they have to write tests and examinations in the medium and they have to utilise the language in many facets in their school life. While the overwhelming consensus of opinion in the literature (apart from a few minor exceptions, e.g. some mentioned above) is that 2 L instruction is not the best way of doing things, the many issues that I mentioned in passing in my introduction have necessitated the use of English in the black schools. The situation could change. The independent national states of the T.B.V.C. fold might decide to test their independence by opting for an own medium of instruction,

or possibly an overt bilingual approach for educational motives similar to those that gave rise to bilingual education in the United States of America, but certainly not for similar social motives, i.e. the assimilation of a minority ethnic group into the larger American group. The enormity of cost and organisation involved in such an adoption of an own medium of instruction leads me to accept that pragmatism will triumph and the status quo as far as medium of instruction is concerned will be maintained. English is likely to remain the official medium of instruction and it is likely to continue presenting a major hurdle to the development of sound cognition among pupils at Ciskei Schools.

Against this background of difficulties caused by 2 L instruction consider now some aspects of concept formation in general and conceptualising in Geography in particular.

## CONCEPT FORMATION

According to Nelson (1977) most definitions currently adopted view concepts as organised sets of diverse objects or events that are nameable. It is this latter characteristic (name-ability) that he feels distinguishes them from other structures such as order, causality and conservation, all of which can also be seen as logical organisations.

Di Vesta (1982) conceives of concepts as functionally important parts of the schemata mentioned earlier in this chapter. It is through concepts that the user is able to simplify the infinite variety of single events by allowing grouping according to some unifying feature or characteristic. Furthermore these schemata permit the classification of a new experience, object or happening. They facilitate predictability of consequence of such functions or objects classified in a particular category. It is through concepts that learning, memory and communication take place. To Di Vesta concepts constitute the major anchors - to use Ausubel's (1968) terminology - at basic, subordinate and superordinate levels of schemata. Hence their importance for any attempt at communication between individuals. They are present in some form in all people from infancy. He quotes Rosch et al (1976) who was able to show that basic level concepts (i.e. those that have common properties enabling categorisation without any analysis of any specific attributes) are present in infants as young as 10 months. With growth and mental development such concepts become increasingly related to one another in an hierarchical organisation. This belief is not unlike that of Bruner et al (1966) and Vygotsky (1962), where such a developmental sequence was viewed as a steady progression from piles of unrelated objects to complexes or concepts based on fragmentary attributes that partially

defined the meaning of the concept.

Maclennan ( 1978 ) suggests a hypothesis on thinking that views all the thinking that one does about the inanimate objects of the physical world as capable of analysis into,

i) a finite number of elementary concepts,
ii) a future number of discernible mental processes or strategies of thinking.

To Maclennan this 'elementary structure' provides a useful model of how the mind learns about, and understands, the behaviour of inanimate objects. In this model,

> "all human beings tend to acquire the same set of these elements of thinking and tend to develop, in general, the same structure of processes and strategies with which to understand and control their physical environment" (p33)

Maclennan conceived of two worlds in the minds of humans; a world of words and a world of concepts. In this conception words are not in themselves concepts but merely visual or audible signals related to the concepts held in the non-verbal part of the mind. It is evidence that one part of the brain deals predominantly with words while the other deals predominantly with concepts and with the behaviour of things that leads Maclennan to this conclusion.

Lowenthal (1961) was able to demonstrate that every idea about the real world was a compound of personal experience, learning, imagination and memory. Every idea rests on the interpretation of fact and exists in the form of a concept. This ability to conceptualise is to Helm (1979) one of the most essential characteristics of mental activity and it is vital that every effort is made within the school context, to ensure that this ability on the part of the child is not hampered by factors such as language control.

Beard (1969) accepts Piaget's classification of the stages of mental development as a guide to understanding just how it is that children assimilate and accept concepts. This acceptance of concepts is dependent upon their mental development. The different stages (sensori-motor, concrete operations with its two sub-stages, pre-conceptual (1½ - 4½ years) and intuitive (4½ - 7 years), the concrete operations sub-stage (7 - 12 years), the formal operations stage) need not concern me here. What is important is the almost universal acceptance that this whole process of conceptual growth and the development of logical thinking is closely related to the development of language, and that the more refined and more abstract concepts become the more dependent they become on inter-personal communication, Graves (1975).

It has not been my intention to enter into lengthy discussion on concept formation in general. Rather, brief attention should now be given to the formation of geographical concepts and the implications for the learning of Geography.

## CONCEPTS IN GEOGRAPHY

Graves (1975) suggests that the learning of Geography implies the learning of certain concepts and theories. Such concepts may vary greatly in order of difficulty. Simplest are those which describe processes or features which the learner can observe at first hand; i.e. they are within the learner's personal experience of the environment within which he lives. Most difficult are those resting upon definitions or principles which express relationships of an abstract nature. Graves highlights the importance of such a distinction for teachers of Geography for whereas the former concepts (simplest) can often be learned by a process of personal discovery, either actual or simulated, the more difficult concepts falling into the latter category must be taught directly by the teacher. In Geography such symbols are largely defined by language and learning is effected through language. Thus the rate of acquisition and understanding of such 'high-level' concepts is directly related to the rate of mental maturation and the accompanying development of appropriate sophisticated language. Because this concept acquisition and growth is so intimately linked to the pupil's experience of the world and his language development it is vitally important that teachers of Geography ensure that the pupil's language development keeps pace with the cognitive development. If the development of the specialised language (the terminology) of Geography is not linked to the child's real world perception upon which rests the construction of the child's conceptual schemes, or if the child's understanding of such specialised language is lacking, then the child will be at a distinct disadvantage as far as the learning of Geography is concerned.

According to Welch (1977) it is difficult to think of concepts, percepts and terms in isolation. Because they are so inter-related any shortcoming on the part of the pupil in making sense of any of them is likely to result in a decreased ability to learn Geography. In the classroom situation

as has been noted above, the higher up the scale of conceptualising the child goes the greater becomes the dependence upon a suitable grasp of the language involved. Graves refers to Lunnon's (1969) research which showed that growth in the understanding of concepts was gradual and was related more to chronological age than to mental age. Of greater interest to this study was the indication in Lunnon's results, that for the full use of a concept (e.g. for communication purposes) a substantial degree of linguistic sophistication was required.

This is not to say that the acquisition of concepts is linked in all instances to language. Graves accepts that geographical concepts (or any concept for that matter), may be acquired independently of the language used to represent them. He illustrates this by giving the example of many children who in early life may form concepts that they can seldom express in words. The opposite also appears to hold true; in later years people may use a number of words which are empty of meaning for them or to which they give a meaning which is not a publicly accepted one. As the individual's language develops so this language plays a very real part in concept development and this part becomes increasingly important as one moves away from the acquisition of concepts of concrete objects to the acquisition of concepts representing ideas. As Lunnon was able to show the acquisition of a concept is one thing but the ability to verbalize about a concept is another.

If it is true, as Graves suggests, that many of the geographical concepts that children pick up occur through personal experience in and out of school and that as far as children are concerned many of these concepts are undifferentiated in the child's thinking, then it is the teaching of Geography, surely, which seeks to establish some order among these concepts. This may be done through verbal intercourse between pupil and pupil, or more usually, between teacher and pupil.

This matter of concept acquisition is closely linked to the question of how individuals process information. The problem, as outlined in my introductory remarks in Chapter 1 is not so much one of difficulty with concepts per se, as it is with how individuals process the geographical information they have to learn. McLaughlin (1982) maintains that any limitations in information processing can be viewed along two dimensions. Firstly there is the issue of **focus of attention.** This is largely a function of task demands. The second dimension is that of **information - processing ability.** This latter is largely a function of how the individual deals with the information on a basis of his past experience. The success of this rests to a large extent upon the characteristics of the input (e.g. geographical facts etc.) and the information - processing ability of the perceiver (i.e. the learner). Why do parents and other adults often adjust their speech (i.e. speak down) when talking to young children? It is because such children find it difficult to attend for long to speech which is beyond their capabilities. For the geography learner, similarly, when he or she is exposed to a rapid flow of speech in an 'unfamiliar' language (as with the 'jargon' of Geography) the information-handling capacity becomes overloaded and the end result on the part of the learner is a "switch-off".

If the learner lacks the language proficiency or experience to cope with such new or 'unfamiliar' language, or if the teacher is insensitive to the existence of such a lack, then serious problems in the learning of Geography are likely to arise.

# CHAPTER THREE

## THE METHOD OF THE STUDY

I wished to administer some form of empirical exercise to a sample of Std 8 pupils taken from a number of Ciskei Schools. In it I sought to gauge their level of understanding of certain geographical concepts and terms.

After an examination of the Std 8 syllabus for Geography of the Department of Education and Training, I narrowed my attention to the sections on Climatology and Geomorphology. It appears that these made greater demands upon the pupils in terms of an understanding of concepts involved. I must admit that this conclusion was arrived at without any attempt to compare sections in a manner which could be termed 'scientific', but I was led by my personal consideration of the sections. My choice was narrowed down even further when I sought to choose the one section which, in my opinion, contained a greater range of terms which, while not purely geomorphological or climatological, nevertheless demanded of the pupil a sound understanding of such terms. My choice fell upon the geomorphology section.

## MILBURN'S STUDY (Devising a list of Geographical terms)

Milburn reported on an investigation carried out over a period of 5 years in the late 1960's in which an attempt was made to pin-point the major difficulties experienced by children in their understanding of geographical vocabultary then current in Great Britain.

With the assistance of teachers Milburn collected terms in 3 primary and 3 secondary schools over a period of 5 years. Proper names of countries, tribes, races, peoples, animals, plants, products, rivers, seas, oceans and other features were omitted. After use of a series of control tests a 'master-list' of terms was compiled. These were the terms in most active everyday use in schools. (See Appendix A for Milburn's list.)

Milburn collected a list of 315 classroom terms. These terms were then set against terms used in school textbooks. Of the 65 texts studied in detail 46 were especially written for primary school work and the remaining 19 comprised 3 'sets' of secondary school books. Following closely the approach he had done in compiling his list of 'classroom terms' Milburn arrived at a number of terms (368) which was fairly close to the number of those collected in the classroom.

Using a selection of terms he gave a test on these terms to 500 children in 3 secondary schools. In this test 215 terms were tested. The actual terms set need not concern me here. What is of interest to me is the manner in which the terms were tested because I sought to duplicate something of his methodology in this present investigation.

The test subjects were asked to define the terms under the question;

**"Tell me something about this word" and**
**"What does this mean to you?"**

Drawings and diagrams were accepted. In marking the tests full credit was given to any explanation which suggested a grasp of the essential meaning. Milburn obtained two scores;

a) The number answered correctly,
b) The number attempted.

## THE QUESTIONNAIRE

After obtaining copies of the various Std 8 textbooks on the departmental approved lists (Cape Education Department and Ciskei Education Department) I tabulated the frequency of all concepts and geographical terms used (See Appendix B for this table). The following textbooks are currently in use in Ciskei Schools, either by the pupils for classroom use, or by the teachers for reference purposes. They appear on the approved lists for both Education Departments mentioned

above.

LIST OF APPROVED TEXTBOOKS - STD 8 GEOGRAPHY

| | | | |
|---|---|---|---|
| A. | Swanevelder C, Du Toit A, Barnard P. | Senior Geography for Std 8. | (Nasou) |
| B. | Nel D E, Le Roux J S, v.d. Walt J, Coetzee H. | Geography 8 | (Juta) |
| C. | Barnard W, Nel A, Jooste P, Preston Whyte R, Smit P | Our New World 8. | (Maskew Miller) |
| D. | Hurry L B. | Living Geography Std 8. | (Via Africa) |
| E. | Podesta B, Conacher R, Venter H. | Active Geography Std 8. | (De Jager-Haum) |

**(NOTE: For the sake of convenience the letters A - E will be used to identify these books in this study)**

Concepts and terms which showed a frequency of 4 in at least four of the five books were taken into consideration when deciding which terms to include in the questionnaire. Also terms which showed the highest frequencies of occurrence, and which appeared on Milburn's vocabulary list were preferred.

The next consideration was to decide how these terms were to be presented to the pupils in the sample. The following possibilities suggested themselves:

( i) The pupils would be given a single word or phrase and asked to give the meaning;

( ii) The words or phrases would be set within the context of a sentence and the pupils would be asked to comment on them;

(iii) The words could be set in the form of a cloze exercise in which contextual clues taken from the accompanying words would provide clues for the pupils;

( iv) The words or concepts could be presented to the pupils orally. In this way I could hope to bypass the inability that many pupils might have of expressing their ideas in a written form in English.

( v) A combination of some or all of the above.

I decided to use a combination of (i) and (iii). Approach (i) was chosen because it would duplicate, methodologically, the approach adopted by Milburn in his study. Pupils would be given a list of terms and then be asked to explain what they understood the terms to mean. Care was to be taken to emphasise that pupils were free to respond either verbally or by means of a labelled sketch, or by using both methods of response. Furthermore, care was taken to emphasise that pupils should not bother about spelling or grammatical considerations. By emphasising this I hoped to alleviate the dange of pupils failing to respond because they were unsure of spelling or grammatical aspects, even though they knew what the term meant. Milburn, though dealing with pupils whose home language was also the medium of instruction, used this approach in his study in an attempt to lessen the effects of pupil uncertainty with regard to spelling and grammar.

Reference to the Questionnaire as it appears in Appendix C reveals that 30 single word or phrase items were set in Part A while 20 single terms were combined to form a cloze exercise in which every seventh word was deleted. For a brief discussion of the cloze technique see Appendix D.

While Milburn's tests did not include a cloze exercise I opted for one because I wanted to see whether or not there would be any significant difference in the results obtained between Part A, which asked the meaning of terms and phrases, and Part B (cloze) in which the context of some of the words asked provided definite clues, as to the correct term required. Here, too, leniency was the order of the day and a variety of answers were accepted, as long as they were appropriate to the context of the sentence in which they were used.

## THE TEXTBOOKS

Of the 5 books on the approved lists (see list of books on p 27 above) one of either 2 books was in use by the pupils in all ten of the schools involved in the study while most of the teachers in the schools made extensive use of either Book B or Book C for reference work and for guidance in the classroom.

Differences in the degree of textbook ownership were encountered between schools. In response to a question in this regard teachers' responses ranged from a percentage of fewer than 25% of pupils who owned their own copy of the textbook in one school, up to 100% of pupils who possessed a copy of a textbook in a number of schools. By far the greater number of schools reported that between 50 - 75% of pupils had their own copy of the textbook.

### TABLE 1

| SCHOOL | APPROXIMATE PERCENTAGE OF PUPILS OWNING A TEXTBOOK |
|---|---|
| | % |
| A | 75 - 100 |
| B | 100 |
| C | 100 |
| D | 50 |
| E | 50 - 75 |
| F | 25 - 50 |
| G | 75 - 100 |
| H | less than 25 |
| I | 50 - 75 |
| J | 50 - 75 |

In a later chapter I have paired these percentages with the school average scores obtained in the questionnaire.

Besides using the textbooks to enable me to compile a list of geographical terms, I also wished to evaluate them in terms of their readability, length, illustrations, paragraphing and definitions. I based this largely descriptive analysis upon the chapters used for my other activities, viz. the geomorphology section.

## a) READABILITY

The study of readability has been an extremely active research area. The E E R identifies over a thousand publications dating from the mid 1920's up until 1982. Add to this the many articles published in journals and which have not been included in the E E R total (the South African articles by Wegerhoff are a case in point) and one is faced with a veritable mountain of research reporting and accompanying comment. Understandably, a wide-ranging discussion of such a body of literature is beyond the confines of this half-thesis, yet some mention must be made of readability in general as a preface to discussion of the readability study that I did on the five books on the list on page 27 .

**What is readability?** Dale and Chall ( 1948 ) defined it as,

> "The sum total (including interactions) of all those elements within a given piece of printed material that affects the success which a group of readers have with it. The success is the extent to which they understand it, read it at optimum speed and find it interesting."
>
> (Quoted by Wegerhoff 1981 page 41)

Put simply what is wanted is some way of determining whether a particular piece of writing is likely to be read and understood by a particular group of readers.

This requirement should not be seen as one tied to modern times. In 1852 Herbert Spencer, while not calling it by this term, discussed, readability in his article in the 'Westminster Review' entitled "Philosophy of Style". In fact Hirsch (1977) refers to Spencer's work as possibly the best introduction to the subject of readability. Following Thorndike's 'The Teacher's Word Book' in 1921 there has appeared the steady flow of publications referred to at the beginning of this section.

Readability matters most when motivation for reading is likely to be low, as is the case with school textbooks (Wegerhoff 1981). Other factors of a non-linguistic nature - sex, age, personality, etc. - all play a part but it is the language used which is the most easily assessed aspect of the readability of textbooks. More than 150 linguistic variables were noted by Gilliland (1972) but these could eventually be grouped into two broad variables; sentence complexity and word complexity.

How then may the evaluation of such variables be used to give an overall measure of the readability of a particular text? Three major approaches suggest themselves:

( i) Judgements of readability
( ii) Measures of readability
(iii) Readability formulas or predictors

**( i) Judgements of readability**

Here one may speak of readability estimates being made by individuals. Thus experts may read material and then estimate the level of difficulty. Alternatively a reader's understanding of this material may be tested.

The problem here is that, because individuals vary widely in both likes and dislikes and abilities such estimates are unlikely to be completely reliable because of the subjective element entering all such personal evaluations. The EER comments on research by Wang 1970: Porter and Popp 1973; Klare 1976; and Harrison 1977, 1979, 1980; in which such difficulties were highlighted. Yet these writers suggested that under certain conditions reliable judgements of readability could be obtained. Mostly this reliability was allied to the emphasis being placed upon pooled group judgements in preference to individual estimates. Such judgements can be useful but as the evaluation becomes more complex and time consuming questions of reliability become more serious. (Klare 1974/1975)

**(ii) Measures of Readability**

Here some type of measure is used to determine the difficulty of a certain passage for a certain group of readers. Such measures usually employ a comprehension exercise. These are either of the short answer or multiple-choice type of question or more acceptably, at least since developed by Taylor (See Appendix D), the close procedure comprehension test. The need for further development in the field of comprehension testing as a means of determining reading difficulty has been highlighted (Simons 1971). Better understanding of the whole process of comprehension can make the measurement of readability by means of comprehension test

more appealing. The problem is the time and expertise needed to construct good comprehension tests. Thus as an easily applicable method for use on a day-to-day basis such measures do not approach the ease of application of the third approach, the readability formula.

**(iii) Readability Formulas**

Here is envisaged a predictive device using counts of words and sentence variables in a piece of writing to produce a quantitative, objective index of style difficulty.

Up until 1982 the EER identifies over 200 different formulas, the exact number depending upon how such formulas are defined.

What such formulas do is to arrive at a quantitative result which can be used to predict how well readers of a certain group are likely to understand a piece of writing. Herein lies the difference between readability measures and readability formulas. The former are in fact measures of an evaluation of a particular population of readers and while such measure may assist in constructing a formula they nevertheless remain measures. The formulas, however, predict how well readers will understand a piece of writing. This prediction is usually applicable to a complete work of writing, yet is based on the application of the formula to a number of text samples. They use word and sentence counts to provide the quantitative, objective index of difficulty. Because such measurement is of a text without cognizance

being taken of the content of the text, such formulas can ideally be seen as being content-free and can therefore be applied to different prose works to arrive at a comparison between writers, or texts, in terms of their readability.

Widespread use of such formulas is not in itself evidence of predictive validity. This warning has been pointed out many times (Klare 1974/1975). Furthermore, no formula should be viewed as a perfect predictor.

Controversy has surrounded the use of reading formulas, almost since their inception. Fitzgerald (1953) deplored literature by slide-rule', while Manzo (1970) conceived of readability research using formulas as a "construct without a point of reference". (Quoted by EER p 1524). Even Chall (1979) found that the decline in pupil reading scores could be associated with a decline in textbook difficulty over a span of three decades. This supported Maxwell's musing (1978) that the obsession with readability and its influence on the writers of textbooks, was a possible factor in the decline of inferential reading skills of teenage pupils between 1970-1974.

Other critics pinpointed sample frequency as a shortcoming in the application of formulas. Many formulas suggest the use of only 3 by 100 word samples (Fry 1977 ) in the evaluation

of the readability of a whole book. Call has been made for further research on adequate sample size (Fitzgerald 1980).

Another problem has been the widespread confusion caused by the use of various formulas with variously assigned reading grades or reading levels. Formulas do not agree with each other in assigning scores to reading levels, although they may reveal high inter-correlations (EER). Thus comparison of formula scores could become meaningless.

Readability formulas then, should not be created with a supposed ability to do more than they were intended to do. They provide a vehicle for research and they do lend a measure of objectivity to the evaluation of writing. Thus, if comprehension, reading efficiency and readership may be predicted through them then they could also be instrumental in producing more readable writing.

## (b) READABILITY STUDY OF THE STD 8 TEXTS

It was my intention to evaluate these texts according to one or more readability formulas. This would enable me to arrive at an objective comparison of the texts concerned. It would thus be possible, not only to comment on all five books in general, but also to compare the two books used as classroom handbooks by the pupils in the study.

I chose two formulas, The Fry Readability Graph (Fry 1965) and the Flesch Reading Ease Formula (Flesch : developed 1943 but subsequently modified in 1948) .

**The Fry Readability Graph (FRG):**

This was chosen because it has applicability to a wide range of materials (Vari-Cartier 1981) and it is generally accepted as an easy and accurate method of predicting reading difficulty. Also Fry's graph has been validated on both primary and secondary materials and the scores derived correlate highly with those from several well-known formulas (Klare 1974/1975; Fry 1977).

**The Flesch Reading Ease Formula (RE):**

This is one of the most widely used formulas for readability measurement. Flesch maintained that this 'reading ease' formula was not merely a measure of sentence complexity but it was also an indirect measure of abstraction,

> since word complexity and sentence length are an indirect measure of this. (Flesch 1948).

Where I differ from the compilers' instructions in applying the formulas is in my application of them to the chapters on Geomorphology in each text and not to the whole book. Thus the scores obtained are those of the geomorphology sections. Yet I feel that having satisfied the designers' numerical requirements regarding samples, the results obtained do give a good indication of the relative reading difficulty of the five books concerned.

