AN EXAMINATION OF THE INFLUENCE OF SCHOOL MEDIATED VARIABLES ON ACADEMIC ACHIEVEMENT.

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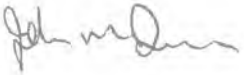
I declare that the enclosed is entirely my own work. Signed:



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CONTENTS

Abstract

A study was conducted over three years to examine the influence of school mediated person and environmental variables on academic achievement outcome. The 250 subjects, male and female, were students in the final year of formal secondary education in three schools, who were preparing for their Irish Leaving Certificate examination, a formal nationwide multisubject assessment. The literature of cognitive and learning styles, academic achievement variables, and programmes to cater for individual differences is reviewed. The methodology and rationale for choice of variables is related to recent interactive student, teacher, environment studies. The variables general ability, dogmatism, need achievement, teacher preference, school alienation,self, esteem, attitude to education and curiosity were correlated with academic achievement as measured by performance in the public examinations. Results were controlled for collinearity. After general ability, the most significant correlating variable, was partialed out, the remaining variables were again correlated with academic achievement. Dogmatism and Curiosity remained the highest correlating significant variables, dogmatism correlating negatively. These two, together with general ability, seem to constitute a significant triad of variables. The results are discussed and implications examined. A tentative conclusion is devised in the framework of interaction theory.

INTRODUCTION

The familiar scene of a teacher directing a class of thirty or more students in a formal lesson is the core around which all other peripheral school activities revolve. Traditionally the educational process has been viewed as a relatively simple operation containing at the most four significant variables -the teacher, the pupil, the learning material and the assessment of the learning, expressible even as a simple equation:

$$T + P = L$$

Teacher plus pupil equals learning. The level of attainment obtained by the pupil at the assessment stage has been considered a function of the ability or lack of ability to retain and reproduce 'knowledge', this being, in turn, largely dependent on natural ability and to a lesser extent student attitude and/or teacher competence.

In the years since the early fifties, the emphasis of research has changed from the problem of access to education and strategies for increased access, though this problem still lingers especially in relation to access to third level education, to that of an examination of the educational process, its organisation and relevance. The main arena of school learning, the classroom has now been recognised as a place of great complexity which no longer contains an instructor busily embellishing the'tabulae rasae', but distinct individuals engaged in intricate personal relationships, personalities which are, moreover in states of flux and development. This shift in emphasis has been reflected in methodological change from psychometric laboratory experiments, which may or may not have direct relevance to classroom practice, to 'participant observation' of the most minute details of classroom activity, and indeed inactivity. All aspects of classroom practice became problematical and nothing was any longer to be taken for granted.

Whilst the shift in experimental emphasis has resulted in some change in practice, noticeably in relation to those peripheral activities such as remedial education or guidance and counselling, there is little to suggest that the impact has been anything other than insignificant on the core activity of teacher instructing pupil towards academic assessment. This is especially so at the level of public examination classes which are totally dominated by examination material and tuition. There is little or no debate as to the efficiency or relevance of the pedagogy, or the effect of significant variables other than those already noted.

This thesis will investigate the presence and significance of variables operating on the teaching/learning environment at senior cycle level, and specifically in relation to academic achievement as measured by public examinations.

The thesis will aim to be at all times practical recognising the restraints placed upon practice. This is not to say that pragmatism is necessarily preferable to idealism nor that it limits empirical validity, but simply that this work is conceived from practical origins and thus seeks to uncover practical problems, which in turn may respond to practical solutions. If one of the aims of educational research is to influence educational practice and point ways to change and improvement, and it would surely be odd if it were not, then such change must lie within the bounds of the possible, otherwise it will remain at best influential but ineffective. Variables will be examined which are mediated by the everyday workings of educational institutions, and they will be tested for their effect.

The educational institution, as a function of its very existence, imposes variables upon the activities of its members. Whether such institutions are able to influence personality traits or societal determinism is the subject of much enquiry and research and often the conclusions are dramatic. De-school and free school movements, for example, were spawned in these waters. Less

doubtful seems to be the contention that activities inspired by classroom activity or school routine can influence the efficiency of the learning process and academic outcome. Some schools are considered 'good' and others 'not so good'. Some schools have waiting lists stretching into the distant future, others find great difficulty in maintaining numbers when demography plays little or no part. Whilst popular perception may not necessarily be the most accurate guide of educational excellence or achievement, it is indicative of the notion that different schools have different ways of operating and indeed different functions. Variables will be examined which are contingent to the learning process and will be empirically tested and where deficiencies in the organisation of learning are indicated changes and the possibility of modification will be examined. If need be,emphasis will be placed on necessary reform which can be effected with minimal implications for organisational change.

In chapter one the theme of change of emphasis in educational research will be developed especially in relation to research on the complexity and problematic nature of classroom interaction and the teaching/learning environment. This will be arranged under the headings of teacher, students and curriculum. In addition to a discussion of relevant themes an example of major research will be outlined in each case. Student general ability and general aptitude remain significant variables but research has stressed individual differences in linguistic and cultural attributes which might be variously described as difference or deficit. The teacher, once seen as a fairly inert catalyst, is now regarded as an integral player in the act of learning, and teacher role has been under especial scrutiny since the first experiments in teacher expectation and self-fulfilling prophecy first raised such controversy. Curriculum documents now proliferate, the latest being those issued by the Curriculum and Examinations Board. Whilst stated aims point to a desire to recognise this essential participation of the teacher, the considerable technical detail found in such documents together with statements of educational philosophy is often only sparsely applied in the classroom. Teachers are faced with following curriculum aims and objectives on the one hand, whilst attempting to achieve extremely specific academic goals on the other, a dilemma which many teachers have long since despaired of resolving.