One difficulty that I encountered had to do with the reading grade or age levels used in the formulas. These are levels applicable to first language English speakers. I could find no evidence of any attempt to modify these levels to fit the expected reading abilities of English second language speakers in the black South African context. I suggest that some research is needed to establish comparable reading age/levels for black second language pupils. Nevertheless, use of the original age levels gives some indication of the respective levels of difficulty of the books.

The FRG utilises the number of sentences and syllables in the extracts under examination. Three 100-word passages were selected, from the beginning, the middle and the end of the chapter on geomorphology. After the total number of sentences and syllables for each passage had been recorded the average number of sentences and syllables were computed. These figures were then plotted on the graph and the co-ordinate point associated with an established grade level designation was established. I modified my selection slightly when compared to Fry's instructions for a random selection. I selected my 3 samples from the same sections in each text. These were the following sections:

Rocks; Volcanicity; Weathering.

These sections appear roughly at the beginning, middle and end of each chapter evaluated.

Table 2 gives a comparison of the analysis for each text.

**TABLE 2**

**COMPARISON OF ANALYSIS OF SAMPLES FOR FRY'S READING GRAPH**

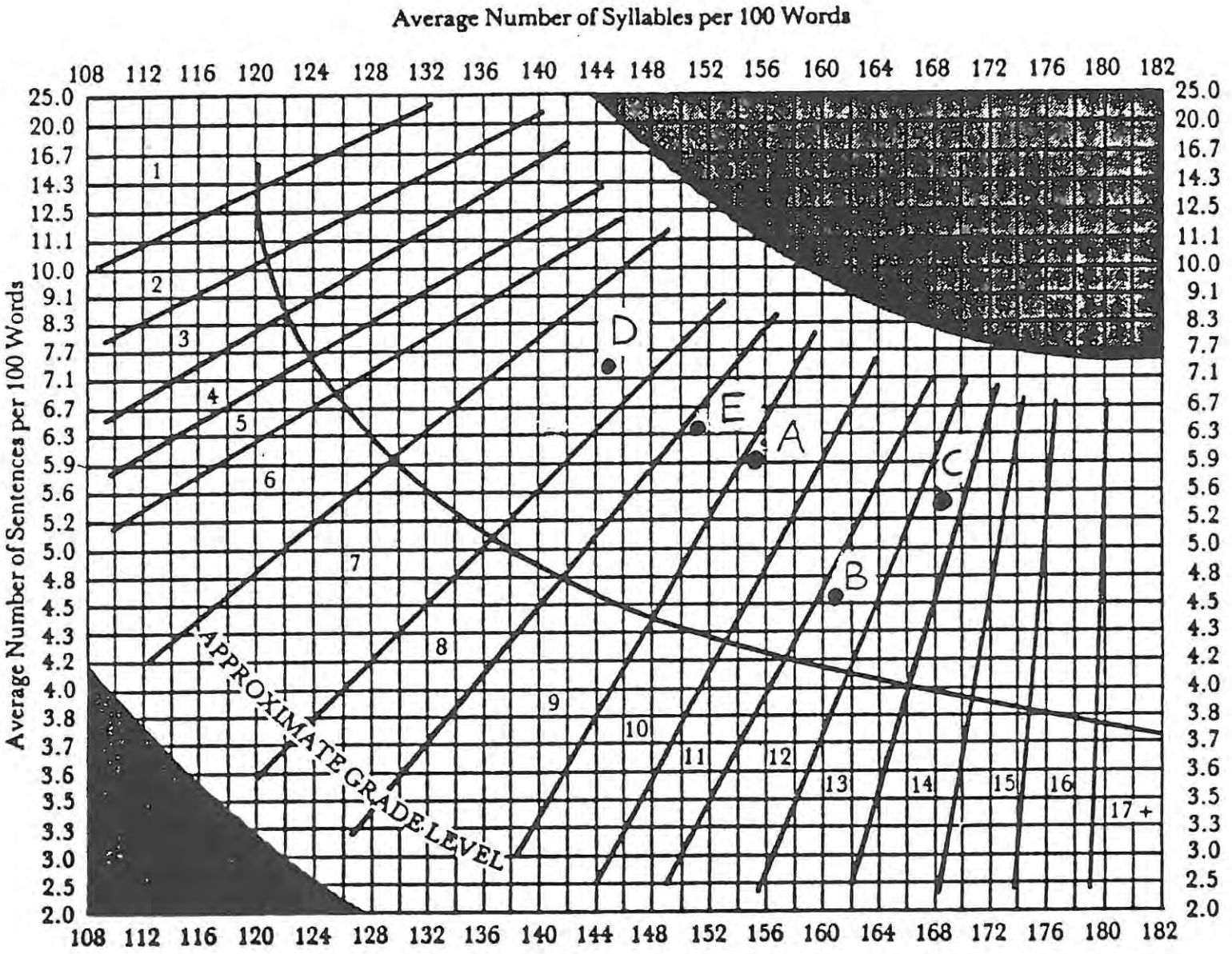
| | 1ST SAMPLE | | | 2ND SAMPLE | | | 3RD SAMPLE | | | BOOK AVERAGE | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BOOK | SYL | SENT | W/S | SYL | SENT | W/S | SYL | SENT | W/S | SYL | SENT | W/S |
| A | 159 | 4,7 | 21,27 | 156 | 7,3 | 13,69 | 150 | 5,8 | 17,24 | 155 | 5,9 | 17,4 |
| B | 168 | 4,3 | 23,25 | 153 | 5,3 | 18,86 | 164 | 3,9 | 25,64 | 161 | 4,5 | 22,58 |
| C | 167 | 4,7 | 21,27 | 159 | 7,0 | 14,28 | 182 | 4,6 | 21,73 | 169 | 5,4 | 19,09 |
| D | 163 | 7 | 14,28 | 130 | 7,9 | 12,65 | 143 | 7,2 | 13,88 | 145 | 7,3 | 13,6 |
| E | 166 | 5,9 | 28,13 | 147 | 8,7 | 16,89 | 147 | 4,3 | 34,18 | 153 | 6,3 | 26,4 |

(SYL - Syllables / 100 words; SENT - Number of sentences/100 words
W/S - Average number of words/sentence)

Reference to the table indicates that of the two books intended for black schools only, D and E, book D is far more uniform as regards number of sentences and consequently the average number of words per sentence. It appears that the author took the book's readership into account. When compared to books B and C (black and white schools) book E, and book A (white schools only), this book has a greater number of sentences which means that the word to sentence ratio is lower. Thus sentence complexity is likely to present less of a problem than with the other four books.

**Figure 1** illustrates the five books plotted on the Fry's Readability Graph, (Fry, extended 1977)

FIG 1. APPROXIMATE READING GRADE LEVELS OF BOOKS A - E ON FRY'S READABILITY GRAPH



Using Fry's approximate grade levels the results are as follows:

TABLE 3

FRY'S APPROXIMATE GRADE LEVELS

| BOOK | GRADE LEVEL |
|---|---|
| A | 10 |
| B | 12 |
| C | 13 |
| D | 7 |
| E | 9 |

Surprisingly, the book which was approved for white schools only, Book A, had a readability level below that of the two books appearing on both the black and white approved lists.

Of the two books intended for pupils in the Ciskei, Book D has a lower predicted reading level, viz. 7 compared to 9. As has been mentioned above, Book E (as evidenced in Table 2) has less uniformity among the samples analysed. If it wasn't for the comparatively high number of sentences in the second sample the reading grade level would in all likelihood have equalled, or even surpassed, that of Book A.

Thus in terms of the FRG Book D should prove the most readable for pupils in the black schools.

A further exercise was to evaluate the 5 texts by means of Flesch's Reading Ease Formula.

This formula (RE) = -206,835 - (0,846 x N Syll) - (1,015 x W/S)

Where N SYLL = average number of syllables per 100 words
W/S = average number of words per sentence.

The N SYLL and W/S values for each book are shown in Table 2.

**TABLE 4**

**Flesch RE scores and equivalent age levels**

| Book | RE Score | Age Level |
|---|---|---|
| A | 58,04 | 15-17 |
| B | 47,72 | 18-21 |
| C | 44,49 | 18-21 |
| D | 70,37 | 12 |
| E | 50,61 | 15-17 |

Flesch's RE Transformational Table (Table 5 below) gave the age levels indicated above.

**TABLE 5**

**Flesch's Reading Ease Transformational Table (Flesch 1948)**

| RE SCORE | DESCRIPTION OF STYLE | AGE LEVEL |
|---|---|---|
| 0 - 30 | Very difficult | College + |
| 30 - 50 | Difficult | 18 - 21 |
| 50 - 60 | Fairly difficult | 15 - 17 |
| 60 - 70 | Standard | 13 - 14 |
| 70 - 80 | Fairly Easy | 12 |
| 80 - 90 | Easy | 11 |
| 90 - 100 | Very Easy | 10 |

TABLE 6

COMPARISON OF FRG AND RE SCORES

| BOOK | FRG GRADE | READING LEVEL | R E SCORES | GRADE | AGE LEVEL |
|---|---|---|---|---|---|
| A | 10 | 15 | 58,04 | 10-12 | 15-17 |
| B | 12 | 17 | 47,72 | 13-16 | 18-21 |
| C | 13 | 18 | 44,49 | 13-16 | 18-21 |
| D | 7 | 12 | 70,37 | 7 | 12 |
| E | 9 | 14 | 50,61 | 10-12 | 15-17 |

**(NOTE: Grades - American)**

Examination of the RE scores in Table 4 reveals that, as with the FRG, Book D was the easiest by far. The RE Score of 70,37 placed this book (on a 1st Language basis American) at an age level of 12-13, lying as it does on the boundary of the category descriptions 'Fairly Easy' and Standard. Book E is similar to Books B and C in that its RE score is not far off those of the latter two texts. In terms of Flesch's Age levels it is equivalent to that of Book A. Thus on this formula too Book A is easier than would be expected in terms of its readability.

Consideration of Table 6 predicts just how less difficult Book D is probably going to be for pupils using it than are the others. In terms of the Ciskei approved list Book D is the better choice of the two as far as readability goes.

Of course readability cannot be viewed as the only criteria in selecting a text book. Other factors on the part of the pupils (e.g. sex, age etc., mentioned earlier) and on the part of the text (layout, length, diagrams, definitions, price etc.) all have to be taken into account.

What can be said here is that Book D is easier than Book E as regards level of difficulty and probable subsequent comprehension, as measured by the formulas and all other factors being equal, it should receive preference.

c. OTHER ASPECTS:

( i) Length and paragraphing:

BOOK A

This book goes into great detail on the topics handled. A feature of this detail is the tendency to engage in lengthy descriptions of geographical terms. Paragraphs are long, in fact of the five books examined, Book A generally contains the longest paragraphs. The authors appear to have favoured the use of prose to explain issues, rather than the use of diagrams.

BOOK B

In this book there is not nearly as much detail as in Book A although there are sections in which the writers have used large expanses of prose. One redeeming factor is the more frequent use of paragraphing. Another is the frequent use of heavy type as sub-headings and within paragraphs. This serves to break the monotony of long paragraphs.

BOOK C

This book goes into great detail on many items. Much use is made of prose in lengthy paragraphs. What is particularly noticeable is the use made of many technical terms in the explanations. One redeeming feature is that like Book B above this book employs different (italic) print as a focal point within paragraphs.

These words and phrases function as a form of sub-heading and thus do contribute to a breakdown of the monotony that exists in very lengthy paragraphs.

BOOK D

In comparison to the three books mentioned above this book appears to have brevity as its overriding intention. It is not nearly as lengthy as the other three. Short paragraphs abound. The writers do not go into much detail on any aspect. Frequent use is made of clear sub-headings. It appears that the intention here is to offer the reader what can only be termed an introductory approach to the items handled.

An interesting feature is the very effective use made of a summary at the end of each section in the book. In this way attention is focused on the main points dealt with in each section.

BOOK E

Of the 5 books this one's layout makes it the easiest to read. There is very little elaboration of the basic facts by way of prose. Most of the items are set out in point form with clear enumeration of the very short paragraphs. Effective use is made of clear sub-headings, as well as heavy print to focus attention on specific items.

## (ii) Diagrams/Photographs

### BOOK A

Very little use is made of diagrams to explain or illustrate an item. The writers have favoured a composite-type diagram (i.e. many features are illustrated in one diagram). Such diagrams tend to be overcrowded and the possibility of confusion among readers should not be ignored. Frequent use has been made of photographs, at times not very successfully, mainly because they are in black and white and have lost much in the printing process.

### BOOK B

Greater use is made of diagrams than in Book A. Also the diagrams are less crowded with items than those in Book A. The tendency has been to use a diagram to illustrate a single item, or where more than one is illustrated, care has been taken to ensure that they are closely-related. The writers have steered clear of reproducing photographs, very wisely it seems in the light of my observations under Book A above.

### BOOK C

Diagrams are rather scattered. Also they are confusing in places, possibly because

the writers have attempted to handle too much detail, or too many items in each drawing. Use has been made of photographs in a number of places to illustrate items and while some of these photographs are reasonably clear others suffer from shortcomings similar to those observed in Books A and B above.

BOOK D

Diagrams here while not profuse are of a simpler character than those in either of the three books mentioned above. They are clear. Use has frequently been made of photographs but it would appear that the observations made above apply to all attempts to reproduce photographs in which the intention is to highlight specific features. Many of the photographs reproduced do not really clarify the item they are intended to illustrate. A number of the photographs appear to have been included for decorative purposes for their content is only referred to in passing in the text.

BOOK E

This book contains a profusion of diagrams. With few exceptions they are simple and clear. It appears that the writers have deliberately chosen the diagrammatic explanation of many items in preference to a prose explanation. In this regard it would seem that the writers were very aware of the needs of the pupils (i.e. English 2 L speakers), hence the frequent use of very effective diagrams.

(iii) Definitions/Explanations:

BOOK A

Great care is taken to ensure that difficult items are carefully explained verbally. Noticeable is the attempt to refrain from replacing one form of Geographical jargon with another. Definitions and explanations do appear simpler than the items they seek to elucidate.

BOOK B

Definitions and explanations are used frequently to assist understanding of various items. Although such explanations at first appear to contain simpler language the writers have unfortunately, often done no more than explain an item by another set of terms which themselves need definition and explanation if the reader is to understand them fully.

BOOK C

It would appear that less frequent use of definitions is made by these writers. Many terms which need explanation are used in the text without any attempt to assist pupil understanding of these terms. Where explanations do occur often terms of equal difficulty have been used to effect the explanation. The danger here is that lack of understanding of items used in the explanation could well hamper pupil understanding.

BOOK D

Definition and explanation are used frequently by the writer to assist pupil understanding. Obvious attempts appear to have been made to keep such explanations simple although there are occasions where such explanations presuppose an understanding on the part of the reader of other items. In comparison with Books A-C care has been taken to refrain from explaining Geographical jargon by using other'jargon'.

BOOK E

In their attempt to keep their content concise the writers appear to have sacrificed explanation and definition to the cause of brevity and simplicity. Very little verbal explanation is apparent. As was mentioned earlier, the very frequent use of explanatory diagrams does to a certain extent offset this shortcoming but it cannot compensate for what must be viewed as a flaw. Possibly the intention was to leave greater responsibility for such explanation in the hands of the teachers.

## THE SAMPLE SCHOOLS

Ten Secondary Schools were selected from two school circuits in Ciskei. While this selection was limited to the Mdantsane area to allow for ease of access to the schools care was taken to select schools of both an urban and rural character. Thus it was that three schools were selected from the Mdantsane South East Circuit, a rural circuit. The number was limited because these three were the only schools within reasonable reach of Mdantsane which offered Geography as a subject in the Senior Secondary Phase (i.e. Stds 8 - 10). Seven schools were selected from the Mdantsane Central Circuit, an urban circuit. These seven were all the schools which offered Geography in Standard Eight. A total of 797 pupils completed the questionnaire. Teachers at 7 schools also completed the questionnaire. 1 Teacher was absent from school on the day on which the questionnaire was administered while 2 teachers declined an invitation to complete the questionnaire.

# GEOMORPHOLOGY TEST

## SCHOOLS INVOLVED

The third component of my field study was to administer a short geomorphology test to the pupils involved in the recorded lessons. At the end of the series of recordings the pupils were told that within a week they would be given a test for revision purposes on the geomorphology chapter in their books. They were encouraged to study for this test.

Unfortunately School A, where one set of lessons was recorded, felt that they would be unable to oblige by permitting their pupils to do such a test. Consequently I was compelled to find another school. My choice settled on School F, which had achieved the highest average score on the questionnaire discussed above. In fact it had been my intention to record lessons at this school but the teacher, who is also the headmaster, felt that this would not give a satisfactory idea of what transpired in his classroom because of the frequent and often lengthy interruptions to his lessons through school affairs. He did however, permit his pupils to write the geomorphology test. Thus, partly through force of circumstances and partly by design, the two groups of pupils who completed this test represented the schools which fared best or worst on the earlier questionnaire. The two schools who completed the test were School F and School J. In all a total of 91 pupils completed the geomorphology test.

## Source of Questions

Geomorphology questions were extracted from the past Std. 8 Geography external examination papers. From these a a selection was made of short questions of equal levels of difficulty. These questions were grouped into a Part A and Part B, each worth 20 marks.

Two tests using the same questions were given to pupils at the two schools. Test 1 was set with both part A and part B written in English (as is the case with examinations), while Test 2 was set with part A in English and part B predominantly in Xhosa. Geomorphological terms with which the pupils were likely to be familiar, were kept in English but all questions and instructions were translated into Xhosa. I was interested to see whether there were likely to be any major differences in the results of the part B's of the tests. I fully expected those pupils who did part B in Xhosa to achieve higher scores than those who did part B in English. Also, pupils who completed Test 2 were expected to score better on the Xhosa part B of the test while those who did Test 1 (all English) were expected to achieve fairly similar results on both parts. Discussion of the results and possible reasons for them follows below (p 73 ) A copy of Tests 1 and 2 are to be found in Appendix E.

**Administration of the Test**

In an attempt to ensure that the pupils who wrote Tests 1 and 2 were matched numerically and according to ability (as measured by their Std 8 geography results) the pupils were ranked, with the assistance of the teachers concerned, from best to worst. In most cases these rankings based on the teachers' impressions of the pupils were confirmed by the test results of the pupils during the year. Teacher subjectivity might well have entered into the ranking procedure nevertheless the rankings, to my mind, give a fair reflection of the pupils in the classes, as regards Geographical ability.

Tests 1 and 2 were given to alternate pupils on the ranked lists so that an equal number of pupils wrote each test.

## THE RECORDINGS - PURPOSE AND IMPLEMENTATION

As stated in Chapter 1 (b) (ii) part of the study involved visits to a classroom in each of two schools in the sample, School A and School J.

A series of Geography lessons extending over a period of one week was recorded in each school. While these recordings were not the main focus of attention in the study it was felt that by considering the teacher's language use some insight might be gained into the whole question of the language life of the classroom. The recordings were done by two Xhosa colleagues of the writer. Each visited the classrooms concerned on two occasions before the actual recording of the lessons took place. The intention was that the presence of a visitor in each class would most likely be less disturbing to the pupils concerned as time passed. The teacher's co-operation in each case was readily given although some deception was practised initially by informing them that the object of the recordings was the language used by their pupils. Only after the recordings were completed was the real reason explained to the teachers. They accepted the explanation and expressed a keen interest in their personal language use during the lessons.

In an effort to limit possible distortion of the recording content through having the pupils respond unnaturally because of their awareness of a recording in progress the two persons responsible for making the recordings were encouraged to set up their equipment before the arrival of the pupils in the classroom for the lessons. They were also encouraged to draw a minimum of attention to the recording. Recording equipment was present

at the first classroom visits, even though no recordings were being taken. It was hoped that any resistance or suspicion on the part of the pupils would lessen as they became accustomed to a visitor and recording equipment in their classrooms.

A discussion of the recordings appears in Chapter 4.

# CHAPTER FOUR

## DISCUSSION OF THE RESULTS OF THE QUESTIONNAIRE

Table 7 gives a comparison between schools in terms of their average percentages.

It contains the following information:

### SCHOOL A:

In this sample of 92 pupils the average percentage of correct responses on Part A of the test was 32,39% with a range of 6 - 56,6%. Part B saw a similarly low correct response percentage of 25,32% with a range of 0 - 50% while the overall test result was 29,8% with the range 10 - 64,2%. The average percentage correct as a ratio of the number of questions attempted was 44,66%.

### SCHOOL B:

The 44 pupils in this sample gave percentages of 25,27 and 22,04 respectively correct for Part A and Part B of the test. The accompanying ranges were 3,3 - 53,3 and 0 - 55,0. The combined test average percentage was 24,04 correct across a range of 8 - 48. Of the average number of items attempted 35,92% of these were answered correctly.

### SCHOOL C:

In this sample of 77 pupils the average percentage correct on Part A was 26,54 across a range of 3,3 - 56,6 while that of Part B was 31,73 with a range of 0 - 60. For the overall questionnaire the school showed an average percentage of 28,49 correct across a range of 12 - 48.

TABLE 7

COMPARISON OF SCHOOL AVERAGE PERCENTAGES

| SCHOOL | AVE % PART A | RANGE | AVE % PART B | RANGE | AVE % TEST | RANGE | AVERAGE % CORRECT OF NUMBER ATTEMPTED |
|---|---|---|---|---|---|---|---|
| A | 32,39 | 6 - 56,6 | 25,32 | 0 - 50 | 29,80 | 10 - 64,2 | 44,66 |
| B | 25,27 | 3,3 - 53,3 | 22,04 | 0 - 55 | 24,04 | 8 - 48 | 35,92 |
| C | 26,54 | 3,3 - 56,6 | 31,73 | 0 - 60 | 28,49 | 12 - 48 | 37,4 |
| D | 26,4 | 3,3 - 46,6 | 26,02 | 0 - 60 | 26,21 | 8 - 50 | 32,6 |
| E | 31,98 | 6,6 - 63,6 | 37,12 | 20 - 60 | 34,07 | 16 - 52 | 43,88 |
| F | 46,6 | 16,6 - 76,6 | 34,2 | 0 - 65 | 41,7 | 20 - 70 | 52,47 |
| G | 8,29 | 0 - 46,6 | 23,3 | 5 - 55 | 20,4 | 2 - 52 | 27,37 |
| H | 19,7 | 0 - 46,6 | 26,2 | 10 - 45 | 22,5 | 4 - 40 | 27,48 |
| I | 29,65 | 0 - 63,3 | 31,37 | 0 - 60 | 30,29 | 4 - 60 | 36,38 |
| J | 13,3 | 0 - 36,6 | 19,3 | 5 - 50 | 16,76 | 2 - 38 | 22,49 |

| SAMPLE POPULATION | PART A | PART B | TEST | AH/cf CORRECT % | |
|---|---|---|---|---|---|
| | 21173,2 | 21748,3 | 21577 | 28230,7 | N = 797 |
| | 26,56 | 27,28 | 27,07 | 35,42 | |

The percentage scored correctly when compared to the number of items attempted was 37,4.

SCHOOL D:

In this sample of 106 pupils the sample average was 26,21% across a range of 8 - 50%. Here the relevant percentages were Part A - 26,4 and Part B 26,02 with the respective ranges 3,3 - 46,6% and 0 - 60%. 32,6% of the items attempted were answered correctly.

SCHOOL E:

This school, with 54 pupils in the sample, obtained the second highest average percentage with a figure of 34,07. The range was 16 - 52%. Part A percentages ranged between 6,6 - 63,6 with an average of 31,98% while Part B saw an average of 37,12% across a range of 20 - 60%. The average percentage of items answered correctly as a ratio of those attempted was 43,88%.

SCHOOL F:

The 70 pupils in this school obtained the highest average percentage of all the schools. This figure was 41,7% across a range of 20 - 70%. On the Part A section the range was 16,6 - 76,6% with an average percentage of 46,6. Part B percentages ranged from 0 - 65 with an average of 34,2%. 52,47% of items attempted were answered correctly.

SCHOOL G:

In this sample there were 50 pupils. They achieved an average percentage of 18,29 on Part A of the test, with a range of 0 - 46,6%. Part B saw an average percentage of 23,3% with a range of 5 - 55%. The combined average was 20,4% with a range of 2 - 50% while only 27,37% of all items attempted were answered correctly.

SCHOOL H:

This was another low-scoring group with the 41 pupils involved achieving an overall average of 22,5% with a range of 4 - 40%. Part A saw a percentage of 19,7 with a range of 0 - 46,6% while Part B shows a result of a 26,2% average while the range was 10 - 45%. Of the number of items attempted 27,48% were answered correctly.

SCHOOL I:

In this sample 127 pupils were involved in attempting the questionnaire. Of all items attempted 36,38% were answered correctly with an average percentage of 30,29 correct. The range of percentages was 4 - 60. On Part A of the test the range was 0 - 63,3 with an average of 29,65% while on Part B the pupils achieved an average of 31,37 correct with a range of 0 - 60,0%.

SCHOOL J:

This school with 136 pupils involved, fared worst on all aspects of the questionnaire. Of the items attempted only 22,49% were answered correctly. The average percentage was a disappointing 16,76 with a range of 2 - 38%. Part A saw a range of 0 - 36,6% with an average of 13,3%. Part B had a range of 5 - 50% with an average of 19,3%.

OVERALL SAMPLE:

797 pupils were involved in completing the questionnaire. Of the average number of items attempted 35,42% were answered correctly. Part A saw an average of 26,56% while Part B saw an average of 27,28 items answered correctly. The overall questionnaire percentage was 27,07.

Appendix F (i) - (x) consists of the histograms for the ten schools involved while Figures 2(a) & (b) give the comparison of the ten schools and the sample on a frequency polygon. Examination of these latter two diagrams reveals that most curves appear to approximate the normal distribution curve although all curves are disturbingly skewed in a positive direction. When the reader realises that the range of scores is from 0 - 38,5 on a total of 0 - 50 then the reader can see just how disturbing the situation is.

Using the data of the sample the degree of skewness was computed using the formula:

$$\text{coefficient of skewness} = \frac{3\,(\text{Mean}-\text{Median})}{\sigma}$$

where Mean = 13,45
Median = 12,995
$\sigma$ = 5,79

FIGURE 2 (a) – COMPARISON OF FREQUENCY POLYGONS : SCHOOLS A – E

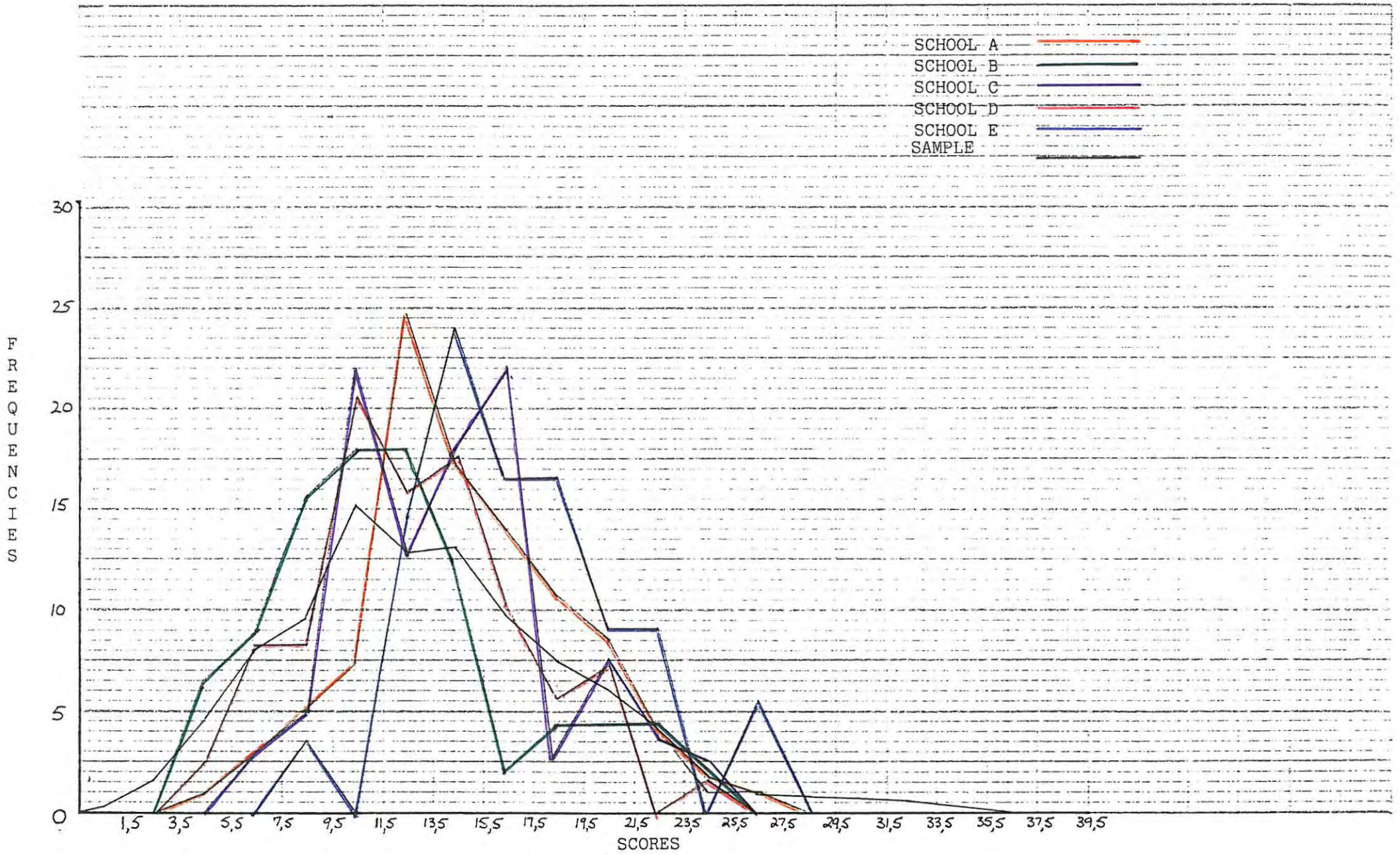
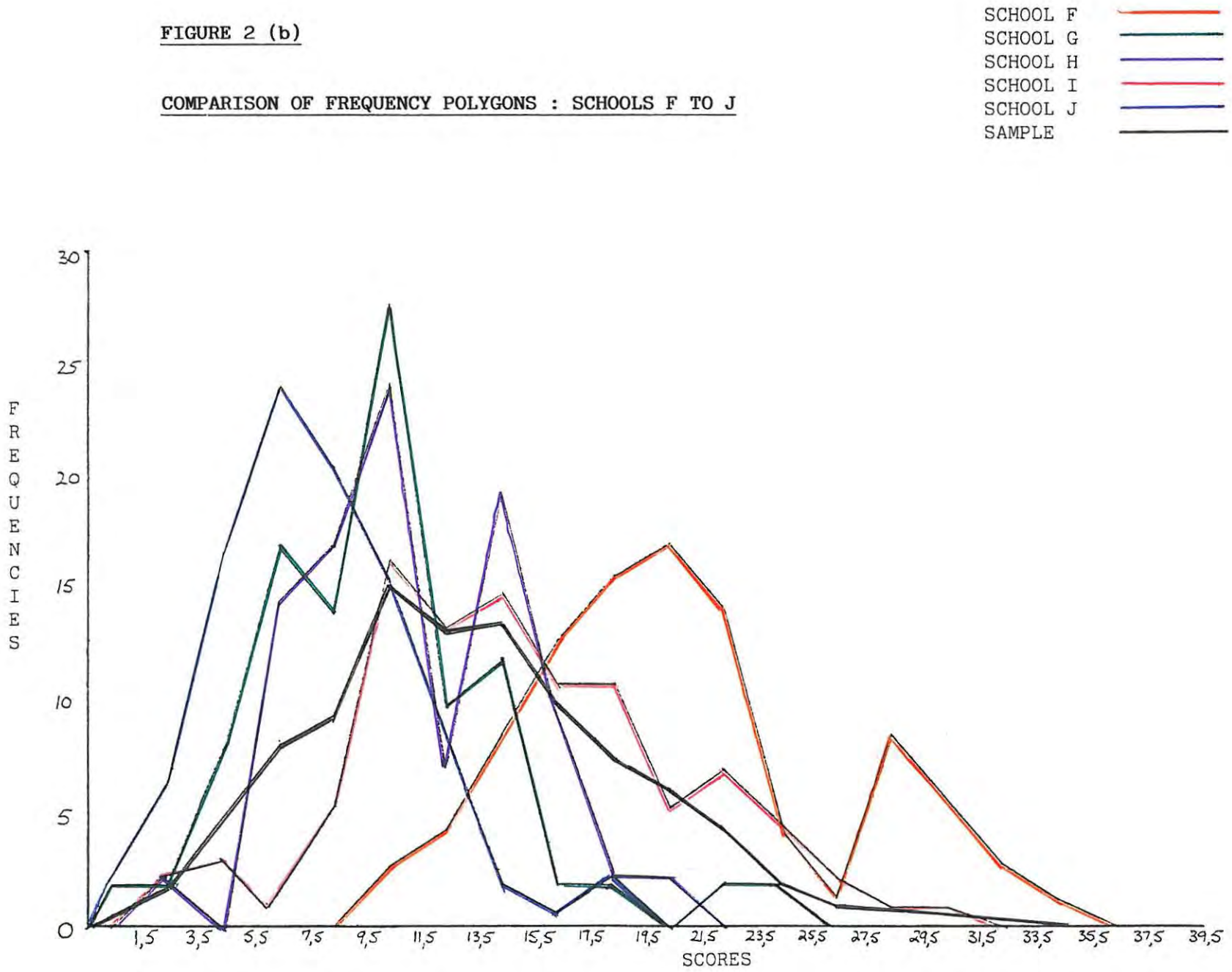


FIGURE 2 (b)

COMPARISON OF FREQUENCY POLYGONS : SCHOOLS F TO J



This gave a positive coefficient of skewness of 0,23 . The significance of this coefficient will be discussed later when discussion of the results is done (p71)

The Mean scores for the ten schools in the sample are show in Table 8 .

TABLE 8

Mean Questionnaire Scores.

| SCHOOL | MEAN SCORE | MEAN PERCENTAGES |
|---|---|---|
| A | 14,8 | 29,6 |
| B | 12,0 | 24,0 |
| C | 14,4 | 28,8 |
| D | 12,9 | 25,8 |
| E | 17,0 | 34,0 |
| F | 20,8 | 41,6 |
| G | 10,1 | 20,2 |
| H | 11,2 | 22,4 |
| I | 15,1 | 30,2 |
| J | 7,8 | 15,6 |

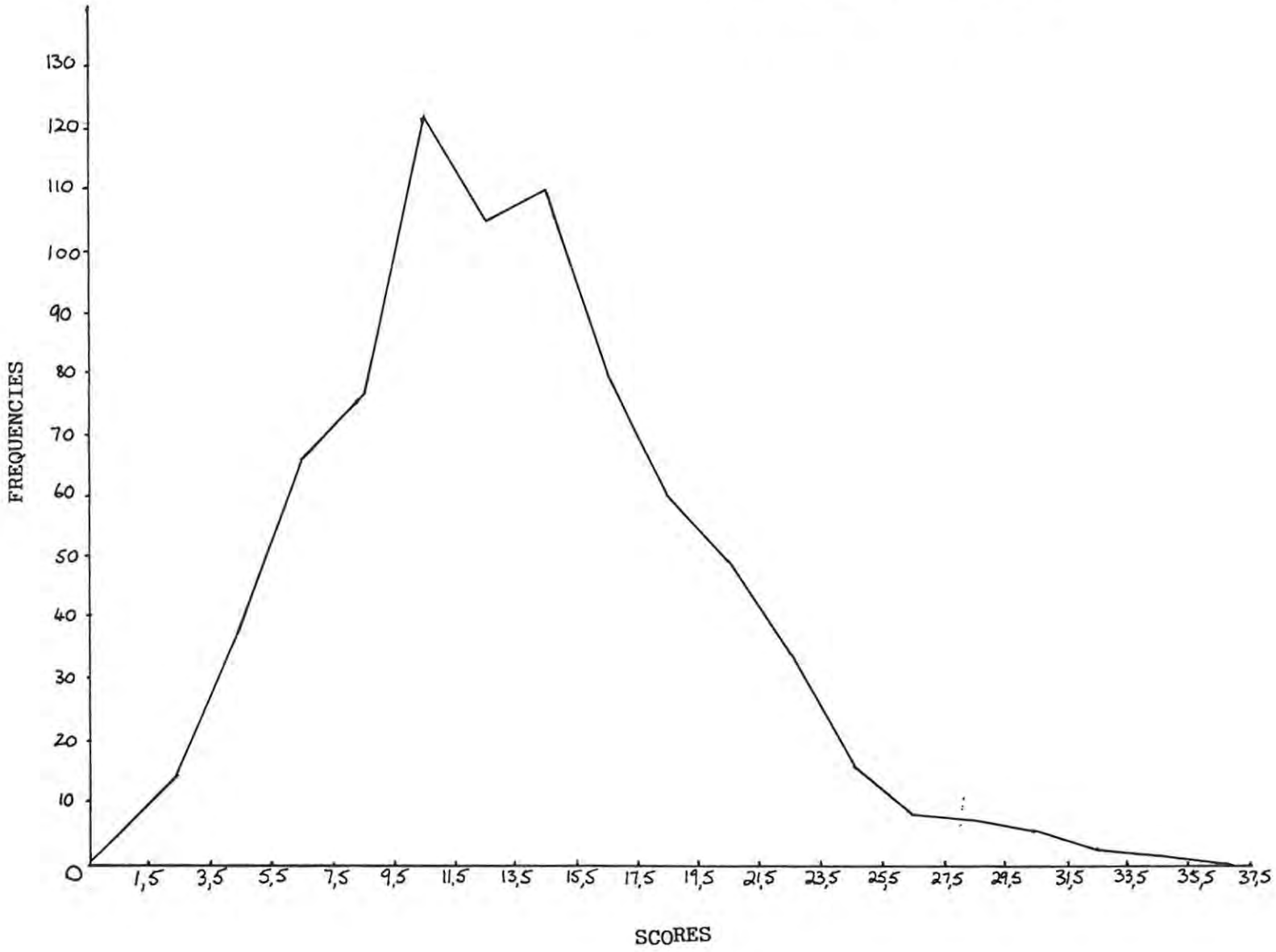
Figure 3 is the Frequency Polygon of scores obtained by the whole sample. Here too, as with Figures 1 and 2 there is a marked positive skewness in the sample results.

Other statistical measures computed were the Median and the Mode.
the Median of the sample was 12,98 while the Mode was 12,96 (Appendix G contains the computations).

A further exercise undertaken was a comparison of the mean questionnaire scores of the male and female pupils. I was interested, almost by way of an aside, to see whether there

FIGURE 3

FREQUENCY POLYGON OVERALL SAMPLE



were any major differences in these mean scores. Table 9 below sets out these mean scores attained.

TABLE 9

Comparison of Mean Questionnaire scores of Male and Female.

| SCHOOL | PART A (30) | | PART B (20) | | QUESTIONNAIRE (50) | |
|---|---|---|---|---|---|---|
| | MALE | FEMALE | MALE | FEMALE | MALE | FEMALE |
| A | 10,4 | 8,9 | 5,1 | 5,09 | 15,5 | 14,0 |
| B | 7,75 | 7,4 | 3,9 | 4,8 | 11,6 | 12,3 |
| C | 8,3 | 7,5 | 6,3 | 6,4 | 14,6 | 14,0 |
| D | 9,0 | 5,39 | 6,8 | 5,0 | 14,4 | 11,8 |
| E | 9,5 | 7,2 | 9,6 | 7,5 | 16,8 | 17,2 |
| F | 15,5 | 6,4 | 12,5 | 7,25 | 22,0 | 19,7 |
| G | 6,7 | 5,1 | 4,4 | 4,2 | 11,9 | 8,6 |
| H | 6,0 | 5,8 | 5,1 | 5,2 | 11,1 | 11,3 |
| I | 10,4 | 6,3 | 7,8 | 6,2 | 16,7 | 14,0 |
| J | 4,8 | 3,6 | 4,0 | 3,8 | 8,8 | 7,4 |

For a breakdown of the numbers of male and female pupils by schools see Appendix H .

As a further exercise in comparison between Male and Female a Cumulative Distribution of scores was undertaken.

Tables 10 and 11 give an abbreviated display of this cumulative distribution. For the detailed tables in this regard see Appendix I .

(Abbreviated Table of Cumulative Percentage Distribution of Sample).

TABLE 10

(See APPENDIX I for complete table)

| SCORES | CUMULATIVE % |
|---|---|
| 33,5 - 35,5 | 100,0 |
| 31,5 - 33,5 | 99,9 |
| 29,5 - 31,5 | 99,6 |
| 27,5 - 29,5 | 99,0 |
| 25,5 - 27,5 | 98,1 |
| 23,5 - 25,5 | 97,1 |
| 21,5 - 23,5 | 95,1 |
| 19,5 - 21,5 | 90,8 |
| 17,5 - 19,5 | 84,7 |
| 15,5 - 17,5 | 77,2 |
| 13,5 - 15,5 | 67,1 |
| 11,5 - 13,5 | 53,3 |
| 9,5 - 11,5 | 40,2 |
| 7,5 - 9,5 | 24,8 |
| 5,5 - 7,5 | 15,3 |
| 3,5 - 5,5 | 7,0 |
| 1,5 - 3,5 | 2,3 |
| 0 - 1,5 | 0,5 |

TABLE 11

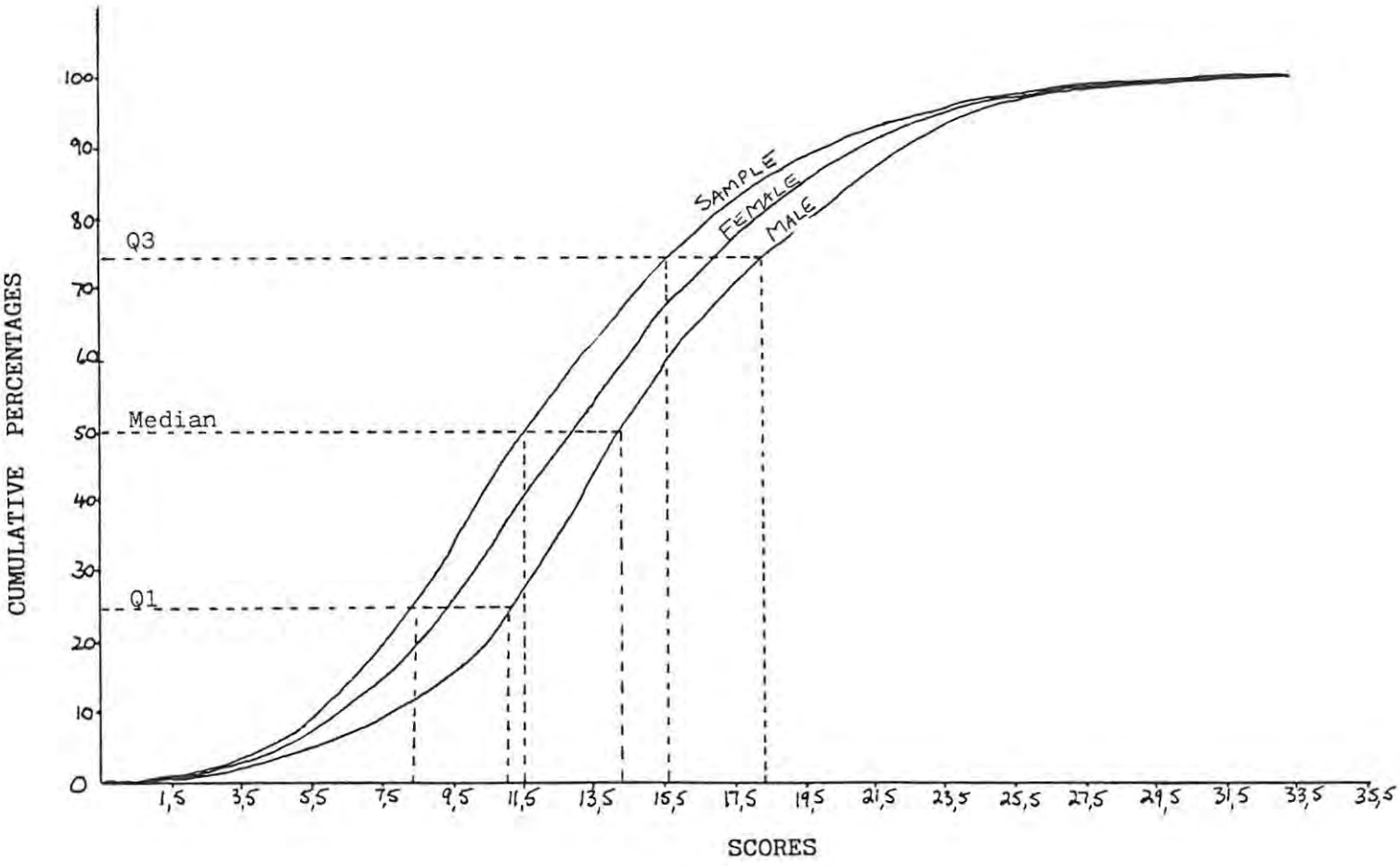
Cumulative Distribution from scores of Male and Female Pupils (Correct to 1 decimal)

| SCORES | MALE CUMULATIVE % | FEMALE CUMULATIVE % |
|---|---|---|
| 34 - 35 | 100 | |
| 32 - 33 | 99,6 | 100 |
| 30 - 31 | 99,3 | 99,9 |
| 28 - 29 | 98,4 | 99,5 |
| 26 - 27 | 97,3 | 98,8 |
| 24 - 25 | 96,4 | 97,7 |
| 22 - 23 | 93,9 | 96,1 |
| 20 - 21 | 87,5 | 93,4 |
| 18 - 19 | 78,9 | 89,0 |
| 16 - 17 | 70,3 | 82,2 |
| 14 - 15 | 58,8 | 73,6 |
| 12 - 13 | 43,0 | 61,3 |
| 10 - 11 | 29,0 | 48,6 |
| 8 - 9 | 14,9 | 32,3 |
| 6 - 7 | 9,8 | 19,4 |
| 4 - 5 | 5,5 | 8,2 |
| 2 - 3 | 2,0 | 2,5 |
| 0 - 1 | 0,9 | 0,2 |

This comparison between the two groups is illustrated further, graphically, in Figure 4 . In this graph the cumulative percentages of both groups are compared with each other and with the curve representing the cumulative percentages of the overall sample.