Theories of individual difference referring specifically to classroom activity are also examined. The intention will be to examine contrasting views of individuality rather than restrict the discussion to one particular perspective. Many theories of personality describe the interaction of innate traits with the environment in the performance of complex behaviours, such that an amenable learning setting for one student may be irritating and unproductive for another. Secondly, the main currency of the teaching/learning activity, knowledge, might be considered as one of the less problematical areas of that activity. The last two decades have seen the evaluation of such a premise from the perspective of the sociology of knowledge. Assertions have been made regarding the relativity of knowledge, its legitimacy and the type of knowledge which students are being asked to assimilate. This line of enquiry leads not only to a vigorous critique of methodology, but also of the very content of education. Closely allied to such critiques is the assessment of a student's cultural background and the learning constructs within that culture. Cross-cultural studies of learning have been cited as further evidence of the complexity of the learning activity especially the strategies brought to bear by the learner. Finally theories of cognition and cognitive development often contrast with the approach to teaching found in many traditionally organised classrooms.

The review of literature continues with an account of variables which have been examined to ascertain their influence on academic outcome within many varied academic settings, both singly and in combination. Having identified such variables, literature is presented which relates to previous attempts to modify learning environments to accommodate such variables which have been identified as significantly influencing learning outcomes. A great deal of this research is subsumed under the heading of cognitive or learning style, this being a major area of study

examining ways of tailoring teaching approaches to learning needs. Cognitive or learning style is defined as:

> **'A predisposition on the part of the student to adopt a particular learning strategy regardless of the specific demands of the learning task.'(1)**

The determinants which make up this predisposition are varied, some being more capable of mediation than others. Some educators have considered learning style to be of such significance as to warrant the wholesale reorganisation of large areas of educational jurisdiction with the complete restructuring of the presentation of instruction. However it is possible that such views could well be too narrow and that the variables which make up a predisposition to approach a learning task may not be either constant within the individual or consistent irrespective of the type of learning task. The previous emphasis on cognitive strategies which are innate and based on personality attributes will be given extensive reference, and indeed, will form components of the empirical research, but the aim has been to broaden the field to include environmentally induced variables on learning strategy in order to ascertain whether it is possible to explain approaches to learning without taking into account these variables. The term 'learning style' is used in addition to 'cognitive style' when appropriate to differentiate the broad field from that of the narrower cognitive trait theory.

Chapters three and four describe an experiment undertaken in three schools examining the effects of selected variables upon academic outcomes amongst senior cycle students. The subjects were students in their final post primary year preparing to write their leaving certificate examinations. The subjects included both males and females. In addition to a measure of general ability, and the results of the examinations themselves, a cohort of seven other variables was chosen from the broad set contributing to individual dispositions to learning style. Each of the variables were correlated with academic performance and one with another and significance tested.

On the basis of the results of year one of the experiment, predictions were made as to the performance of the students of year two in academic achievement. To complete the classroom equation the teachers in the schools were also invited to complete a battery of three questionnaires investigating three related variables to those examined in the student battery and which in a revised theory of individual instruction would be amenable to mediation and which refer specifically to teaching strategies in theories of the individualisation of learning. A major premise of such theories is that learning outcomes will be improved if styles of teaching and learning are matched.

The results of the experiment together with a discussion and implications for further research are presented in chapter .

Chapter 5 will present a major discussion of the results of the experimental section in the context of evidence elicited from other research cited in the thesis. Implications for future research will be suggested and practical implications for educational implementation will be explored.

An appendix of statistical data and a bibliography are provided. References are in numerical order of appearance at the end of each chapter.

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1.STATEMENT OF PROBLEM

The last two decades have seen a major shift in emphasis in the perceived problems facing education. Prior to this period major studies tended to be demographic in nature and the major problem was how to provide access to second level education for as many children as possible. Studies abounded to ascertain the reasons why access to education was not either universally available, or if available not being made use of. The problem was summarised in the classic study by Jackson and Marsden (1):

> **'The hard evidence suggests that if we could open education as freely to working class children as we have done to middle class ones we would double and double again our highly talented and highly educated groups.'**

To a large extent this issue remains live in current debate in Irish education, especially in relation to selection of students to secondary and tertiary education. But from the early seventies the problem of access to education as the main focus of research was to a large extent superseded by the development of enquiry into the nature of education and specifically of what exactly was happening in the classroom and other arenas of learning. The view that education consisted of a teacher imparting knowledge to a group of students in a formal classroom setting with the only significant variable being the intellectual capacity of the student and the only problem being the access to educational environment was challenged by study after study and continues to be so challenged. Three areas of investigation which shaped the change of direction - the teacher, the student and the curriculum are cited and also some recent policy documents which are attempting to address the changed emphasis.

THE TEACHER

The initial research of Rosenthal and Jacobson (2) reporting the effects of teacher expectation on student performance caused controversy and inspired many attempts at replication. The subsequent failure to replicate satisfactorily the initial findings dampened some of the enthusiasm for this line of enquiry, and not least in regard to the ethical considerations of creating artificial negative learning environments. However, the seeds of suspicion that teacher expectation was a significant variable remained planted, and later research, albeit in a less dramatic fashion did little to inhibit germination and tended to confirm the notion that the influence of the teacher's personality is rather greater than earlier more simplistic views of the teacher/pupil relationship were prepared to acknowledge. More naturalistic studies, that is, those which examine the teacher's existing expectations rather than attempting to induce new ones, tend to confirm that the 'self-fulfilling prophecy' is as much a factor in education as in other activities involving interpersonal relationships. For example, Brophy and Evertson (3) discovered that one of the few attitudes which differentiated those teachers who were achieving good academic gains amongst their students as opposed to those who were not, was the belief that their students could and would learn.

A second problem of the teacher/learning relationship is the amount of control the teacher exercises over the learning activity. In her influential work, Keddie (4), studies the interaction between teachers and pupils segregated into various 'streams' in a large secondary school. Even though lesson material was similar, the approach was not necessarily one of offering a' watered down' syllabus to those who could not cope with the full blown variety. She discovered that the tendency amongst the higher streams was to submissively accept the direction of the lesson offered by the teacher on the grounds that the teacher knew the comparative relevance or irrelevance of material presented and student questioning, whereas the lower stream classes were often characterised by vociferous debate leading the direction of the class into uncharted and unprepared water for the teacher and unapproved by the course outlines. Keddie suggested that such classes

often uncovered highly relevant material and applied knowledge of the 'common sense' variety to problems which according to the manuals demanded an academic solution. The common sense approach, so vociferously expounded by difficult classes was generally assumed by staff to be subliminally present in the higher streams. Keddie believed that such assumptions could not necessarily be made. The lesson material and the teachers remit demanded that the lessons and assignments refer to the psychological and sociological problems of developmental retardation and this was successfully negotiated in acquiescent higher streams. The lower streams often diverted the class into areas of morality and 'common sense' discussion. It would seem that the teacher, in addition to having favourable expectations of the students, must also have a clear sense of direction of the learning material if the goals of the curriculum are to be met.

A major problem confronting teachers of senior cycle courses is one of increasing numbers of students entering such courses. These students bring with them a far greater range of ability and levels of classroom acquiescence than was the previously the case with fifth and sixth year students. Teachers accustomed to an 'academic atmosphere' in a class of 'academically oriented students are finding that the senior cycle clientele is changing. Students, in some instances, are proceeding to a leaving certificate course after having completed a group certificate junior cycle course, and others who complete an intermediate certificate course after completing a two year group certificate. The introduction of a limited 'alternative' leaving certificate has added to the variety of senior cycle students. Other courses are also being added to the school curriculum to cater for post leaving certificate students who do not have sufficient qualification or interest in traditional third level courses. These new school based courses are branching out into areas of learning not previously experienced either by the schools themselves or by the teachers. Certification for such courses is being provided by native bodies such as the Curriculum Development Unit of Dublin Vocational Education Committee or professional bodies such as accountancy or catering, and non-Irish bodies such as City and Guilds. An already complex learning environment is becoming even more complex.

THE STUDENT

The variety of backgrounds which students bring to the place of learning whether labelled cultural, socio-economic, ethnic or any combination, has been identified as a significant variable in the learning process and the successful assimilation of the student in to the prevailing environment of the school. This variety has been classed as either deficit or difference, depending upon the perspective of the theorist and their views of the functions of schooling. A seminal exposition of the deficit model of culture and language is that of Bernstein(5) who identifies linguistic types. Teachers from middle class backgrounds or through long association with middle class peers speak a 'formal' language in which:

> **'The speech mode is one where the structure and syntax are relatively difficult to predict for any one individual and where the formal possibilities of sentence organisation are used to clarify meaning and make it explicit.'**

They are often engaged in teaching 'working class' students who speak a public language which is distinguished by:

> **'rigidity of syntax and limited and restricted use of structural possibilities for sentence organisation'**

In such circumstances communication can be awkward and in the deficit model one of the responsibilities of the school is to provide either formally or informally a programme of language training in which those students experiencing the above 'limitations' eventually graduate to a use of a more 'formal' language - the language of the educated person. But Bernstein is quite clear

that language deficiency is not necessarily indicative of intellectual deficiency.

'The evidence from these language studies indicates that the level of linguistic skill may be independent of potential I.Q. and certainly independent of measures of non-verbal I.Q. and that grossly different environment structures affect aspects of language structure and vocabulary.'

This finding would certainly be echoed by those who subscribe to the view that it is more accurate to speak of difference rather than deficit. To these theorists, the task of the school is to accommodate different language modes rather than convert all to the accepted mode of school communication. Labov (6) in his work with ethnic minorities showed that whilst lower working class speech may well be devoid of the 'backing and filling' of middle class speech, the intellectual content in the form of logical argument is at least equal to that of middle class speakers:

> **'There is reason to believe that any non-standard vernacular is itself an obstacle to learning. The chief problem is ignorance of language by all concerned.'**

As an example, Labov analyses arguments put forward on the nature of witchcraft delivered by two negro speakers, one middle class, and the other working class. The speech of the working class negro is disjointed and impulsive, whereas the language of the middle class speaker appears to be educated and intelligent, yet under close analysis the development of logical argument is revealed to be far more cogent in the working class speaker whilst the main characteristic of the working class speaker is shown to be 'verbosity'.