FIGURE 4

COMPARISON OF MALE AND FEMALE SCORES



The data was also examined to ascertain the Quartile divisions. These were as follows:

Lower Quartile - 9,536
Upper Quartile - 19,09

Median - 13,0

Quartile Deviation - 4,77

Based on the sample of 797 pupils the mean was 13,45. I must now ask myself to what extent this mean (which is in fact the estimated mean of the entire population of Std 8 geography pupils in the Ciskei) can be considered a reliable estimation. Using the Std Error of the Mean, (See Appendix J ) at the 5% level the confidence limits are 13,05 - 13,85 while at the 1% level the confidence limits are 12,92 - 13,98.

Thus at the 5% level the true mean of the population will lie between 13,05 and 13,85 marks out of a possible total of 50 while at the 1% level the true mean of the population will lie between 12,92 - 13,98 marks correct out of a possible total of 50.

Such population means on a Questionnaire such as the one that the sample pupils completed, are very disconcerting indeed.

As indicated on page 59 the sample average of Part A of the Questionnaire was only 26 % while for Part B the percentage was 27. This gave an overall percentage of 27. When one realises that of the items attempted only 35% were answered correctly one can see just how weak the pupils' grasp of items is. These scores were achieved at the beginning of the third quarter. This means, in all likelihood, that pupils had been exposed to the items during handling of the geomorphology

TABLE 12

TEACHER SCORES

| | PART A | | PART B | | TOTAL | | % |
|---|---|---|---|---|---|---|---|
| | ATTEMPTED | CORRECT | ATTEMPTED | CORRECT | ATTEMPTED | CORRECT | % |
| A | 30 | 27 | 20 | 17 | 50 | 44 | 88 |
| B | 29 | 24 | 18 | 16 | 47 | 40 | 80 |
| C | 28 | 22 | 18 | 10 | 46 | 32 | 64 |
| D | 29 | 24 | 19 | 11 | 48 | 35 | 70 |
| E | 23 | 21 | 8 | 8 | 31 | 29 | 58 |
| F | | | ABSENT | | | | |
| G | | | DECLINED | | | | |
| H | 30 | 26 | 17 | 12 | 47 | 38 | 76 |
| I | | | DECLINED | | | | |
| J | 26 | 21 | 15 | 11 | 41 | 32 | 64 |

TABLE 13

COMPARISON OF SCHOOL QUESTIONNAIRE SCORES
AND % TEXTBOOK OWNERSHIP

| SCHOOL | QUESTIONNAIRE % | % TEXTBOOK OWNERSHIP |
|---|---|---|
| A | 28 | 75 - 100 |
| B | 24 | 100 |
| C | 28,6 | 100 |
| D | 25,9 | 50 |
| E | 34 | 50 - 75 |
| F | 39 | 25 - 50 |
| G | 20 | 75 - 100 |
| H | 22,4 | Less than 25 |
| I | 30,2 | 50 - 75 |
| J | 15,6 | 50 - 75 |

section midway down the Std 8 Geography Syllabus (Appendix N contains the Physical Geography component of the Syllabus). If the results of the Questionnaire are anything to go by it appears that the problem facing pupils in Ciskei Schools caused by a lack of understanding of terminology because of problems associated with 2 L instruction are more acute than most teachers and departmental officials would like to believe. The scores of the teachers (Table 12) would appear to compound the problem. The range of percentages from 58 - 88 is a real cause for concern. These are teachers who had taught the section to their pupils prior to the administration of the Questionnaire.

What was interesting about the comparative sample percentages achieved on the two parts of the Questionnaire was the insignificant difference between the two figures; less than 1 %. It would appear that even when contextual clues were given, as in the cloze component, such clues are of little assistance to the pupils. Possibly the language problem is of such a magnitude that such pointers are not noticed.

The positive coefficient of skewness (0,23) indicates that the series of sample scores tails off sharply towards the high values. Examination of Figure 3 and Appendix F shows this indeed to be the case. The magnitude of the coefficient indicates how far from the normal distribution curve the sample is.

Either the sample was unrepresentative or it was too small to give a true reflection of the total population, or the items chosen for inclusion in the Questionnaire were exceptionally difficult and the marking too strict. As indicated in Chapter 3 care was taken to circumvent such influences. What the Questionnaire findings illustrate is the very serious situation caused by an exceptionally low English 2L proficiency. Examination of Tables 10 and 11 serves to bear this out further. 90% of the 797 pupils involved scored less than 40% on the Questionnaire. Differences between Male and Female pupils were evident. Table 11 and Figure 4 reveal that while 58% of the Male pupils scored less than 30% the figure for the female pupil was 73%.

Table 9 reveals that male pupils scored consistently higher than female pupils on both parts of the questionnaire although the difference between male and female scores was noticeably less on part B of the questionnaire (the cloze section). This difference was very pronounced at schools F and I, especially on part A of the questionnaire.

If it wasn't that the percentages for both groups were so low it might be construed that the language problem was less acute among male pupils. Obviously some other variable has influenced the result. Possibly male pupils were more interested in the Geomorphology section of the subject.

Table 13 presents as interesting finding. it appears that the percentage of textbook ownership did not have a noticeable influence upon the individual school percentages. In fact the school with the highest average percentage, School F, had the lowest percentage of textbook ownership among pupils. School G with the second lowest average percentage could boast of a textbook ownership percentage of 75 - 100. I suggest that these findings appear to represent further evidence of the enormity of the language problem. Even with reasonable percentages of textbook ownership schools still achieved scores which were generally low. When the reader realises that all the schools used either Book D or Book E (i.e. the two books which exhibited the lowest reading grade levels when evaluated in terms of readability) then one might be forgiven for suggesting that even with textbook availability the low English 2 L proficiency is severe enough to result in the low achievements as seen in the questionnaire results.

## DISCUSSION OF THE GEOMORPHOLOGY TEST RESULTS

The Geomorphology Test was administered as outlined in Chapter 3 (c) to two schools in the sample. These were Schools F and J.

Tables (a),(b),(c) and (d) in Appendix M give the scores of the pupils from each school and each class. In School F pupils from two classes were ranked together.

Effectively, therefore, only one class of pupils completed the test. In School J pupils were ranked separately in two classes, A and B.

### TABLE 14

### COMPARISON OF AVERAGE TEST SCORES : SCHOOLS F AND J

(Percentages in brackets)

| | TEST 1 | | | TEST 2 | | |
|---|---|---|---|---|---|---|
| SCHOOL | PART A | PART B | TOTAL | PART A | PART B | TOTAL |
| F | 8,68(43,4) | 11,76(58,8) | 20,44(51,1) | 7,71(38,5) | 10,79(53,95) | 18,5(46,2) |
| J Class A | 6,4 (32,0) | 11,0 (55,0) | 17,40(43,5) | 5,6(28,0) | 8,7 (43,5) | 14,2(35,5) |
| Class B | 2,9 (14,5) | 7,9 (39,5) | 10,83(23,07) | 3,2(16,0) | 7,6 (38,0) | 10,75(26,8) |
| Combined | 4,6 (23,0) | 9,4 (47,0) | 14,0 (35,0) | 4,4(22,0) | 8,15(40,75) | 12,47(31,18) |

The first point to note was the difference between the average scores of the two schools on both tests. School F achieved an average of 51,1% on Test 1 and an average of 46,25% on Test 2. School J achieved a score of 35,0% on Test 1 and 31% on Test B. In the light of comments on the two schools on page 51 it was expected that School F would achieve higher scores than School J.

Examination of the scores for School J on Tests 1 and 2 (Table 12 ) shows a result contrary to what was expected. It was fully expected that pupils who had the questions in Part B of Test 2 in Xhosa, and who were permitted to answer these questions either in Xhosa or English or in a combination of both languages would have achieved considerably higher scores.

The difference in results of Part A and Part B of each test were also contrary to what was expected. Table 12 reveals that the average score on questions which were considered to be of equal difficulty were lower on Part A of each test. These scores were expected to be closer together.

The results of Test 2 were as expected with marked differences between the average scores for Part A and Part B. This was more pronounced in School J than in School F. This bore out the expectation that Part B would result in higher scores, but the results of Test 1 tend to refute such a conclusion. Test 1 should have produced average scores of nearly equal magnitude but the situation which emerged was similar to that for Test 2. Clearly some other factor(s) must have been at work. Either the questions in Part B were easier than those in Part A and the arrangement of such questions according to equal levels of difficulty erroneous, or else the pupils may have done better revision on those sections of work which were tested in Part B. There might possibly have been other variables in operation or the pupils at the two schools were not a true reflection of the sample population.

A possible explanation in the light of Kolesnik's findings (page 11 ) is that the pupils doing the Part B of Test 2 engaged in rote learning. Because they have become so accustomed to learning the "jargon" of the subject as a means of compensating for a lack of understanding of the terms used any attempted change of approach (i.e. Xhosa medium permitted) might cause difficulty.

Whatever the cause the idea of research into differing pupil achievements in tests of identical content yet using different language mediums holds out exciting possibilities.

## DISCUSSION OF THE RECORDINGS

Recordings were made in two schools in the sample viz. Schools A and J. The choice of the two schools was explained in Chapter 3.

A striking feature of the recordings was the excessive use made by the teacher of what can only be labelled 'teacher talk'. Both teachers talked at great length in their lessons.

LANGUAGE USED: Both teachers made use of English and Xhosa in their lessons. A feature was the frequency with which both switched from the official medium, English, to Xhosa explanation. Teacher A however, made less use of Xhosa for explanation than did Teacher J.

Both teachers exhibited a tendency to use geographical terms without any attempt to explain such terms. Teacher J was very fond of using the 'jargon' of the subject. One wonders to what extent such 'jargon' was meaningful to the pupils in the classroom. If the results of the Questionnaire for School J (p 59 ) give an indication then it is extremely doubtful if this understanding was present. The teacher's score on the Questionnaire (i.e. 64% - Table 12 ) leads one to question her own level of understanding of the terms used. It is possible that this excessive use of the 'jargon' was some form of defence mechanism to protect against any embarrassing questions on the part of the pupils. The following short extract from a transcription of one lesson illustrates what I have been saying.

In response to a question from a pupil the teacher drew the class' attention to a stereoscope.

T: A stereoscope is used to measure the three-dimensional view of objects.

If you are looking for high topographical features like mountains and hills from an aerial photo-projection try to identify high objects like mountains, trees eh' towers and all the like.

P: (A Xhosa sentence now follows.)

T: Yes. So the picture will show you the three-dimensional effect in the example.

The teacher's use of 'measure' and 'aerial photo-projection' clearly indicates an obvious lack of understanding of what a stereoscope is used for. Also exactly what is meant by an 'aerial photo-projection' is not exactly clear.

Many similar examples were forthcoming in both classrooms. The absence of suitable explanations must surely hamper pupil understanding.

The language used by the pupils both in response to teacher questioning and when pupils sought clarification of some item, was a mixture of English and Xhosa, with Xhosa predominating, except where pupils were able to answer a question by repeating appropriate 'jargon' in English.

QUESTIONING: Both teachers made use of questioning as a technique to gauge pupil understanding in the lesson. Teacher A made greater use of questioning than did Teacher J. A feature noticeable in both sets of recordings was the predominance of teacher - directed questioning. Only very seldom was a pupil heard to offer an unsolicited suggestion or a query. The nature of the questions asked were also revealing. Most questioning was of the closed type which required a single correct answer. It appeared that most answers were of the factual recall type. Pupils either knew or did not know the answer. Often when such answers were not forthcoming the teacher proceeded to help a pupil by virtually giving the answer required by suitable hints.

PUPIL ACTIVITY: The only pupil activity noticeable during the recordings was that already referred to above, i.e. in response to teacher-directed questioning. No attempt was made to involve the pupils in group discussions. In fact there is no evidence in the recordings that the teaching method varied from that of 'teacher talk' interspersed with factual recall questioning. Any pupil activity scheduled for completion appeared at the end of the lessons in the form of instructions for homework.

What then can be said of the language used by both teachers and pupils in the classrooms visited? Obviously only lip-service is paid to Departmental directives that the medium of instruction at all times be English. It would appear that the teachers have become so accustomed to reverting to Xhosa medium for explanation that the amount of English actually used is disappointing. Also disappointing is the amount of opportunity given the pupils for

practice in using English. One would expect to find much more pupil talk than is actually the case. If one assumes, not unreasonably, that other content subjects probably exhibit similar characteristics as far as teacher talk and pupil participation is concerned, then the situation as it exists at present is very disturbing. Such a situation is no doubt aggravated by the knowledge that in the rural areas at least, often the only place that the 2 L is heard with any frequency is in the classroom. If teachers continue to use language as outlined above then the problems facing many pupils will probably intensify.

## IMPLICATIONS FOR THE EDUCATION DEPARTMENT AND FOR FURTHER RESEARCH

This study on Std 8 Geography pupils and their understanding of certain geomorphological concepts has addressed the questions posed on p 3 of Chapter 1. Pupils did under-achieve in the Questionnaire on geomorphological concepts and in the geomorphology test. The results of both exercises, as indicated in Chapter 4 were very disappointing. The use of English as the medium of instruction coupled with the pupils' obviously low English proficiency presented major problems to pupils in Std 8 Geography. Further research is needed to ascertain whether such a state of affairs extends to the traditional content subjects (e.g. History, Agriculture, Biology and Physical Science). If this situation does indeed extend to these other subjects then perhaps the state of affairs revealed in this study goes some way towards explaining why pupils in Ciskei who write the external Std 10 examinations seem to achieve low marks and why the failure rates among these pupils continually cause concern on the part of the education authorities.

The classroom recordings revealed the extent to which a combination of English and Xhosa was used as the medium of instruction. The question to be asked is why this should be the case, especially when official Departmental policy is that English should be the medium of instruction. Also, does such a state of affairs extend down through the school system into the Higher Primary Phase, where the official medium of instruction is intended to be English? If it does then the Ciskei Education Department should address this problem. Is the problem not allied to the grounding that pupils receive in their 1L (Xhosa) in the Lower Primary Phase (Sub A - Std II)? Research has been quoted that

illustrates the interdependence of the 1 L and 2 L in conceptualisation. Possibly this whole question of the 1 L proficiency also needs examination. It is suggested that further research into teachers' language used as a medium of instruction be carried out across the range of content subjects on the school curriculum. It is important that the extent of this problem throughout the school curriculum be ascertained because the English language proficiency of the teachers will influence the type of teaching taking place in the schools.

The type of classroom teaching evident in the classrooms visited (i.e. Talk and Chalk) holds certain implications for the Ciskei Education Department. Not only does it appear necessary to persuade teachers to accept the importance of using the English medium for teaching and explanation whenever possible but opportunity exists for an attempt to be made to get teachers to change their classroom methodology from one based upon teacher-centredness to one in which the pupil is at the centre of a programme of pupil activity and involvement. The obvious vehicle for such a change would be through the existence of in-service training programmes. One wonders however, how successful such attempts at changing classroom methodology in Geography are likely to be if the other content subjects continue to exhibit evidence of teacher-centredness. There exists a need for research in this direction. Is 'talk and chalk' teaching endemic to all the subject areas in most of the schools or are there some subject areas where moves have been made to move away from teacher-centred teaching. If teacher-centredness is the norm then the need for some plan of action to bring about changes in the teaching approaches evident in the schools becomes imperative.

On the question of textbook readability considerations fall outside the scope or jurisdiction of the Ciskei Education

Department. Invariably when a new syllabus is introduced the Department is presented with a choice of books from various publishers. It seems that publishers need to take greater cognizance of the problems associated with the readability of texts and low pupil English 2 L proficiency. Possibly textbook writers should receive more guidance from their publishers on the whole issue of what characteristics epitomise a 'successful' textbook. In terms of readability the need exists for the development of reading age levels applicable to English 2 L pupils (both white and black) in Southern Africa. Such reading age levels would make any readability studies more applicable to local textbooks and would afford writers and education departments alike greater guidance in their choice of suitable textbooks from the range usually available.

The finding that setting part B of the geomorphology test in the vernacular resulted in unexpected scores (p 74) suggests that the idea of research into differing pupil achievements in tests of identical content yet using different language mediums, holds out exciting possibilities. While such research is unlikely to influence examination papers in the forseable future, such papers being set entirely in English, it should go some way towards explaining what disadvantage, if any, pupils in an examination situation find themselves under through having to answer all their questions in a 2 L.

The apparent differences in male and female questionnaire scores offers scope for further investigation because in this instance the differences in achievement ascribed to sex differences are linked to language usage and conceptualisation in a 2 L context. It would be interesting to establish whether the differences observed would occur in a similar study based on the other content subjects of the school curriculum.

What has emerged from this study has been the expectionally important role that language in general, and English 2 L in particular, plays in the educational experience of pupils. In the Ciskei pupils in Std 8 who participated in the study exhibited the extent to which a lack of proficiency in their 2 L could influence school achievement. If, as has been indicated in Chapter 2, English is likely to remain the medium of instruction in Ciskei Schools for the forseable future the task facing education in the Ciskei is obvious. Serious attempts will have to be made to improve not only the standard of classroom teaching and the teacher's competence to use English wherever possible, but attention will have to be given to programmes of pupil English Language Improvement. The obvious place to commence such upliftment would seem to be in the primary schools.