The linguistic conflict which arises in the classroom whether as a result of difference or deficit is a reality which affects teaching and learning. The linguistically deviant student must come to terms with the linguistic currency of the school expressed in lists of rules,in formal teacher speech or in academic and verbose examination questions to mention just a few situations. However varied the academic composition of the junior cycle classes and primary school is considered to be, it is assumed that by the time he student reaches senior cycle the 'weeding out' process has eliminated all but the most 'academically oriented' students who also have come to terms with the prevailing cultural climate of the school. This leads to a fairly straightforward 'take it or leave it' pedagogy in which classes are delivered lecture style in a predictable and uniform manner, the only perceived significant variable beings the student's general ability and aptitude in each subject taken for examination. Minor variables might be identified such as teacher presentation or quality of text, but generally the senior cycle teaching environment is seen as non-problematic.

The basic cultural conflict of teacher and student may surface in the classroom given suitable conditions. Irrespective of the teacher's nurturing environment, the academic cultural training leading to teacher certification takes the teacher into a different cultural world to that from which students derive. Some students may well identify with the academic culture and find little alienation in the classroom. Certainly the assumption that a classroom full of students can present a homogeneous cultural grouping, no matter how selective the school, would seem to be less than realistic.

THE CURRICULUM

The Curriculum as a written expression of educational goals is the teacher's guide to everyday classroom activity. If teachers are asked to describe their work, the most common response is likely to be one in which specific instructional goals designated in the curriculum syllabus are attained by as many pupils as possible. Most occupations, whether they be skilled or unskilled, usually have, as their raison d'être, a specific aim or goal to be achieved. The road sweeper aims to clean one side of the street before tea break, the heart surgeon aims to successfully complete a transplant before the end of the session. The aim, or aims, of education are much less easy to

define. Even if the aim of education is expressed purely in terms of instructional objectives, there would still remain the complex and contentious issue of methodology. Indeed methodology and organisation seem to have a much greater importance than broad aims in educational debate. Teaching, perhaps more than any other occupation suffers from conflicting views of aims and means to achieve aims. Kob (7) perceived teachers as having either one of two rôles. He termed these teacher types A and B. On the one hand a teacher may be subject-centred, taking on the rôle of the transmitter of a set of discreet items of knowledge or learning strategy. This teacher's starting point is the material , of which, by his studies he has acquired a mastery, and which by his training, he is able to pass on to students. On the other hand teacher B is student centred. This teacher's starting point is his expertise as a teacher and his mastery of pedagogy and it is the student rather than the material which will dominate the teaching activity. In short a teacher may be a specialist in a subject area or a specialist teaching methodology.

> **'The professional self-image of type A is primarily determined by educational functions....their interpretation of their professional role is not derived from their academic background, but is based on their being teachers; their specific academic training is subordinate and relative to educational functions'**

and

> **'The professional image of type B is based on their academic qualifications and their specialised knowledge in certain subjects. Their conception of their rôle is determined by their scientific, musical or artistic background'**

There is still a feeling in the teaching profession that some members are more suited to 'academic' classes and some more suited to the 'weaker classes'. Descriptors such as 'he knows his subject' or 'she is very good with the children' are common currency in staff rooms and there is no doubt teacher rôles are different and are perceived as such by teachers. This notion of different and often conflicting rôles will be treated on later when the theory of professionalism is discussed. But a broad statement of curriculum aims usually encompasses each of Kob's teacher types and probably several others also. Definitions of what education is or should be about are almost as numerous as educational researchers.

There is clearly a feeling amongst those responsible for formulating aims in primary education that child centredness is an integral part of their activities. In a 'Teacher's Handbook' (8) to accompany the primary curriculum of 1971 the two aims of primary education were stated thus:

> **'1. To enable the child to live a full life as a child.**
>
> **2. To equip him to avail himself of further education so that he may go on to live a full and useful life as an adult in society.'**

Recent publications by the Curriculum and Examinations Board relating to both primary and post primary education subscribe to the broad aim of education as set out in the Board's publication 'Issues and structures in Education'(9):

> **'The general aim of education is to contribute towards the development of all aspects of the individual including aesthetic, creative, cultural, emotional, intellectual, moral, political, physical, social and spiritual development for personal and family life, for working life, for living in the community and for leisure.'**

Documents relating specifically to senior cycle courses also tend to stress terms similar tot the above with less emphasis on more 'practical ' concepts such as 'instruction' or 'classes' . Paragraph 5.2. of 'In our Schools' (10) states that 'senior cycle provision' should be distinguished

by:

> **'-diversity of provision and approach to meet the differing needs of students. -equality of access for all. -the centrality of the personal and social development of each individual student.'**

It would seem debatable if such aims are, in fact, DISTINGUISHABLE from primary or junior cycle aims and it would appear that what presently makes senior cycle practice clearly distinguishable is the increased emphasis on subject-centred instruction with decreasing student-centered instruction. If it is possible to implement such aims, it would seem that the best opportunity would present itself to those peripheral teachers not involved in the intense atmosphere of exam preparation.

To such teachers the call to observe the' centrality of the personal and social development of each individual student' might seem idealistic and equally Burke's view of the task of education (11) :

> **'The wisdom of the ages, then, is incorporated in the heritage that has come down to us because the "crucial explorations have been undertaken", and the task of education is to transmit the core of that heritage (knowledge, values and know how) to all who come to school.'**

Trant's (12) 'simplified' view seems equally elusive:

> **'The message of education is simple and powerful and is still a long way from being fully realised: all persons must be helped to grow in unity and freedom.'**

and perhaps the rather basic assertion of the behaviour modification school is as close one can realistically approach an all-encompassing definition (13):

> **'Parents send their children to school with the justifiable expectation that their behaviour will change.'**