## APPENDIX A

Extract from Milburn's list of terms having a bearing on Geomorphology.

alluvium
alp
anticline
aquifer
arête
arid
atoll
avalanche
bank
bar
barchan
basalt
basin
bay
beach
bench
bight
block
bluff
boulder clay
bourne
braided
Chalk
channel
clay
clint
col
combe
contour
coral
core
corrie
crag
crag and tail
crater
creek
crevasse
crust
cuesta
delta
denudation
deposition
depression
desert
downland
drowned valley
drumlin
dry valley
dune
dyke
earthquake
embankment
erosion
escarpment
estuary
fault
fault line
fen
fiord
flint
flood plain
fold
ford
gap
geyser
glacier
gorge
granite
groyne
gulch
gully
cairn
canyon
cape
cataract
cave
chain
hanging valley
harmattan
headland
hill
hogback
horst

**Appendix A continued.../**

ice
ice sheet
impermeable
inlet
island
joint

kaolin
karst
kopje
lava
levee
limestone
loch
loess
lough

magma
marsh
moraine
mountain
mouth
mud

ness
outcrop
ox-bow

pass
pavement
peak
peneplain
peninsula
permeable
plain
plateux
polje
pot hole
promontory
quartz
quicksand
radial drainage
raised beach
range
rapids
ravine
reef
relief
ria
ridge
rift valley
river capture
river terrace
rock

sand
sandstone
screes
sedimentary
selvas
serac
shale
shield
shingle
shoal
silt
spit
stack
stalactite
stalagmite
straits
strata
strath
subsoil
swallow holes
syncline

tableland
tarn
topsoil
tor

U-shaped valley
upland

vale
valley
volcano

wadi
waterfall
watershed
watertable
wave cut platform
weathering

# APPENDIX B

| | A | B | C | D | E |
|---|---|---|---|---|---|
| **A** | | | | | |
| abyss | - | - | - | | - |
| acid/acidic rock | 4 | 4 | 1 | - | - |
| agglomerate | - | - | 2 | - | - |
| agent | - | - | 1 | - | - |
| alluvial/aggradation alluvium | 2 | - | 2 | - | - |
| alkali | - | 1 | - | 2 | - |
| altitude | - | - | 32 | - | - |
| amygdaloidal | - | 1 | - | - | - |
| anticline | 8 | 4 | 13 | 1 | 1 |
| anthracite | 1 | - | - | - | - |
| aquifer | 2 | - | 2 | - | - |
| aquicludes | 1 | - | - | - | - |
| arkose | - | 2 | - | - | - |
| ash | 9 | 9 | 4 | 3 | 6 |
| axial plane | - | - | 4 | - | - |
| azonal | - | - | 1 | - | - |
| **B** | | | | | |
| bands/banded | 1 | - | 1 | - | - |
| banket | - | - | - | 1 | - |
| basalt | 11 | 6 | 18 | 2 | 2 |
| base/basic | 2 | 3 | 10 | - | - |
| basin | 3 | 4 | 6 | - | - |
| batholith | 10 | - | 8 | - | 5 |
| bay | 1 | - | - | - | 1 |
| bedding plane | - | 3 | 8 | 1 | 2 |
| beach | - | 2 | - | - | - |
| belts | 4 | 10 | 10 | - | - |
| block (block mountain) | 11 | 2 | 43 | 5 | 6 |
| bonded | 2 | - | - | - | - |
| boulder (clay) | 2 | 1 | 1 | - | - |
| braided (rivers) | - | - | 1 | - | - |
| breccia | 3 | 2 | 1 | - | - |
| buttes | 7 | - | 9 | 1 | 4 |

| | A | B | C | D | E |
|---|---|---|---|---|---|
| **C** | | | | | |
| calcerous | - | 2 | 1 | - | - |
| caldera | 7 | 4 | 9 | - | - |
| canyon | - | - | 1 | - | 1 |
| carbonation/carboniferous | - | 5 | 2 | - | 3 |
| catchment (area) | - | - | 1 | - | - |
| cave/cavern | 3 | 3 | 2 | 2 | 2 |
| cementing | - | - | 3 | - | 2 |
| channel | 2 | - | 3 | - | - |
| chemical (weathering action) | 1 | 11 | 15 | 3 | 6 |
| cinders | 2 | - | 6 | - | 4 |
| clastic | 1 | - | - | 1 | 1 |
| classification | - | 4 | - | - | - |
| clay | 3 | 9 | 6 | 1 | 3 |
| cleavage (planes) | - | - | 4 | - | - |
| cliffs | 5 | - | 7 | 3 | 2 |
| clinkers | 1 | - | 1 | - | - |
| coalesce | - | - | 4 | - | - |
| coast/coastal | 7 | 7 | 24 | 2 | 3 |
| coal | - | - | 1 | - | - |
| cobbles | - | - | 1 | - | - |
| columns | - | - | 1 | - | - |
| compaction | 3 | - | 4 | - | - |
| composition | 2 | 11 | 6 | - | 4 |
| composite (volcanoes) | | | | | |
| compression | 7 | - | 1 | 4 | 5 |
| cone | 21 | 12 | 8 | 5 | 6 |
| conglomerate | 6 | 5 | 9 | - | 5 |
| constituent (minerals) | 2 | - | 1 | - | - |
| consolidate | - | 5 | 11 | - | - |
| continent | 38 | 34 | 67 | 19 | 17 |
| continental drift | 5 | 11 | 10 | 4 | 13 |
| continental block | - | - | 3 | - | - |
| contraction | 3 | 1 | 3 | - | - |
| contour | 6 | 7 | 13 | - | 4 |
| coral | 1 | 4 | - | - | 2 |
| core | - | - | 1 | - | - |
| cordillera | - | - | 1 | - | - |
| crater | 12 | 3 | 10 | 2 | 5 |

**APPENDIX B** (continued)

| | A | B | C | D | E |
|---|---|---|---|---|---|
| D | | | | | |
| datum (plane) | - | - | 2 | - | - |
| debris | 2 | 2 | 6 | - | - |
| decomposition | 2 | 2 | 4 | - | - |
| deform | 3 | - | 1 | - | - |
| degradation | - | - | 3 | - | - |
| delta | 2 | - | - | - | - |
| denude | - | 1 | 1 | 1 | - |
| deposit/deposition | 24 | 1 | 21 | 7 | 9 |
| depression | 8 | 3 | 12 | - | - |
| desert | - | 2 | - | - | - |
| diabase | - | 1 | - | - | - |
| diatrophic | - | 10 | 3 | - | - |
| disintegration | 8 | 7 | 7 | - | - |
| dislocation | 1 | 1 | - | - | - |
| dip | - | 2 | - | - | - |
| displacement | 3 | 4 | 10 | - | - |
| dissection (river) | - | - | 2 | - | - |
| dissolve | 1 | 1 | - | 1 | - |
| dolerite | 8 | 7 | 13 | - | 1 |
| dolomite | 5 | 3 | 2 | - | 1 |
| dome | 10 | - | 7 | 0 | - |
| dormant | 2 | - | 2 | 4 | 3 |
| drainage | 2 | - | 8 | - | - |
| duct | 1 | 1 | - | - | - |
| dune | - | - | 1 | - | - |
| dust | - | 2 | 4 | 1 | - |
| dykes | 9 | 9 | 10 | - | 5 |

| | A | B | C | D | E |
|---|---|---|---|---|---|
| C | | | | | |
| crest | - | 1 | 7 | - | - |
| crust/crustal | 43 | 41 | 100 | 54 | 32 |
| crystal | - | - | - | 4 | 7 |
| crystalline | 11 | 17 | 26 | 1 | - |
| E | | | | | |
| earthflow | - | - | 1 | - | - |
| earthquake | 33 | 22 | 49 | 36 | 14 |
| earthslide | | | | | |
| effervesce | 1 | - | - | - | - |
| elasticity | 1 | - | - | - | - |
| element | 4 | - | 1 | 1 | - |
| elevation | 2 | - | 4 | - | - |
| emissions | 1 | - | 1 | - | - |
| endogenetic | 4 | 4 | - | - | - |
| environment | - | - | 1 | - | - |
| epicentre | 2 | - | 8 | 4 | 1 |
| epirogenetic | - | 4 | - | - | - |
| equilibrium | 3 | - | - | - | - |
| erode/erosion etc | 17 | 7 | 46 | 4 | 8 |
| erupt/eruption | 18 | 3 | 4 | 22 | 7 |
| escarpment | 1 | - | 9 | 1 | - |
| evaporation | - | 1 | - | - | - |
| exfoliation | 5 | - | 5 | 3 | 1 |
| exogenetic | 3 | - | - | - | - |
| expansion | 3 | - | - | - | - |
| extinct (volcanoes) | 2 | 2 | 1 | 8 | 2 |
| extrusive (volcano) | 9 | - | 1 | - | 14 |
| F | | | | | |
| fault | 32 | 13 | 36 | 22 | 14 |
| fault line / planes | 1 | 3 | 29 | 4 | - |
| felsenmeer | - | - | 2 | - | - |
| fissility | 1 | - | - | - | - |
| fissure | 10 | 6 | - | - | 3 |
| flakes/flaking | 2 | - | 2 | - | - |
| flagstones | - | - | 2 | - | - |
| flexure | 1 | - | - | - | - |
| flint | - | 1 | - | - | - |

APPENDIX B (continued)

| | A | B | C | D | E |
|---|---|---|---|---|---|
| F | | | | | |
| flows (soil flows) | 4 | - | 3 | - | - |
| focus (earthquake) | 4 | - | 6 | - | 2 |
| fold | 64 | 16 | 61 | 16 | 24 |
| foliated | 1 | - | - | - | - |
| foot wall | - | - | 9 | - | - |
| foothills | 1 | - | - | - | - |
| formation | 2 | 6 | 2 | - | 3 |
| fossils | 9 | 6 | - | 2 | 5 |
| fountain | - | 1 | 1 | - | - |
| fragments/fragmentation | 6 | 9 | 12 | - | - |
| friable | - | - | 1 | - | - |
| fumaroles | - | 3 | 1 | - | - |
| G | | | | | |
| geology | 5 | 8 | 26 | 1 | - |
| geologist | 1 | 1 | 30 | - | - |
| geomorphology | 1 | 2 | 13 | 4 | 1 |
| geomorphologist | - | - | 4 | 1 | - |
| geophysicist | - | - | 1 | - | - |
| geosyncline | 3 | - | 22 | - | 3 |
| geyser | - | 3 | 1 | 8 | 3 |
| glacier/glacial | 4 | 10 | 5 | 2 | 1 |
| glyptogenesis | - | - | 3 | - | - |
| gneiss | 2 | 2 | 5 | 2 | 1 |
| gorge | 2 | 2 | 5 | 2 | 1 |
| graben | 3 | 3 | 3 | - | 1 |
| gradation (forces/system) | - | - | 7 | - | - |
| gradient | - | 3 | 19 | - | 5 |
| grain/granular | 6 | 6 | 4 | - | 3 |
| granite | 17 | 9 | 37 | 1 | 5 |
| gravel | 5 | 1 | 5 | 1 | 1 |
| gravity | - | - | 3 | 2 | - |
| grit | - | 2 | - | - | - |
| ground | 1 | - | 5 | 2 | - |
| gulley | - | - | 1 | - | - |
| gypsum | 1 | - | 3 | - | - |

| | A | B | C | D | E |
|---|---|---|---|---|---|
| H | | | | | |
| hachures | - | - | 4 | - | - |
| hanging wall | - | - | 10 | - | - |
| heights | - | - | 2 | - | - |
| hemicrystalline | - | 1 | - | - | - |
| hexahedral pyramids | - | - | 1 | - | - |
| highlands | - | - | 3 | - | - |
| hills | 9 | 1 | 28 | 4 | - |
| hinterland | - | - | 1 | - | - |
| holocrystalline | - | 1 | - | - | - |
| horizon | - | - | 4 | - | - |
| horst | 2 | 2 | 1 | - | 1 |
| hot springs | - | 4 | 1 | 7 | - |
| humus | - | - | 1 | - | - |
| hydration | - | 1 | 1 | 1 | 1 |
| hydrolosis | - | 1 | 3 | - | - |
| hydrostatic | - | 1 | - | - | - |
| hypabyssal | - | 7 | - | - | - |
| I | | | | | |
| ice | 4 | - | 6 | - | 3 |
| iceberg | - | - | 3 | - | - |
| icecap | - | - | 2 | - | - |
| iceflow | - | - | 1 | - | - |
| igneous | 34 | 15 | 33 | 11 | 11 |
| impermeable | 1 | - | 1 | - | - |
| impervious | - | - | 1 | - | - |
| incised | - | - | 5 | - | - |
| interstices | - | - | 1 | - | - |
| intercratonic (belt) | - | - | 1 | - | - |
| intermontane (plateaux) | - | - | 1 | - | - |
| intrazonal (soils) | - | - | 1 | - | - |
| intrude | 17 | 3 | 2 | - | 4 |
| ironstone | 3 | - | 1 | - | - |
| island | 8 | 5 | - | 1 | 1 |
| isoclinal | - | - | 2 | - | - |
| isostasy/isostatic | 6 | - | 6 | 4 | 4 |

APPENDIX B (continued)

| | A | B | C | D | E |
|---|---|---|---|---|---|
| J | | | | | |
| Joint/jointing | - | - | 23 | - | 2 |
| K | | | | | |
| kloof | - | - | - | 2 | - |
| knots | - | - | - | 3 | - |
| koppies | - | - | - | 2 | - |
| L | | | | | |
| laccolith | 3 | - | 5 | - | 2 |
| lagoon | - | - | 2 | - | - |
| lakes | 1 | 4 | 5 | 3 | - |
| land | - | - | 3 | - | 5 |
| land form | 11 | 12 | 47 | - | 3 |
| landmasses | 1 | 4 | 3 | - | 1 |
| landscape | 5 | 1 | 37 | 1 | - |
| landslide | 2 | - | 8 | 2 | 4 |
| lava | 34 | 17 | 40 | 12 | 16 |
| layer | 36 | 12 | 23 | - | 24 |
| limestone | 9 | 12 | 4 | 6 | 4 |
| lithogenesis | - | - | 5 | - | - |
| lithosphere | 1 | - | 3 | - | - |
| littoral | - | - | 1 | - | - |
| loess | 6 | - | 1 | - | - |
| lopolith | 3 | - | 4 | - | - |
| lithology | - | - | 4 | - | - |
| M | | | | | |
| mafic (minerals) | - | 2 | - | - | - |
| marsh | 3 | - | - | - | - |
| massive | 4 | - | 11 | - | 1 |
| mass wasting | - | - | 7 | - | 1 |
| material | 2 | - | - | - | 8 |
| matrix | - | - | 5 | - | - |
| mechanical (weathering) | 1 | 2 | 11 | 2 | 10 |
| meltwater | - | - | 1 | - | - |
| mesa | 4 | - | 2 | 1 | 4 |
| metamorphic | 18 | 7 | 26 | 14 | 6 |
| metaquartzite | - | 1 | - | - | - |
| metallic | - | - | 3 | - | - |
| mica | - | 1 | 5 | - | - |
| mineral | 14 | 13 | 42 | 8 | 7 |
| mineralogist | - | - | 3 | - | - |
| mobile belts | - | - | 17 | - | - |
| moho discontinuity/mohorovic | 1 | 5 | 6 | 2 | 1 |
| molten | 10 | 4 | 5 | 5 | 6 |
| monocline | 4 | 1 | 2 | - | - |
| mountain | 53 | 18 | 93 | 14 | 19 |
| mud | 4 | 2 | 2 | - | 1 |
| mudstone | - | 5 | - | - | - |
| N | | | | | |
| nek | - | - | 1 | - | - |
| niches | - | - | 1 | - | - |
| O | | | | | |
| ocean | 10 | 22 | 23 | - | 5 |
| ore | 3 | - | 3 | - | - |
| orientated | - | - | 3 | - | - |
| organic | 2 | 5 | - | - | - |
| orogenetic/orogeny | 11 | 9 | 6 | - | - |
| orographic | 2 | - | - | - | - |
| outcrop | 1 | 1 | 9 | - | - |
| outflows | - | 2 | - | - | - |
| overfold | 2 | 1 | 4 | - | - |
| overburden | - | - | 1 | - | - |

APPENDIX B (continued)

| | A | B | C | D | E |
|---|---|---|---|---|---|
| O | | | | | |
| oxidation | 1 | - | 2 | 1 | 1 |
| P | | | | | |
| pans | 1 | - | 4 | - | - |
| pass | - | - | 3 | - | 4 |
| peaks | 9 | 2 | 5 | - | 1 |
| peat | 1 | - | - | - | - |
| pebbles | 3 | - | 1 | - | 3 |
| pellets | - | - | 1 | - | - |
| peninsula | - | 1 | - | - | - |
| permeable | 1 | - | 1 | - | - |
| petralogic | - | - | 1 | - | - |
| petrified (remains) | 1 | - | - | - | - |
| pipe | 7 | 3 | 7 | 2 | 2 |
| plain | - | 3 | 18 | 1 | - |
| plane | 10 | 4 | 2 | - | - |
| plateau | 10 | 6 | 10 | 1 | - |
| plates | - | 9 | 7 | - | - |
| plugs | 2 | - | 1 | 2 | - |
| plutonic /plutons | 1 | 6 | 2 | 1 | 4 |
| pores | 3 | - | - | - | - |
| porphyritic | - | 3 | - | - | - |
| pothole | 1 | - | - | - | - |
| precipice | - | - | 1 | - | - |
| primeval/primordial | 3 | - | 3 | - | - |
| profile | 5 | 2 | 2 | - | - |
| provenance (area) | - | - | 1 | - | - |
| pyroclastic | - | 1 | 7 | - | - |
| Q | | | | | |
| quartz | 1 | 9 | 4 | - | 1 |
| quartzite | 4 | 6 | 11 | 1 | 1 |
| R | | | | | |
| ranges | 6 | 4 | 15 | - | - |
| reduction (of surfaces) | 2 | - | 1 | 1 | - |
| reefs | - | 1 | - | 1 | - |
| relief | 6 | 8 | 25 | - | 1 |
| residual | - | - | 1 | - | - |
| resistant | 4 | - | 12 | - | 3 |
| reversed fault | - | - | 5 | - | - |
| ridges | 5 | 5 | 36 | 1 | 4 |
| rift (valley) | 8 | 2 | 13 | 11 | 6 |
| rim | 1 | - | - | - | - |
| river | 4 | 7 | 25 | 6 | 2 |
| rock | 84 | 89 | 139 | 56 | 63 |
| run-off | - | - | 6 | - | - |
| S | | | | | |
| sand | 3 | 6 | 9 | 10 | 1 |
| sandbank | - | - | 1 | - | - |
| sanddune | - | - | 1 | - | - |
| sandstone | 11 | 2 | 30 | 2 | 5 |
| scarp | - | - | 3 | 4 | - |
| schist | 4 | - | 7 | 1 | - |
| screes | - | - | 1 | - | - |
| sea | 10 | 5 | 20 | 1 | 5 |
| sea level | 2 | - | 21 | - | 7 |
| seam | 1 | 1 | - | 1 | - |
| section line | 2 | - | - | - | - |
| secondary joints | - | - | 4 | - | - |
| sedimentary/ sedimentation | 49 | 28 | 52 | 25 | 26 |
| seepage/seeping | - | - | 4 | - | - |
| seismograph/seismic | - | 2 | - | - | 1 |
| serrated ridge | - | - | 3 | - | - |
| shale | 8 | 5 | 22 | 2 | 4 |
| shelves | - | - | 2 | - | - |
| shield | - | 2 | 28 | 5 | 1 |
| shield volcano | 12 | - | 5 | - | 4 |
| shrinkage joint | - | - | 5 | - | - |
| sial | 10 | 7 | 6 | 4 | 2 |
| siliceous/silica | - | 11 | 3 | - | - |
| sill | 4 | 7 | 6 | - | 5 |
| silt | - | 1 | 1 | 3 | 2 |
| sima | 8 | 11 | 7 | 3 | 2 |

APPENDIX B (continued)

| | A | B | C | D | E |
|---|---|---|---|---|---|
| S | | | | | |
| sinkhole | 2 | - | 1 | - | - |
| sinter | - | 2 | - | - | - |
| slab | - | - | 1 | - | - |
| slate | 3 | 3 | 3 | 2 | 1 |
| slaking | - | - | 1 | - | - |
| slope | 9 | 2 | 51 | 1 | 15 |
| snow | - | - | 2 | - | - |
| soil | 12 | 7 | 19 | 8 | 4 |
| solidify/ solidifacation | 15 | 7 | 11 | - | 4 |
| solifluction | - | - | 2 | - | - |
| solution/soluble | 2 | - | 4 | - | - |
| spitskop | - | - | - | 1 | - |
| splinters | - | - | 1 | - | - |
| spring | - | - | 1 | 1 | - |
| spur | - | - | 10 | - | 5 |
| stable/stability | 4 | - | 15 | - | 9 |
| stone | 3 | - | - | 4 | - |
| stalactites | 1 | 1 | - | 2 | 2 |
| stalagmites | 1 | 1 | - | 2 | 2 |
| strata | 13 | 12 | 28 | 2 | 2 |
| strato volcano | 3 | - | 1 | - | - |
| stream | - | 1 | 6 | - | - |
| stresses | 2 | - | - | - | - |
| strike | - | 2 | - | - | - |
| structure | - | 3 | 20 | - | 2 |
| sub-continent | 1 | - | 10 | 1 | - |
| submarine | - | - | 5 | - | - |
| subterranean | 1 | - | - | - | - |
| subside/subsidence | 6 | - | 2 | - | - |
| summit | 2 | - | 7 | - | - |
| swamp | - | - | 1 | 1 | - |
| swells | 3 | - | - | - | - |
| syncline / synclinal | 10 | 2 | 11 | 2 | 1 |
| T | | | | | |
| tafonis | - | - | 1 | - | - |
| talus | 1 | - | 4 | - | - |
| tectonic | 1 | 3 | 6 | 2 | - |
| terrace | - | - | 9 | - | - |
| terrain | 1 | - | 3 | - | - |
| terrestrial | - | - | 3 | - | - |
| tetahedron /tetahedral | - | 2 | 1 | - | - |
| texture | 13 | 3 | 11 | - | 2 |
| tidal wave | - | - | 2 | - | - |
| tillite | 4 | 3 | 4 | - | - |
| tombstone weathering | - | - | 1 | - | - |
| topography | 12 | 1 | 29 | - | - |
| trench | 1 | - | - | - | - |
| tributaries | - | - | 2 | - | - |
| trough | 2 | 2 | 21 | - | 1 |
| tsunami | 7 | - | - | 4 | 2 |
| tuff | - | - | 1 | - | - |
| turbulence | - | - | 1 | - | - |
| U | | | | | |
| undulating | 1 | - | 3 | - | - |
| uplift | 2 | 12 | 9 | 3 | - |
| upsurge | - | - | 2 | - | - |
| upwelling | - | - | 1 | - | - |
| V | | | | | |
| valley | 4 | 1 | 23 | - | 3 |
| vent | 5 | - | 3 | - | - |
| viscosity | 2 | - | - | - | - |
| vitreous | - | 5 | - | - | - |
| vlei | - | - | 1 | - | - |
| volcano/volcanism | 50 | 49 | 85 | 37 | 37 |
| W | | | | | |
| Wave | 5 | 1 | - | 2 | 3 |
| warp | 18 | 8 | 13 | 4 | 1 |
| watershed | - | - | 5 | - | 2 |
| waterfall | 1 | - | 1 | - | 3 |
| weather/weathering | 17 | 18 | 41 | 15 | 16 |
| X | | | | | |
| xenolith | - | - | 1 | - | - |
| Z | | | | | |
| zone/ zonal | 8 | - | 26 | - | 3 |

## APPENDIX C

## QUESTIONNAIRE

SCHOOL : | A | B | C | D | E | F | G | H | I | J |

| MALE | FEMALE |
|---|---|

INSTRUCTIONS:

**PART A**

For each of the items listed below (Numbers 1-30) show that you know the meaning by briefly explaining each one.

You may use a sketch or diagram to help you show what is meant by each item.

You must not worry about your spelling or grammar. The only thing that matters is your explanation.

e.g. A Pass
This is a narrow path or passageway through a range of hills


1. anticline

2. block (as in block mountain)

3. coast

4. core

5. crystal or crystalline

6. erosion

7. fault (as in fault line or fault plane)

8. fold (as in fold mountain)

9. glacier

10. granular

11. hill

12. isostasy

13. lava

14. layer

15. magma

16. mantle (as in mantle of the earth)

17. mountain

18. orogenetic

19. mineral

20. ocean

21. relief

22. sea level

23. soil

24. sial

25. sill

26. sima

27. strata

28. syncline

29. warp

30. zone or zonal

**PART B**

Fill in ONE suitable word in each of the blank spaces in the passage below. The word you fill in must fit the meaning of the sentence. You must not worry about spelling.

The surface of the earth, its _____ is composed of many different kinds of _____ . Thus Igneous rocks were once _____ material. Sedimentary rocks are formed by _____ of layers of silt or sediments. _____ rocks are all igneous or sedimentary _____ which change because of heat and _____.

Various processes can alter the surface _____ of the earth. A violent example, _____, can be very damaging, as shock _____ often exert great force upon the _____. Sometimes features wear away gradually. This _____ only affects the relief over long_____ of geological time. Sometimes great volcanic _____ can alter the earth's surface. While _____ of mountains can alter slowly. River _____ are often cut into flat hilltop _____. Landforms change like this. Even _____ drift very slowly apart creating _____ valleys which are very large.