A major difficulty in defining and achieving educational aims is one of measurement. The measurement of a student's level of 'unity and freedom' might prove rather more problematical than the measurement of scores in an end of term mathematics test. The teacher of senior cycle leaving certificate students may well be conversant with the major documents of curriculum and general educational aims and genuinely espouse high ideals such as those of personality development and the rest, but the odds are that the teacher will be engaged in an annual single-minded attempt to ensure that as many students as possible under their care gain as high a mark as possible in the relevant leaving certificate examination. In other words, the ingenuity of senior cycle teachers is almost exclusively employed in a teaching activity, the expression of which would not be a central theme of a major curriculum document dealing with the aims and objectives of education. Is it possible for a teacher to promote academic excellence as expressed in examination results and still attend to the almost universally expressed aims of full development of student potential.? Do the complexities of teacher personality interacting with those of the student significantly affect academic achievement, or is such achievement gained irrespective of these variables? Or do the variables associated with full development of student personality contribute to academic achievement.

The now follows a review of literature which describes and empirically tests the effects of student, teacher and school variables on educational activity in general, and academic achievement in particular

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2. LITERATURE REVIEW

The review will begin with four major theoretical positions particularly relevant to the examination of those student, teacher and school mediated variables which are possible constituents of the learners total individual learning style and which may affect academic performance. The emphasis on the interaction of the person with the environment, whilst only applied quite recently to education, dates back at least as far as the work of Kurt Lewin (1) in the 1930's. The influence of theories of cultural difference entered education by way of anthropology and has been most influential in questioning notions of cultural deficit and compensatory education. Deriving from cultural relativity came epistemological relativity -what counts as knowledge and by what means this knowledge is legitimised. The theory of learning style itself is examined, its present limited parameters defined, and consideration of additional variables such as those examined in this thesis is made. The four theoretical studies lead from the general theme of the whole environment through cultural influences on learning and institutional definitions of knowledge to particular personality attributes. A rationale for the methodology and choice of variables is presented with reference to the application of interaction studies.

The Person and the Environment.

The prospect of identifying and examining underlying personality characteristics which are consistent and enduring is very attractive to those who order and direct large numbers of people. If it is possible to identify 'types' of behaviour which are measurable and predictable, then performance goals will be that much easier to set and with much greater confidence. But even the most enthusiastic proponents of trait theory from Allport (2) onwards have recognised that no individual is either predictable or analyzable in toto. Although he found that on average subjects recognised 7.2 'central traits' in friends and acquaintances (3), he referred to his third category traits ('secondary traits') as 'attitudes' and suggested that there were so many of these traits that no two people had the same combination, resulting in each person having an 'individuality'. Also whilst traits are considered to be enduring, different traits have different levels of endurance, and they are not always manifest but are stimulated by environmental conditions. Further traits may be environmentally dependent not only for their manifestation but also for their very nature, a person exhibiting completely opposite traits in different situations(4).Finally the notion that traits or indeed personality itself is totally dependent on the immediate situation, in the pure behaviourist sense, is an extreme position which is clearly flawed. In their classic study of 140 children from infanthood to adolescence in the New York Longitudinal study beginning in the late fifties, Thomas, Chess and Birch (5) noted differences in temperament from the infant stage onwards.

The work of Kurt Lewin introduced the environment into personality theory and provided the impetus for research and development which continues unabated. The basis of his work is his field theory which he defines as: 'a method of analyzing causal relations and of building scientific constructs.' (6). Behaviour is a function of the field existing at the time of the behaviour and he defines a field as:'the totality of existing facts which are conceived of as mutually interdependent'(7). Lewin's theory is complex and ambitious and its complete exposition is beyond the scope of this thesis, but the basic concepts employed by Lewin provide the foundation for any theory which seeks to explain personality and behaviour as an interaction of many variables. The theory conceptualises the person as both a separate entity from the rest of the world - the differentiation of the person, yet an entity which is included in a greater totality. The differentiated person is represented diagrammatically by an enclosed area. Contingent to this area is a larger bounded area which is the psychological environment. Diagrammatically Lewin designated the psychological environment as a larger ellipse enclosing the smaller circle (the person). The psychological environment together with the differentiated person constitute the Life Space and

behaviour is a function of the life space -B=F(L).

> **'The task of dynamic psychology is to derive univocally the behaviour of a given individual from the totality of the psychological facts that exist in the life space at a given moment.'(8)**

Beyond the psychological environment of the life space lies the 'foreign hull of the life space' (9), and its significance to the theory is that it can influence and alter the 'psychological facts' Lewin suggests that the study of the influence of the nonpsychological facts be called psychological ecology - an idea which has been developed in educational psychology with great effect.

In an overview of the work of Lewin, Bronfenbrenner referred to the basic premises of Lewin's systematic theory, and the inspiration of his own work in the ecology of education. (10):

> **'the primacy of the phenomenological over the real environment in steering behaviour, the impossibility of understanding that behaviour solely from the objective properties of an environment in which behaviour is described without reference to its meaning for the person, the palpable motivational character of environmental objects and events, and especially, the importance of the unreal, the imagined...'**

In a major exposition of the principles of ecology of education (11), Bronfenbrenner criticises the parameters of educational research:

'Contemporary educational researches are characterised by experimental designs that are primarily statistical rather than scientific: that is; these designs enable us to predict the concomitants of certain combinations of conditions, but not to understand the causal connections that produce the observed effect.'

and suggests that a solution to the problem, of misleading conclusions resulting from design limitations is to recognise that:

'Whether and how people learn in an educational setting is a function of sets of forces, or systems at two levels: (1) This concerns relationships between the characteristics of the learner and his or her surroundings in each of the principle environments in which he lives out his life(e.g. home, school, peer groups, work place, neighbourhood, community), and (b) the second encompasses the relations and interconnections between these environments. The scientific study of both sets of relations as they affect learning constitutes the ecology of education and represents a major and necessary focus for educational research.'

The influence of Lewin on interactive classroom research is examined in the work of several researchers later.

The view that individuality of personality must receive some consideration if education is have any relevance to individual needs is not new. Developmental psychology originating with Piaget has had an impact on pedagogy, albeit largely at the primary level and with great emphasis on the distinction between the concrete and formal operational stages. Much of the theory has been translated into rules for purchasing and use of equipment rather than more radical examinations of underlying principles. The effect of research into individual difference recedes as external pressures descend on the learning process in later school life, and even in primary schools there is evidence of retreat in the face of campaigns to re-establish the three 'r's, and increased assessment at younger ages.

There appears to be a tacit assumption that by later years the system has ironed out the creases and that senior cycle represents the culmination of the sieving process so that all that is left is the pure academic type whose progress is predictable in terms of well establish practice beyond the

scope of research which provides a critique of earlier years. However, teachers, recognise personality types and define such types in terms of behaviour within the setting in which they meet the students, having little opportunity to observe them for any length in any other setting. Thelen (12) found that from teachers perceptions students fell into four main types: good, indifferent, bad, and lost souls. Amongst the characteristics of each group were: natural leaders; interdependent, high achievers; nonconforming and work orientated amongst the 'good'; happy go-lucky, and beauty queens amongst the 'indifferent', teacher impressers and clowns and attention seekers amongst the 'bad' and the rejected and the passive amongst the 'lost souls'. Teacher assessment of personality is almost always informal and subjective. Research into its effects, as we have seen, have been initially characterised as inconclusive and later as unethical, but since the senior cycle classroom is almost totally teacher centred and teacher directed, it seems inconceivable that subjective teacher assessments of non-academic characteristics are insignificant variables in student performance and constitute significant elements of the total learning environment.

It does not appear possible to make easy judgements regarding whole environments, although there may be some educational environments which come close to a broad consensus as to their fitness. But Cronbach (13) is probably accurate when he states that:

> **'environments cannot be arranged from good to bad, rich to poor. The highly stimulating environment that most of us think of as "rich" promotes optimal growth for some persons and may not be suitable for others. Environments can be varied along many dimensions, and the optimal with respect to each dimension depends upon the person's phenotype at a given time.'**

Attention has been given to the teachers as director and major influence of the classroom environment and just as each student brings a unique personality to the learning place so too does the teacher. Rosenshine and Furst (14) derived five dimensions of teaching behaviour which affected academic achievement amongst 6th grade children. The five dimensions of clarity, variability, enthusiasm, task orientation, and student opportunity to learn material correlated positively with academic achievement.

Theories which stress inherent personality traits of whatever origin are constrained to identify groups and sub groups to explain the diversity of personality. Once the influence of environment is considered, the picture becomes even more complex. The preceding section has outlined major theoretical positions in this area and has approached research which has arisen from a recognition of the complexity of the interaction between person and environment. A more detailed review of such research follows later, but for the moment a second major theoretical perspective on diversity of learning is described deriving from social anthropology - that of cultural difference.

The Person and Culture:

Kluckhohn (15) defines culture as:

> **'the total life way of a people, the social legacy the individual acquires from his group...culture is a way of thinking. feeling, believing.'**

Culture, he says, is formative and all pervasive:

> **'Culture regulates our lives at every turn. From the moment we are born until we die there is, whether we like it or not, constant pressure upon us to follow certain types of behaviour that other men have created for us'**

Culture so defined takes on a descriptive rather than a prescriptive guise, and ideas of superior or inferior culture are inappropriate. A common term in education is 'school culture' and a common theme is the 'clash of cultures'. We will return to this but in order to approach educational culture

with a rather more informed view than is often apparent amongst protagonists in the field it is necessary to address the problem of cultural difference and whether this also entails cultural deficit.

The idea of cultural deficit arose from the work of early anthropologists comparing the 'primitive' cultures they encountered with their own. They identified differences in cognition which could be associated with language and racial deficiency. The deficit concepts owed much in their origins to the developing work in biological evolution of the late 19th century. Spenser (16) said that primitive thinking allowed:

> **'no conception of general facts, no ability to anticipate future results, limited concepts, absence of abstract ideas, lack of idea of causality'**

This of course, bears a striking resemblance to the assertions made about the deprived linguists in the research of Bernstein mentioned earlier.(17). Cole (18) has suggested that in a search for 'cultural factors' which differentiate one culture from another some anthropologists have identified language or literacy as 'a crucial factor in changing the way people think.' However he believes that to isolate single factors as significant cultural influences may be misleading:

> **'But except in rare cases, literacy co-occurs with other cultural features such as the presence of formal education, increased industrialisation and urbanisation.'**

Another cultural factor often cited by anthropologists and of interest to educators is that of mental ability or intelligence. Fierce debate has raged over the years as to the relative 'intelligence' of different cultures. Cole believes that such a debate might be more enlightened if a distinction is made between mental capacity and mental processes. He quotes an unlikely ally in Levy-Bruhl(19):

> **'We have seen that Australian and Melanesian children learn what the missionary teaches them quite as readily as French or English children would do. Neither is it the result of profound intellectual torpor, of enervation or unconquerable weariness, for these same natives, who find an insuperable difficulty in the very slightest abstract thought, and who never seem to reason, show themselves on the contrary observant, wise, skilful, clever, even subtle when an object interests them.**