Appendix C continued..../8

**PART I**

NUMBER ATTEMPTED

NUMBER CORRECT

**PART II**

NUMBER ATTEMPTED

NUMBER CORRECT

TOTAL ATTEMPTED

% ATTEMPTED

TOTAL CORRECT

% CORRECT

# APPENDIX D

## THE CLOZE PROCEDURE

The word "cloze" originated in work by W Taylor in 1953. It referred to a type of test which was designed to measure the readability of a passage of prose (Oller). Typically, it involves a passage from which every 'n'th word is deleted and replaced by standard-length blanks. Different deletion ratios (i.e. n = varying numbers) can be used although it appears that the ratio of 1:5 is most common (EER 1982). Subjects then attempt to fill in the deleted word. For a test to be termed "cloze" in the strictest sense of the word, various forms have to be used in the same test. Thus while every 5th may be deleted for example, the form of deletion should change so that in some it is the 2nd, 7th, 12th etc., while in others it is the 3rd, 8th, 13th word etc.

The term "cloze" is derived from 'closure', a term used in Gestalt psychology referring to the natural human tendency to complete mentally familiar yet incomplete patterns. While originally developed as a measure of readability it has become widely used as a test of reading comprehension and general language proficiency (Schultz 1982).

From the point of reliability when testing readability, possibly the deletion of every 3rd word may be desirable for this would yield more responses but some writers have shown that four or more words are needed between blanks in order to obtain the most reliable and valid measures. (EER refers to work done by MacGuintie 1960; Fittenbaum, Jones and Rapoport 1963). Klare et al (1972) maintained that an increase in the number of words between deletions beyond four, especially with readers of limited ability may make such cloze tests more acceptable.

**Appendix D continued..../**

While attempts such as Klare's have been made to increase the reliability of the 'cloze' procedure, others have expressed doubts. Criticism includes the inability of 'cloze' to measure all kinds of comprehension skills; such skills may sometimes be based on general knowledge rather than the interpretation of the material being tested; the results may sometimes depend too much on short term constraints (ie. the words on either side of the blank). Krutsch showed that 'cloze' may in effect be rather misleading as a test of comprehension for it may ignore other measures (such as reading time; eye movement data; number of inferences answered correctly) which might be better indicators of comprehension difficulty.

The literature on the 'cloze' procedure is vast. The EER mentions over one thousand references ranging from commentaries (both for and against the procedure to review of the research, and to bibliographies of such commentaries).

In constructing my questionnaire I wished to use a procedure which was based on the 'cloze' procedure. I am aware that to be termed 'cloze' in its strictest sense, I should have had seven different forms to present to the pupils. In this way the requirements for a truly 'cloze' exercise would have been satisfied.

I took the terms I wanted to ask the pupils and proceeded to work them into a passage in which every 7th word was deleted. One of the possibilities mentioned in the section under Method of Study, was to ask the questions in the form of full sentences in which the context would assist the pupil. This type of approach is the one used in part B of the questionnaire.

## APPENDIX E

GEOMORPHOLOGY TEST 1. (A)

1. What type of rock is closely associated with volcanic activity? (2)

.....

2. Name one example of this type of rock formed on the earth's surface. (2)

.....

3. What is the main difference between mechanical and chemical weathering? (2)

.....

.....

4. List three examples of mechanical weathering? (6)

( i) .....

( ii) .....

(iii) .....

5. What is meant by each of the following terms (8)

( i) Epicentre .....

( ii) Focus .....

(iii) Seismograph .....

( iv) Tsuname .....

PART B

1. Classify the following rock samples into three main rock types: (4)

Granite; Sandstone; Limestone; Basalt;

Igneous .....

Metamorphic .....

Sedimentary .....

**Appendix E continued..../2**

2. List two ways in which metamorphic rocks form (4)

( i) .....

(ii) .....

3. Explain the meaning of isostasy. (2)

.....

.....

4. Forces that change the earth's surface may be divided into two classes : internal and external.

List the following forces under the correct heading.

River, Volcano, Earthquake, Glacier, Faulting (10)

| Internal Forces | External Forces |
|---|---|
| ..... | ..... |
| ..... | ..... |
| ..... | ..... |
| ..... | ..... |

## APPENDIX E

GEOMORPHOLOGY TEST 2.

PART A

1. What type of rock is closely associated with volcanic activity? (2)

.....

2. Name one example of this type of rock formed on the earth's surface (2)

.....

3. What is the main difference between mechanical and chemical weathering? (2)

.....

.....

4. List three examples of mechanical weathering? (6)

( i) .....

( ii) .....

(iii) .....

5. What is meant by each of the following terms? (8)

Epicentre .....

Focus .....

Seismograph .....

Tsuname .....

PART B

1. Beka ilitye ngalinye phantsi kodidi lwalo kula alandelayo
Granite, Sandstone, Limestone, Basalt (4)

Igneous .....

Metamorphic .....

Sedimentary .....

**Appendix E continued..../**

2. Chaza indlela ezimbini ezenzekayo ngayo imetamorphic rocks
   ( i) .....(4)
   (ii) .....

3. Chaza ukuba i isostasy ithetha ukuthini na (2)
   .....
   .....

4. Inguqulelo zemo yomhlaba zingohlulwa zibe zindidi ezimbini

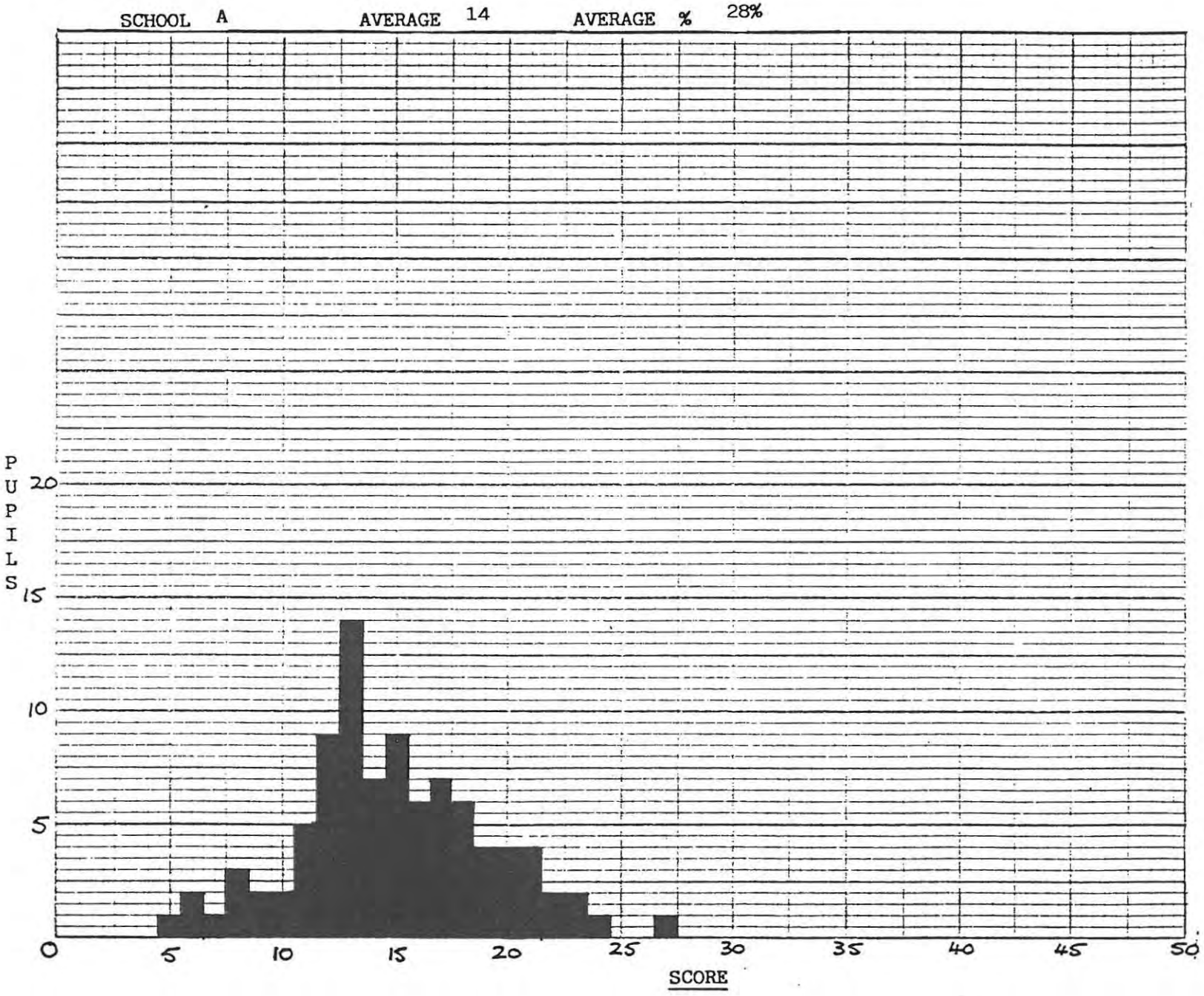
   Internal okanye external

   Phantsi kwezindidi zimbini bhala iforces kwezi zilandelayo eziwa phatsi kodidi ngalunye.

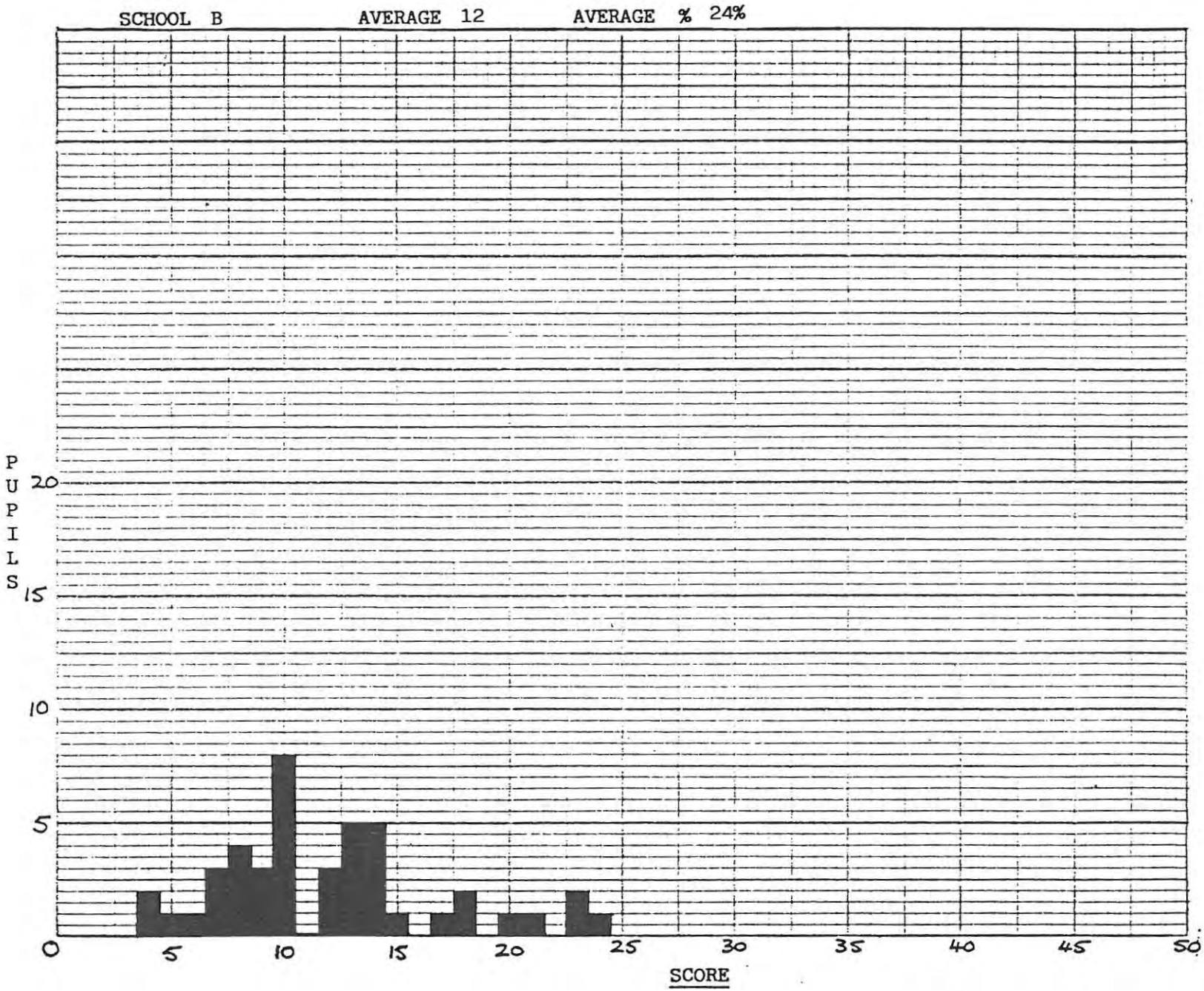
   River, Volcano, Earthquake, Glacier, Faulting (10)

| Internal forces | External forces |
|---|---|
| ..... | ..... |
| ..... | ..... |
| ..... | ..... |
| ..... | ..... |

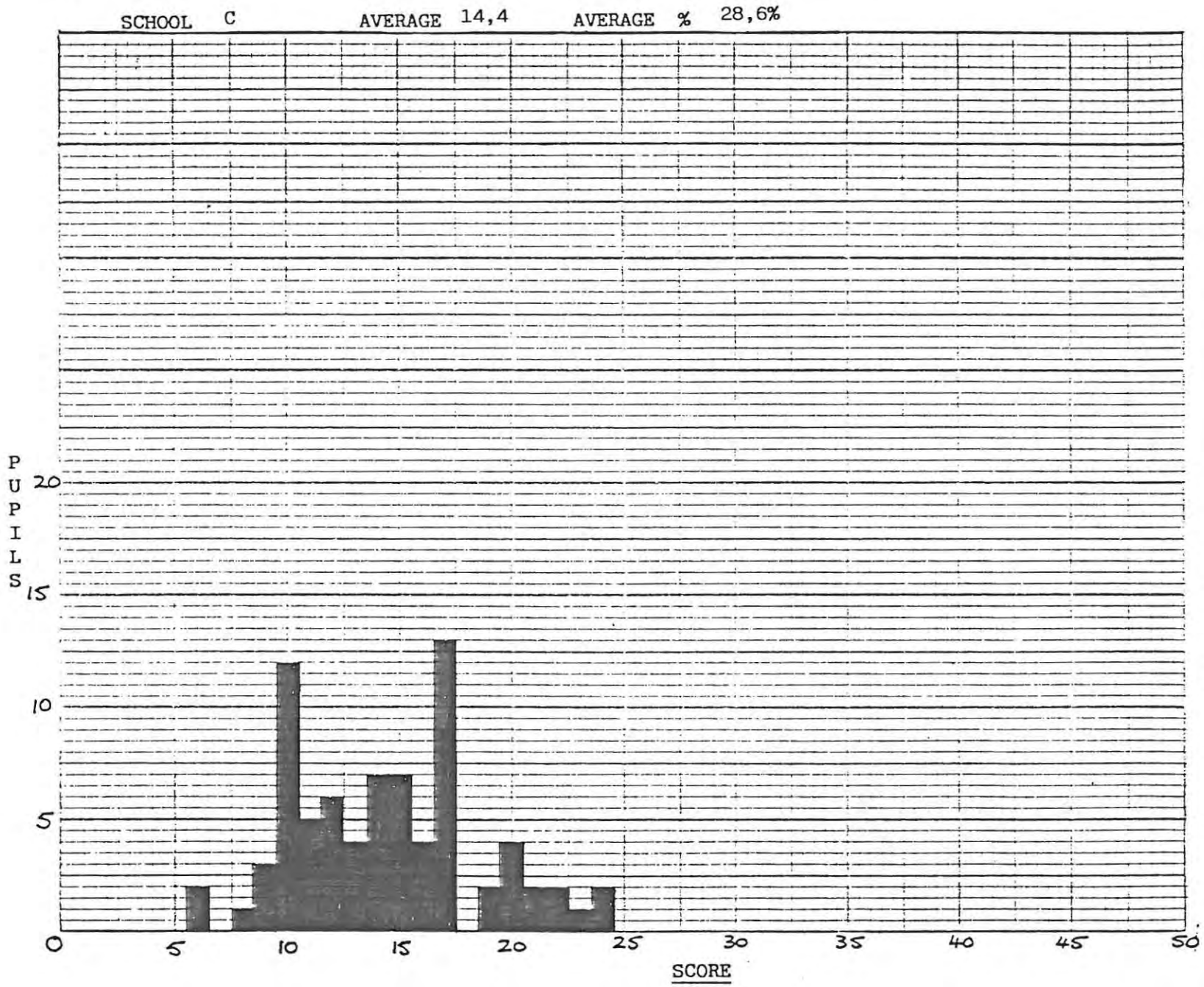
APPENDIX F (i)


SCHOOL A
AVERAGE 14
AVERAGE % 28%
PUPILS
0
5
10
15
20
25
30
35
40
45
50
SCORE

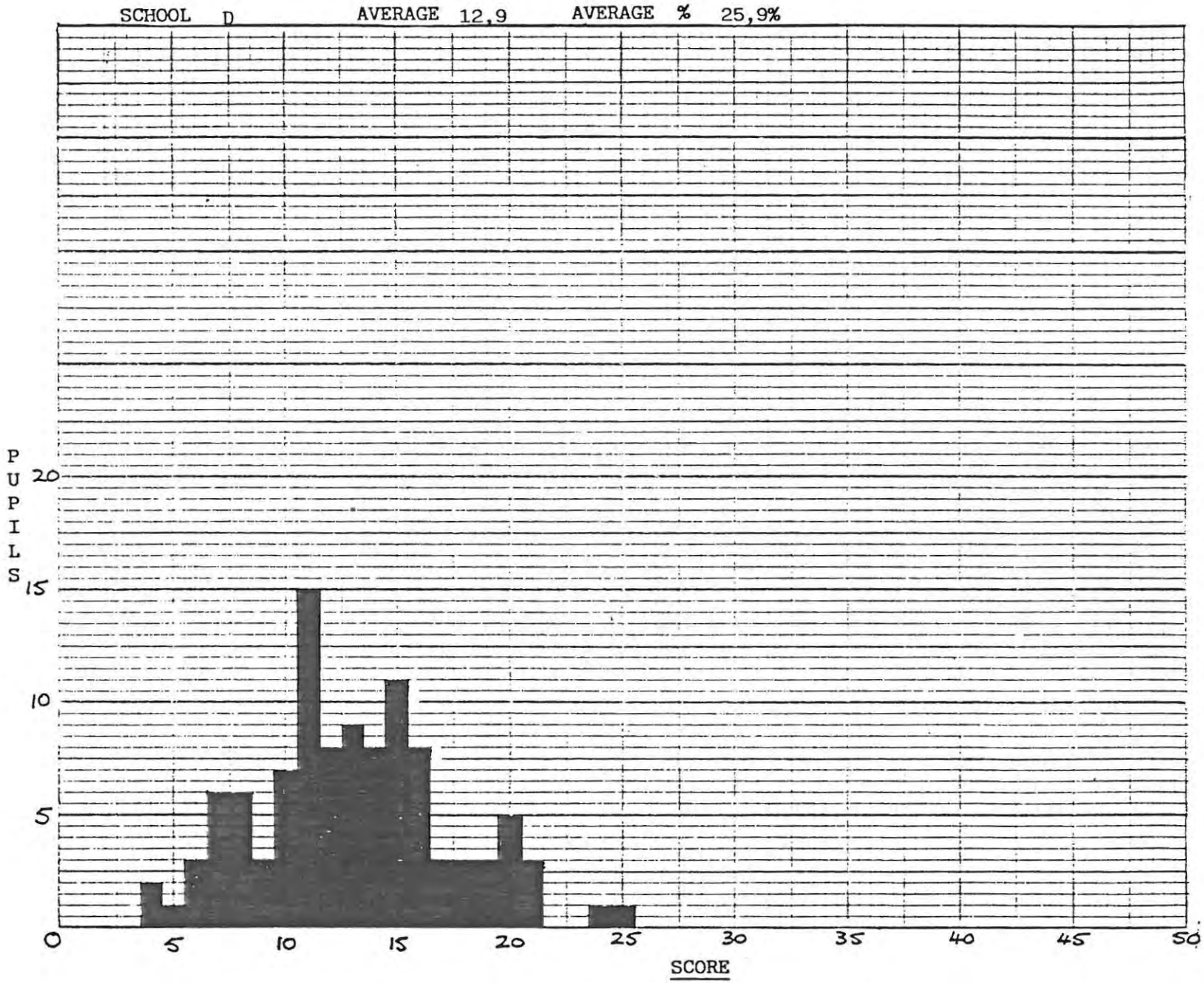
APPENDIX F (ii)



APPENDIX F (iii)

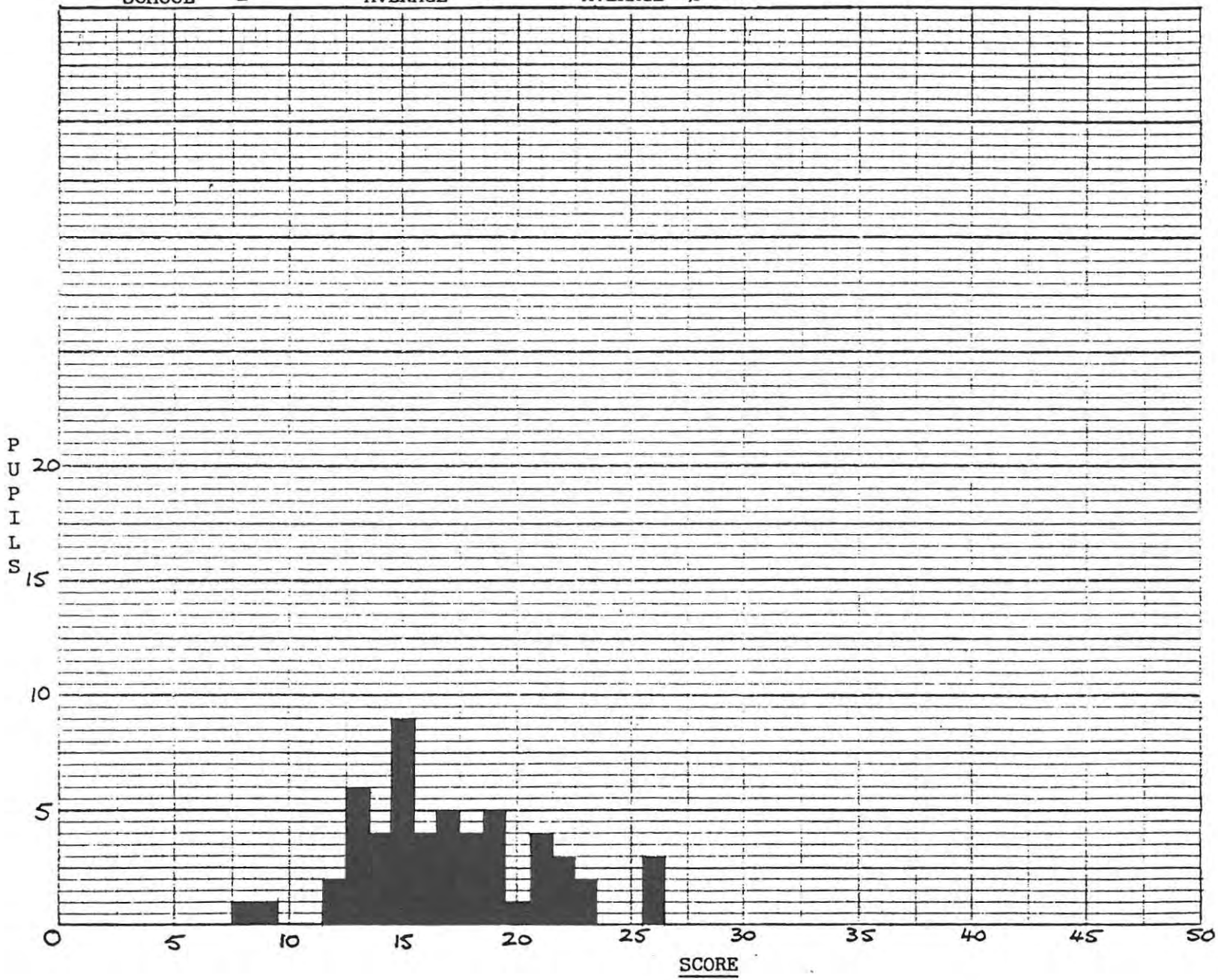


APPENDIX F (iv)

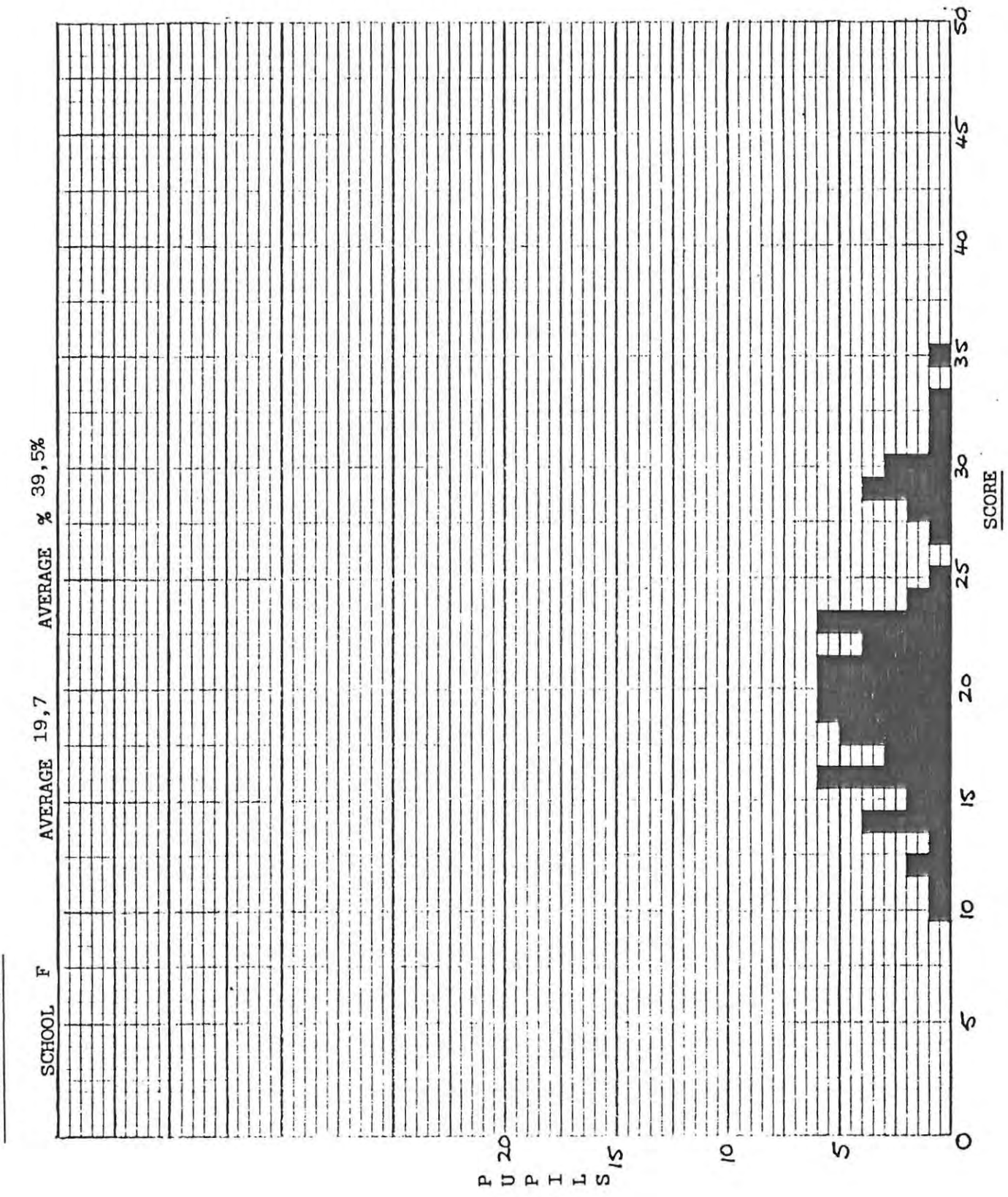


APPENDIX F (v)

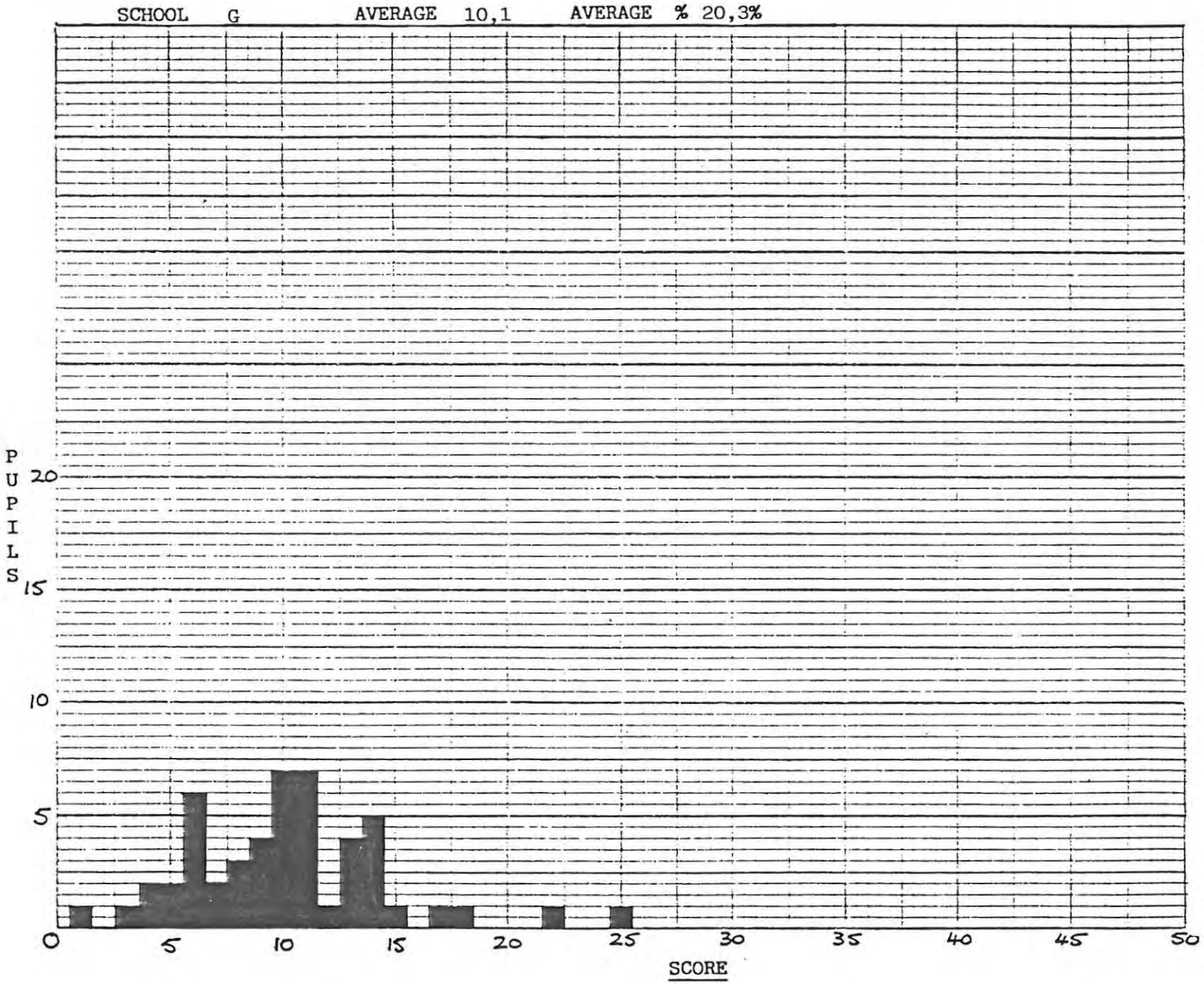
SCHOOL E AVERAGE 17 AVERAGE % 34%



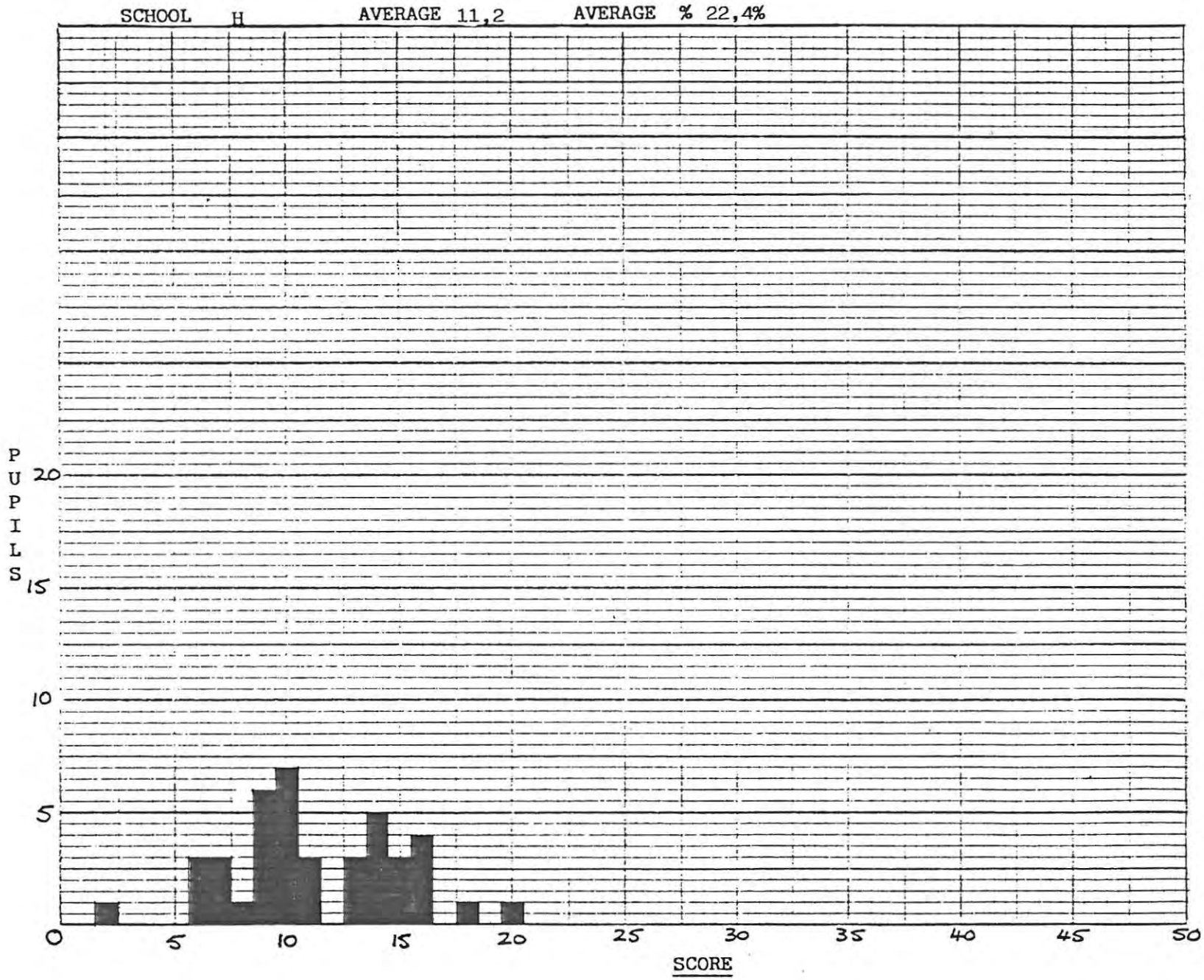
APPENDIX F (vi)



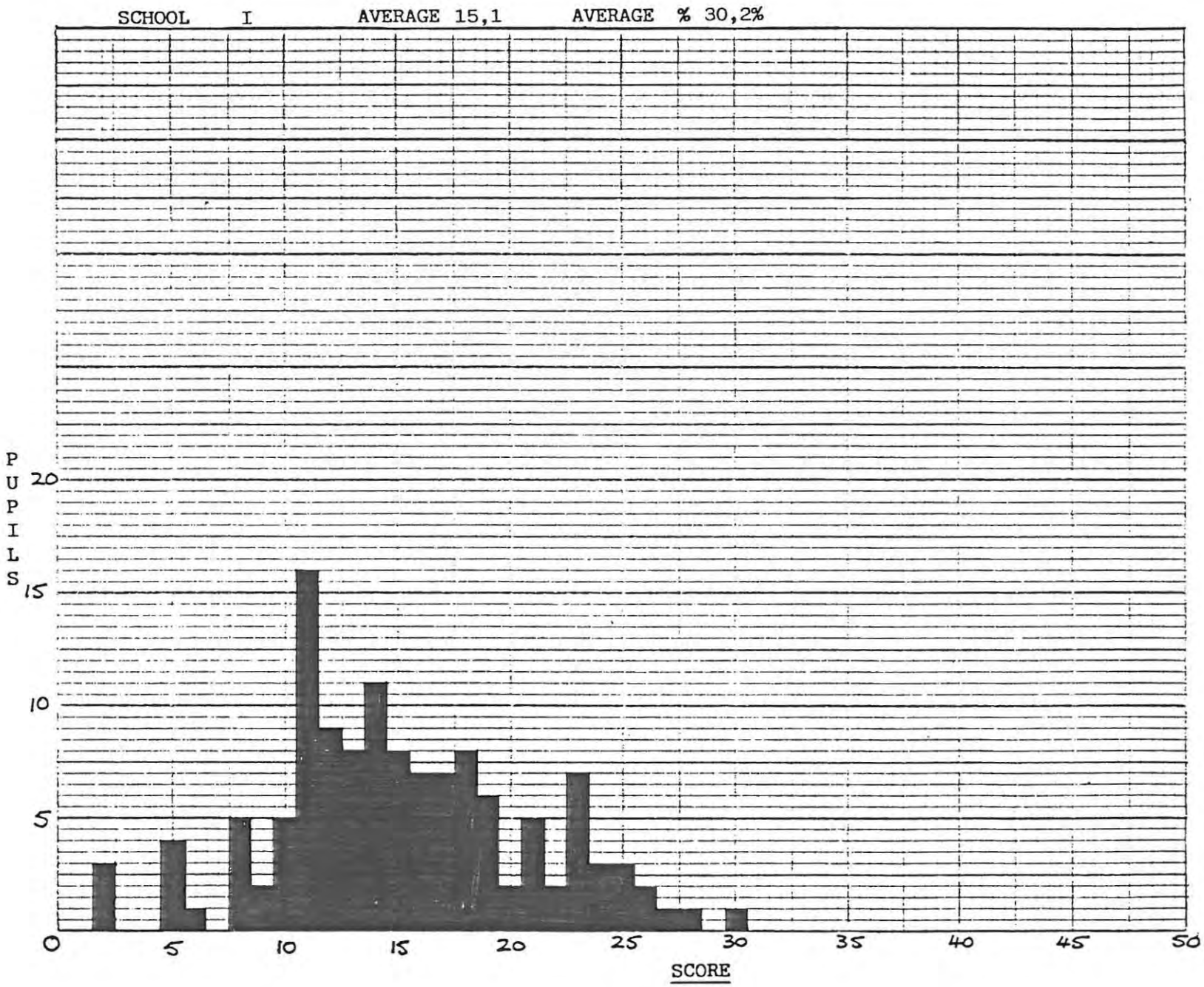
APPENDIX F (vii)



APPENDIX F (viii)

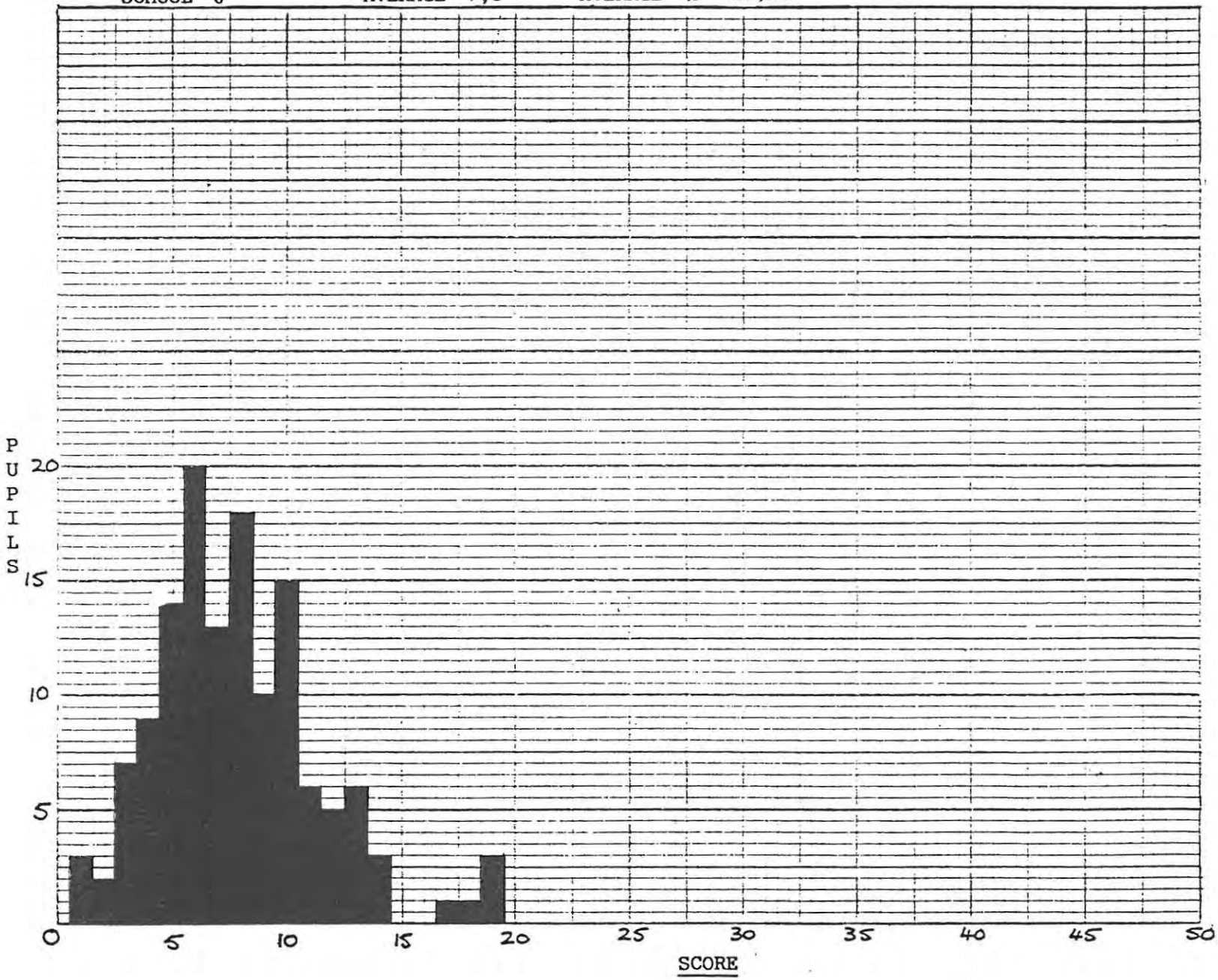


APPENDIX F (ix)



APPENDIX F (x)

SCHOOL J AVERAGE 7,8 AVERAGE % 15,6%



## APPENDIX G

The Median

Median $= \ell + \left( \frac{\frac{N}{2} - F}{fm} \right) i$

$= 11,5 + \frac{(398,5 - 320)\ 2}{(105)}$

$= 11,5 + \frac{(78,5)\ 2}{(105)}$

$= 12,995$

---

Mode $= \ell + \left( \frac{di}{d_1 + d_2} \right) i$

$= 11,5 + \frac{(46)\ 2}{(46 + 17)}$

$= 12,96$

---

## APPENDIX H

NUMBER OF MALE AND FEMALE PUPILS IN EACH OF THE SAMPLE SCHOOLS

| SCHOOL | MALE | FEMALE |
|---|---|---|
| A | 48 | 44 |
| B | 20 | 24 |
| C | 45 | 32 |
| D | 46 | 60 |
| E | 26 | 28 |
| F | 34 | 36 |
| G | 23 | 27 |
| H | 12 | 29 |
| I | 52 | 75 |
| J | 42 | 94 |