A graphic illustration of the skill of non-literate people is supplied by the work of Gladwin (20) who studied the ability of Truk islanders in the Pacific to steer a canoe over a journey of up to a hundred miles on featureless oceans with unerring accuracy. He contrasts the thought processes and cognitive strategies used by both Pacific Islanders and Europeans embarking on similar enterprises:

> **The European and Trukese cognitive strategies differ in at least two essential aspects. One is that the European procedure can be described fully in words by the navigator. At any time he is prepared to give logical explanations for what he is doing...In contrast the Trukese navigator can point to his destination over the horizon, but he cannot possibly put into words all of the myriad perceptions which have led him to be sure at that moment where his island lies... The other difference lies in the logical processes employed by each. The cognitive strategy of the European navigator can be characterised as essentially deductive proceeding from principles to details...It would be satisfying in contrast to suggest that the Trukese navigator operates inductively from details to principles..the total process goes forward without any reference to principles and without any planning...It is non-verbal and does not follow a sequence of logical steps...yet it is undeniable**

that the process of navigating from one island to another, when this is accomplished entirely through the mental activity of the navigator, must reflect a high order of intellectual functioning.'

This lengthy quotation serves to illustrate the type of anthropological study which led anthropologists such as Gladwin to (22):

'stoutly defend the equality of all men, especially with respect to intellectual potential.'

and has led educationists to examine if such equality has been extended to the classroom. The influence of such enquiry has been significant on some aspects of educational practice.

The emphasis on process rather than capability has been the approach used by educationists investigating cultural influence within the school and the effect of cultural conflict. A further illustration from anthropology may serve as a bridge to educational theory in that the study was conducted by Greenfield (22) a colleague of Bruner, and relates to Bruner's views of cognitive growth and conceptual development. Children in Senegal were asked to group familiar objects according to either colour, form or function. The results tended to support Bruner's contention that cognitive growth is reinforced by intellectual demands made by school, in that those African children who had been to school moved from colour preference to form and function according to grade and closely resembled American children in performance whereas those African children who did not attend school failed to develop a preference for form. This returns the argument to the nature of what happens in school and the legitimacy of what is taught and why it is taught.

The Person and the Curriculum

Radical critiques of the type of knowledge presented in schools and its relevance to all students became prevalent in the 1970's and subsequently. Writers took their impetus from anthropological studies of the type described above and new insights into the sociology of knowledge, especially inquiry into the nature of legitimate knowledge and how it comes to be accredited. In regard to the present study, for example, such inquiry would seek answers to such questions as to why certain subjects are taught at any particular time, why some subjects have higher status than others, are the measures of subject so used merely reflections of one particular view of the subject; is one particular cognitive strategy demanded to the exclusion of others, and in the light of answers to such questions, are large sections of the student population disadvantaged through cultural deficit or difference, indeed are some types of knowledge, for example, commonsense knowledge (cf Keddie 23) deemed irrelevant?

Bourdieu (24) who conducted extensive research into what he termed 'cultural' and 'social' reproduction within the French educational system was a major influence in the initial stages of this critique of educational practice. His work may be summed up in the following observation:

'It seems that a sociological explanation can account for the unequal achievement usually imputed to unequal ability.' (25)

He sees the educational system as a socially conservative force reinforcing cultural divisions which the students bring into school:

'The pedagogy used in secondary or higher education is, objectively an '' arousing pedagogy'', in Weber's words, aimed at stimulating the 'gifts' hidden in certain exceptional individuals by means of certain incantatory techniques such as the verbal skills and powers of the teacher. As opposed to a rational and really universal pedagogy which would take nothing for granted, initially, would not count as acquired what some and only some of the pupils in question had

inherited...our own pedagogical tradition is...only there for the benefit of pupils who are in the particular position of possessing a cultural heritage conforming to that demanded by the school.' (26)

To test the assertion that variables other than ability are significant in one particular area of academic achievement, that of final year examinations, the aim of this thesis.

The results of the curriculum as a function of cultural reproduction, or in Eggleston's (27) term 'the received curriculum' is that:

'It (the received perspective) is one in which curriculum knowledge, like other components of the knowledge system in the social order, is accepted as a received body of understanding that is 'given' even ascribed, and is predominantly non-negotiable. Essentially is non-dialectical and consensual.' (28)

We have already seen (Ch.1 above) that curriculum documents, even in those areas of school activity in which the pressure of external forces such as entry to third level institutions poses no constraints, seem to reflect this curriculum perspective. For whatever reason subjects remain largely unchanged in spite of endless hours of consultative deliberations and position papers. It may be argued that some changes are being introduced to the junior cycle curriculum but discussion tends invariably towards methods of assessment and resources. The senior cycle remains unchanged; the status enjoyed by subjects remains as does the clear lack of consistency of standards between the subjects studied. The clientele entering senior cycle is changing and the homogeneous group for whom such an arrangement might well have been culturally appropriate has dissolved into a more representative sample of the population (at least in those schools which do not select entry to junior cycle courses).

In a discussion of the present status of school subjects, Young (29) talks of the 'reification' of school subjects. Instead of being recognised for what they are, inventions of discrete chunks of 'knowledge', they are thought of as having a 'life of their own' totally independent of those who labour in their mastery. This supposes a 'passive' model of the teacher who 'reproduces' knowledge 'produced elsewhere by others'.