## APPENDIX I (a)

FREQUENCY DISTRIBUTION OF SCORES OF THE TEN SCHOOLS

| SCORES | MID-POINT | Fa | Fb | Fc | Fd | Fe | Ff | Fg | Fh | Fi | Fj | f Sample |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 35,5-37,5 | 36,5 | | | | | | | | | | | |
| 33,5-35,5 | 34,5 | | | | | | 1 | | | | | 1 |
| 31,5-33,5 | 32,5 | | | | | | 2 | | | | | 2 |
| 29,5-31,5 | 30,5 | | | | | | 4 | | | 1 | | 5 |
| 27,5-29,5 | 28,5 | | | | | | 6 | | | 1 | | 7 |
| 25,5-27,5 | 26,5 | 1 | | | | 3 | 1 | | | 3 | | 8 |
| 23,5-25,5 | 24,5 | 1 | 1 | 2 | 2 | 0 | 3 | 1 | | 6 | | 16 |
| 21,5-23,5 | 22,5 | 4 | 2 | 3 | 0 | 5 | 10 | 1 | | 9 | | 34 |
| 19,5-21,5 | 20,5 | 8 | 2 | 6 | 8 | 5 | 12 | 0 | 1 | 7 | | 49 |
| 17,5-19,5 | 18,5 | 10 | 2 | 2 | 6 | 9 | 11 | 1 | 1 | 14 | 4 | 60 |
| 15,5-17,5 | 16,5 | 13 | 1 | 17 | 11 | 9 | 9 | 1 | 4 | 14 | 1 | 80 |
| 13,5-15,5 | 14,5 | 16 | 6 | 14 | 19 | 13 | 6 | 6 | 8 | 19 | 3 | 110 |
| 11,5-13,5 | 12,5 | 23 | 8 | 10 | 17 | 8 | 3 | 5 | 3 | 17 | 11 | 105 |
| 9,5-11,5 | 10,5 | 7 | 8 | 17 | 22 | 0 | 2 | 14 | 10 | 21 | 21 | 122 |
| 7,5-9,5 | 8,5 | 5 | 7 | 4 | 9 | 2 | | 7 | 7 | 7 | 28 | 76 |
| 5,5-7,5 | 6,5 | 3 | 4 | 2 | 9 | | | 8 | 6 | 1 | 33 | 66 |
| 3,5-5,5 | 4,5 | 1 | 3 | | 3 | | | 4 | 0 | 4 | 23 | 38 |
| 1,5-3,5 | 2,5 | | | | | | | 1 | 1 | 3 | 9 | 14 |
| 0-1,5 | 0,5 | | | | | | | 1 | | | 3 | 4 |
| | | 92 | 44 | 77 | 106 | 54 | 70 | 50 | 41 | 127 | 136 | 797 |

## APPENDIX I (b)

PERCENTAGE FREQUENCY DISTRIBUTION OF THE TEN SCHOOLS

| SCORES | MID-POINT | Pa | Pb | Pc | Pd | Pe | Pf | Pg | Ph | Pi | Pj | P Samples |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 35,5-37,5 | 36,5 | | | | | | | | | | | |
| 33,5-35,5 | 34,5 | | | | | | 1,4 | | | | | 0,1 |
| 31,5-32,5 | 32,5 | | | | | | 2,9 | | | | | 0,3 |
| 29,5-31,5 | 30,5 | | | | | | 5,7 | | | 0,8 | | 0,6 |
| 27,5-29,5 | 28,5 | | | | | | 8,6 | | | 0,8 | | 0,9 |
| 25,5-27,5 | 26,5 | 1,1 | | | | 5,6 | 1,4 | | | 2,3 | | 1,0 |
| 23,5-25,5 | 24,5 | 1,1 | 2,3 | 2,6 | 1,9 | 0 | 4,3 | 2,0 | | 4,7 | | 2,0 |
| 21,5-23,5 | 22,5 | 4,3 | 4,5 | 3,9 | 0 | 9,3 | 14,3 | 2,0 | | 7,1 | | 4,3 |
| 19,5-21,5 | 20,5 | 8,7 | 4,5 | 7,8 | 7,5 | 9,3 | 17,1 | 0 | 2,4 | 5,5 | | 6,1 |
| 17,5-19,5 | 18,5 | 10,9 | 4,5 | 2,6 | 5,7 | 16,7 | 15,7 | 2,0 | 2,4 | 11,0 | 2,9 | 7,5 |
| 15,5-17,5 | 16,5 | 14,1 | 2,3 | 22,1 | 10,4 | 16,7 | 12,9 | 2,0 | 9,8 | 11,0 | 0,7 | 10,0 |
| 13,5-15,5 | 14,5 | 17,4 | 13,6 | 18,2 | 17,9 | 24,1 | 8,6 | 12,0 | 19,5 | 15,0 | 2,2 | 13,6 |
| 11,5-13,5 | 12,5 | 25,0 | 18,2 | 13,0 | 16,0 | 14,8 | 4,3 | 10,0 | 7,3 | 13,4 | 8,1 | 13,1 |
| 9,5-11,5 | 10,5 | 7,6 | 18,2 | 22,1 | 20,7 | 0 | 2,9 | 28,0 | 24,4 | 16,5 | 15,4 | 15,3 |
| 7,5- 9,5 | 8,5 | 5,4 | 15,9 | 5,2 | 8,5 | 3,7 | | 14,0 | 17,1 | 5,5 | 20,6 | 9,5 |
| 5,5- 7,5 | 6,5 | 3,2 | 9,1 | 2,6 | 8,5 | | | 16,0 | 14,6 | 0,8 | 24,3 | 8,3 |
| 3,5- 5,5 | 4,5 | 1,1 | 6,8 | | 2,8 | | | 8,0 | 0 | 3,1 | 16,9 | 4,8 |
| 1,5- 3,5 | 2,5 | | | | | | | 2,0 | 2,4 | 2,3 | 6,6 | 1,8 |
| 0 - 1,5 | 0,5 | | | | | | | 2,0 | | | 2,2 | 0,5 |
| | | 99,9 | 99,9 | 100,1 | 99,9 | 100,2 | 100,1 | 100 | 99,9 | 99,8 | 99,9 | 99,7 |

**NOTE:** The discrepancies in the total percentages for each distribution have arisen during the course of computing the various percentages and then reducing them to 1 decimal place.

## APPENDIX I(c)

### CUMULATIVE PERCENTAGE DISTRIBUTION OF PUPILS

| SCORES | EXACT UPPER LIMIT | f | cf | CUMUL % |
|---|---|---|---|---|
| 33,5-35,5 | 35,5 | 1 | 797 | 100 |
| 31,5-33,5 | 33,5 | 2 | 796 | 99,9 |
| 29,5-31,5 | 31,5 | 5 | 794 | 99,6 |
| 27,5-29,5 | 29,5 | 7 | 789 | 99,0 |
| 25,5-27,5 | 27,5 | 8 | 782 | 98,1 |
| 23,5-25,5 | 25,5 | 16 | 774 | 97,1 |
| 21,5-23,5 | 23,5 | 34 | 758 | 95,1 |
| 19,5-21,5 | 21,5 | 49 | 724 | 90,8 |
| 17,5-19,5 | 19,5 | 60 | 675 | 84,7 |
| 15,5-17,5 | 17,5 | 80 | 615 | 77,2 |
| 13,5-15,5 | 15,5 | 110 | 535 | 67,1 |
| 11,5-13,5 | 13,5 | 105 | 425 | 53,3 |
| 9,5-11,5 | 11,5 | 122 | 320 | 40,2 |
| 7,5- 9,5 | 9,5 | 76 | 198 | 24,8 |
| 5,5- 7,5 | 7,5 | 66 | 122 | 15,3 |
| 3,5- 5,5 | 5,5 | 38 | 56 | 7,0 |
| 1,5- 3,5 | 3,5 | 14 | 18 | 2,3 |
| 0 - 1,5 | 1,5 | 4 | 4 | 0,5 |

NOTE: Percentages corrected to 1 decimal point.

## APPENDIX I(d)

FREQUENCIES OF TEST SCORES: PARTS A AND B AND OVERALL BY SEX DIFFERENTIATION.

| | MALE | | | FEMALE | | |
|---|---|---|---|---|---|---|
| SCORES | Part A(30) | Part B(20) | Test(50) | Part A(30) | Part B(20) | Test (50) |
| 34 - 35 | | | 1 | | | |
| 32 - 33 | | | 1 | | | 1 |
| 30 - 31 | | | 3 | | | 2 |
| 28 - 29 | | | 4 | | | 3 |
| 26 - 27 | | | 3 | | | 5 |
| 24 - 25 | 1 | | 9 | | | 7 |
| 22 - 23 | 2 | | 22 | 1 | | 12 |
| 20 - 21 | 6 | | 30 | 2 | | 20 |
| 18 - 19 | 7 | | 30 | 2 | | 30 |
| 16 - 17 | 19 | | 40 | 11 | | 39 |
| 14 - 15 | 21 | | 55 | 19 | | 55 |
| 12 - 13 | 41 | 5 | 49 | 32 | 5 | 57 |
| 10 - 11 | 56 | 20 | 49 | 41 | 20 | 73 |
| 8 - 9 | 58 | 60 | 18 | 69 | 61 | 58 |
| 6 - 7 | 68 | 90 | 15 | 97 | 114 | 50 |
| 4 - 5 | 34 | 99 | 12 | 84 | 136 | 26 |
| 2 - 3 | 28 | 45 | 4 | 63 | 98 | 10 |
| 0 - 1 | 7 | 29 | 3 | 28 | 15 | 1 |

## APPENDIX I(e)

CUMULATIVE DISTRIBUTION FROM SCORES OF MALE AND FEMALE PUPILS

| SCORES | Exact Upper Limit | MALE | | | FEMALE | | |
|---|---|---|---|---|---|---|---|
| | | f | Cum f | Cumul % | f | Cum f | Cumul % |
| 34-35 | 35,5 | 1 | 348 | 100 | | | |
| 32-33 | 33,5 | 1 | 347 | 99,59 | 1 | 449 | 100 |
| 30-31 | 31,5 | 3 | 346 | 99,30 | 2 | 448 | 99,9 |
| 28-29 | 29,5 | 4 | 343 | 98,44 | 3 | 446 | 99,46 |
| 26-27 | 27,5 | 3 | 339 | 97,29 | 5 | 443 | 98,79 |
| 24-25 | 25,5 | 9 | 336 | 96,43 | 7 | 438 | 97,67 |
| 22-23 | 23,5 | 22 | 327 | 93,85 | 12 | 431 | 96,11 |
| 20-21 | 21,5 | 30 | 306 | 87,54 | 20 | 419 | 93,44 |
| 18-19 | 19,5 | 30 | 275 | 73,93 | 30 | 399 | 88,98 |
| 16-17 | 17,5 | 40 | 245 | 70,32 | 39 | 369 | 82,29 |
| 14-15 | 15,5 | 55 | 205 | 58,84 | 55 | 330 | 73,59 |
| 12-13 | 13,6 | 49 | 150 | 43,05 | 57 | 275 | 61,32 |
| 10-11 | 11,5 | 49 | 191 | 28,99 | 73 | 218 | 48,61 |
| 8-9 | 9,5 | 18 | 52 | 14,92 | 58 | 145 | 32,34 |
| 6-7 | 7,5 | 15 | 34 | 9,76 | 50 | 87 | 19,40 |
| 4-5 | 5,5 | 12 | 19 | 5,45 | 26 | 37 | 8,25 |
| 2-3 | 3,5 | 4 | 7 | 2,01 | 10 | 11 | 2,45 |
| 0-1 | 1,5 | 3 | 3 | 0,86 | 1 | 1 | 0,22 |

N = 348 N = 449

## APPENDIX J

SE of the mean $\sigma_m = \frac{\sigma}{N}$

$= \frac{579}{797} = 0,205$

At P 0.05

$m \pm 1,96 \sigma_m$

$= m \pm 1,96 \times 0,205$

$= 13,45 \pm 0,4$

$+ 13,05 - 13,85$

---

At P 0,01

$m \pm 2,58 \sigma_m$

$= m \pm 2,58 \times 0,205$

$= 13,45 \pm 0,53$

$= 12,92 - 13,98$

---

## APPENDIX K

### STANDARD DEVIATIONS OF THE TEN SCHOOLS

| SCHOOL | |
|---|---|
| A | 4,25 |
| B | 4,90 |
| C | 4,09 |
| D | 4,33 |
| E | 4,07 |
| F | 5,58 |
| G | 4,51 |
| H | 3,85 |
| I | 5,68 |
| J | 3,63 |

Std. Deviation of the Sample 5,79

## APPENDIX L

### QUARTILE DISTRIBUTION OF THE SAMPLE SCORES

| SCORES | f | | |
|---|---|---|---|
| 34-35 | 1 | | |
| 32-33 | 2 | | |
| 30-31 | 5 | | |
| 28-29 | 7 | | |
| 26-27 | 8 | | |
| 24-25 | 16 | | |
| 22-23 | 34 | | |
| 20-21 | 50 | | |
| 18-19 | 60 | 183 to here | 16,25 cases needed |
| 16-17 | 79 | | |
| 14-15 | 110 | | |
| 12-13 | 106 | | |
| 10-11 | 122 | 319 to here | 79,5 cases needed |
| 8-9 | 76 | 197 | 2,25 cases needed |
| 6-7 | 65 | | |
| 4-5 | 38 | | |
| 2-3 | 14 | | |
| 0-1 | 4 | | |

797 $\frac{N}{4} = 199,25$ $\frac{N}{2} = 398,5$

Lower Quartile $9,5 + \frac{2,25}{122} \times 2 = 9,5 + 0,036 = 9,536$

Upper Quartile $19,5 - \frac{16,25}{79} \times 2 = 19,5 - 0,41 = 19,09$

Quartile Deviation $Q = \frac{19,09 - 9,536}{2} = 4,77$

## APPENDIX M (a)

TEST 1 SCHOOL F

| PUPIL RANK | PART A | PART B | TOTAL |
|---|---|---|---|
| 1 | 12 | 15 | 27 |
| 2 | 13 | 17 | 30 |
| 3 | 8 | 14 | 22 |
| 4 | 10 | 15 | 25 |
| 5 | 4 | 13 | 17 |
| 6 | 8 | 8 | 16 |
| 7 | 14 | 17 | 31 |
| 8 | 10 | 14 | 24 |
| 9 | 12 | 14 | 26 |
| 10 | 12 | 14 | 26 |
| 11 | 11 | 15 | 26 |
| 12 | 10 | 9 | 19 |
| 13 | 12 | 15 | 27 |
| 14 | 6 | 3 | 9 |
| 15 | 12 | 15 | 27 |
| 16 | 6 | 12 | 18 |
| 17 | 8 | 20 | 28 |
| 18 | 2 | 8 | 10 |
| 19 | 10 | 8 | 18 |
| 20 | 4 | 3 | 7 |
| 21 | 12 | 14 | 26 |
| 22 | 7 | 14 | 21 |
| 23 | 8 | 7 | 15 |
| 24 | 2 | 6 | 8 |
| 25 | 4 | 4 | 8 |
| | 217 | 294 | 511 |
| Average | 8,68 | 11,76 | 20,44 51,1% |

## APPENDIX M (b)

TEST 2 SCHOOL F

| PUPIL RANK | PART A | PART B | TOTAL | |
|---|---|---|---|---|
| 1 | 12 | 13 | 25 | |
| 2 | 10 | 17 | 27 | |
| 3 | 16 | 20 | 36 | |
| 4 | 14 | 16 | 30 | |
| 5 | 14 | 19 | 33 | |
| 6 | 4 | 10 | 14 | |
| 7 | 4 | 19 | 23 | |
| 8 | 16 | 12 | 28 | |
| 9 | 6 | 5 | 11 | |
| 10 | 3 | 12 | 15 | |
| 11 | 6 | 4 | 10 | |
| 12 | 12 | 16 | 28 | |
| 13 | 8 | 13 | 21 | |
| 14 | 2 | 13 | 25 | |
| 15 | 14 | 8 | 22 | |
| 16 | 12 | 11 | 23 | |
| 17 | 2 | 4 | 6 | |
| 18 | 4 | 13 | 17 | |
| 19 | 9 | 11 | 20 | |
| 20 | 2 | 1 | 3 | |
| 21 | 8 | 4 | 12 | |
| 22 | 2 | 3 | 5 | |
| 23 | 3 | 4 | 7 | |
| 24 | 2 | 11 | 13 | |
| | 185 | 259 | 444 | |
| Average | 7,71 | 10,79 | 18,5 | 46,25% |

## APPENDIX M (c)

TEST 1 SCHOOL J

### CLASS A

| PUPIL RANK | PART A | PART B | TOTAL | |
|---|---|---|---|---|
| 1 | 16 | 18 | 34 | |
| 2 | 12 | 12 | 24 | |
| 3 | 7 | 9 | 16 | |
| 4 | 8 | 12 | 20 | |
| 5 | 2 | 12 | 14 | |
| 6 | 11 | 11 | 22 | |
| 7 | 0 | 6 | 6 | |
| 8 | 2 | 10 | 12 | |
| 9 | 0 | 9 | 9 | |
| 58 | 58 | 99 | 157 | |
| | 6,4 | 11,0 | 17,4 | 43,6% |

### CLASS B

| | | | | |
|---|---|---|---|---|
| 1 | 3 | 8 | 11 | |
| 2 | 2 | 9 | 11 | |
| 3 | 0 | 8 | 8 | |
| 4 | 4 | 13 | 17 | |
| 5 | 2 | 6 | 8 | |
| 6 | 2 | 10 | 12 | |
| 7 | 4 | 10 | 14 | |
| 8 | 2 | 7 | 9 | |
| 9 | 2 | 2 | 4 | |
| 10 | 2 | 10 | 12 | |
| 11 | 6 | 8 | 14 | |
| 12 | 6 | 4 | 10 | |
| | 35 | 95 | 130 | |
| Average | 2,9 | 7,9 | 10,83 | 27% |
| BOTH CLASSES A | 4,43 | 9,24 | 13,67 | 34,1% |

## APPENDIX M (d)

TEXT 2 — SCHOOL J

### CLASS A

| PUPIL RANK | PART A | PART B | TOTAL |
|---|---|---|---|
| 1 | 4 | 12 | 16 |
| 2 | 8 | 13 | 21 |
| 3 | 4 | 11 | 15 |
| 4 | 10 | 7 | 17 |
| 5 | 4 | 8 | 12 |
| 6 | 9 | 9 | 18 |
| 7 | 0 | 4 | 4 |
| 8 | 10 | 10 | 20 |
| 9 | 1 | 4 | 5 |
| | 50 | 78 | 128 |
| Average | A 5,6 | B 8,7 | 14,2 |

### CLASS B

| | | | |
|---|---|---|---|
| 1 | 4 | 10 | 14 |
| 2 | 0 | 10 | 10 |
| 3 | 4 | 9 | 13 |
| 4 | 4 | 10 | 14 |
| 5 | 2 | 6 | 8 |
| 6 | 2 | 2 | 4 |
| 7 | 0 | 2 | 2 |
| 8 | 8 | 9 | 17 |
| 9 | 4 | 10 | 14 |
| 10 | 4 | 3 | 7 |
| 11 | 2 | 10 | 12 |
| 12 | 4 | 10 | 14 |
| | 38 | 91 | 129 |
| Average | A 3,2 | B 7,6 | 10,75 |
| BOTH CLASSES | 4,19 | 8,05 | 12,24 30,6% |

## APPENDIX N

## EXTRACT FROM STD 8 SYLLABUS : GEOGRAPHY. PHYSICAL GEOGRAPHY

2. PHYSICAL GEOGRAPHY

(a) Climatology

(i) The Seasons

(1) Explanation of the causes of seasons: Inclination of the axis; revolution.

(2) Explanation of:

varying length of day and night; solstices and equinoxes.

(ii) The Atmosphere

(1) Composition of the atmosphere (Atmospheric gases)

(2) Structure of the atmosphere (Atmospheric layers)

(iii) Temperature

(1) Atmospheric temperature - insolation, radiation, conduction, convection.

(2) Factors affecting the horizontal variation of temperature in the atmosphere:

Latitude; the effect of land and water distribution; relief; winds; ocean currents; soil colour; cloud cover; rainfall.

(3) Lapse rates of temperature: Normal vertical temperature gradient and temperature inversion:

Dry adiabatic lapse rate (D.A.L.R.)

Wet adiabatic lapse rate (W.A.L.R.)

The relationship between the temperature lapse rate and adiabatic change.

(iv) Moisture in the atmosphere

(1) Relationship between moisture in the atmosphere and temperature.

(2) Actual and relative humidity (definition).

(3) Dewpoint temperature (definition).

(4) Simple cloud classification and recognition (cirriform, stratiform, cumuliform and type thereof respectively).

This must be continued throughout the year as such clouds appear.

(v) Precipitation: rain, hail, snow, dew, frost. (Practical observation when and where possible).

(vi) Practical work: use of barometers, rain gauges, thermometers, anemometers and hygrometers, weather records; drawing isolines and simple climatic maps and diagrams and the interpretation thereof.

APPENDIX N (Continued)

(b) Geomorphology

(i) Definitions: internal and external forces.

(ii) The earth's crust: composition and structure (sial, sima, moho).

(iii) Rock types: origin, characteristics and significance of igneous, sedimentary and metamorphic types with examples.

(iv) Internal forces and resultant landforms: continental drift; warping, faulting and folding; volcanism and earthquakes; mobile belts (areas of crustal instability) and shield areas. Results and examples of each.

(v) Weathering (processes and features).

(vi) Practical work: identification of simple rock types; contour sketches and use of topographic maps and photographs to illustrate specific landform types of 2(b)(iv); drawing of topographic profiles; at least one field excursion should be undertaken.

(a) Population Geography

(i) Population characteristics: birth and death rates, age structure and population pyramids, sex balance, rural/urban ratios; arithmetic density, physiographic density and agricultural density (in simple terms). (1)

(ii) Population distribution and density:

An overall survey of the world population map, taking note of: (In the above survey pay particular attention to factors affecting population distribution).

(1) Areas of uniformly high population density (e.g. Java, the Netherlands, Lowland China and Ganges Basin).

(2) Areas of medium density (e.g. the Mississippi Basin, Nigeria and S.E. Brazil.)

(3) Areas of sparse population (e.g. the Tundra and desert areas). (6)

(iii) Population movements:

(1) Spontaneous movement: within political units (e.g. rural depopulation) and across political boundaries (immigration and emigration and their effects); migrant labour.

(2) Induced movement (e.g. effects of slavery in former times, ancient and modern pogroms). (7)

(iv) 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. (5)

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