'One way in which this passivity is displayed is the way in which outside bodies such as university examining boards are able, almost without question, to define what counts as knowledge in the schools.'

Young (30) believes that the curriculum reforms of the type we have mentioned previously are not only illusory, but tend if anything to confirm the existing state. He considers any meaningful curriculum reform to be impossible under the 'received' curriculum regime. He instances Nuffield Science A level in which the practical part of the examination is replaced by a project for which the student gets 15% of the marks (Continuous assessment is seen, certainly by teachers as one of, if not the major, curriculum changes imminent) He found that the project work came to be 'crammed into one afternoon per week' whilst formal examinations consideration involving the 'real' work took up the rest of the time:

'It may be therefore that such liberalisation tends to sustain rather than challenge, both for teachers and pupils, a view that knowledge of viscosity, like all real knowledge is something to be learnt and reproduced rather than a way of understanding the world we are part of; thus a view of the curriculum as fact, rather than as practice is confirmed.' (31)

Critiques such as these have initiated voluminous research examining classroom practice and the role of the teacher in the interpretation of the curriculum and the perceived role of the director of knowledge transference. In chapter one the work of Keddie was described. An extension of the

view of the reification of the knowledge and mores of the classroom was an interest in another sociological ideology - that of deviance -and in particular the deviant in the classroom. We have mentioned that a large heterogenous intake of first year pupils inevitably contains its share of deviants (by whatever definition the school uses to identify deviance) but by senior cycle those students who have found school to be an alien environment have tended by and large to have found other activities. Increased entry to senior cycle courses means that such 'deviants' may be more persistent than formerly necessitating reappraisal of senior cycle procedures by school administration.

An influential study by Werthman (32) investigated the 'delinquent' behaviour of groups and individuals in schools and in particular why some students displayed deviant behaviour in the presence of some teachers and in some situations but not others. Werthman showed that the behaviour of students often depended on their interpretation of events happening at the time and in particular whether the students themselves considered the exercise of authority to be legitimate. The central part of the research concerned the assignment of grades to students in the course of their studies. He learned that students believe that the purpose in assigning grades could be designated as fairness, as a means of punishment, as a bribe, or as a completely random exercise. In the area of general authority students tended to misbehave with those teachers who attempted to impose a regime of rules in dress and hair styles, and who impose what is considered to be illegitimate rules in an 'imperial' dominating manner. In summarising their own extensive research into 'classroom deviance' Hargreaves et al. (33) suggest that a possible solution to labelling or typing of students is to dissociate the actor from the act:

> **'For if the act rather than the person is subject to the definition of deviance, then the offender has some means of "normalising" his conduct, that is, of dissociating himself from the act from his "real self" so that the act can be seen as "out of character"...Such neutralising techniques... are not merely excuses for deviant behaviour; they help us to maintain our self image as essentially non-deviant.'**

They refer to the work of Jordan (34) who identified the 'deviance-provocative teacher and the 'deviance-insulative teacher'. The one believes that:

> **'the pupils he defines as deviant do not want to work in school and will do anything to avoid it'**

whilst the other believes that:

> **'these pupils, like all other pupils really want to work. If the pupils do not want to work then, the conditions are seen to be at fault.'**

The Person, Cognition and Learning:

The theory of individual difference within the educational system has developed from consideration of the many variables identified from such research as outlined above. The theory of 'cognitive style' derives from the consideration of the individuality of the learner.

Cognitive style is characterised as a 'hypothetical construct that has been developed to explain the process of mediation between stimuli and responses.'(35) In a major review of research Goldstein and Blackman (36) conclude that' cognitive style' is best construed as a generic construct much like personality (see above). It is immediately apparent that in establishing the term in the context of cognitive psychology and in comparing it with personality, the concept takes on the characteristic of a fairly fixed cognitive structure which might not appear to be possible to mediate within the school environment. It may well be a trait that could influence academic outcome but it may not be quite so indelible or immutable as at might first appear, and in any event, would

constitute only a part of the total learning style of an individual association with environmental and cultural attributes already described.

Goldstein and Blackman identified five approaches to the study of cognitive style which they present in a sequence reflecting the change of emphasis from concern with cognitive content to concern with cognitive structure. The five approaches are listed as: authoritarianism/intolerance of ambiguity; dogmatism;personal constructs and cognitive complexity; integrative complexity; and field dependence. The authoritarian personality is one which exhibits intolerance of ambiguity -'likely to make infrequent use of limiting and qualifying language' and rigidity -'which refers to thought and behaviour which is exceptionally resistant to modification.(37)

The development of the concept of dogmatism as a factor of cognitive style owes much to the work of Rokeach and this will be dealt with in some detail later since this thesis will use both Rokeach's (38) own dogmatism scale (form E) and a development of the scale for use in schools. However it is sufficient to note for the moment that one of the significant implications for educational practice of the dogmatic trait is the ability of both high and low dogmatic subjects to perform analytic tasks, whereas the low dogmatic subject performs synthetic tasks more efficiently, and the perceived need of curricula to contain elements of both an analytic and synthetic nature continues to be reflected in curriculum publications reflecting the continued influence of taxonomies of those such as Bloom's(39). The element of constructs and complexity refers to the theories of Kelly (40) who theorised that the individual makes representations or constructs which interpret the environmental stimuli received rather than merely responding to them and the relative simplicity or complexity or such responses reflects the relative cognitive sophistication of the subject. Integrative Complexity derives from the work of Schroder et al. (41) who identified two elements of stimulus processing - differentiation and integration. Differentiation reflects the ability to distinguish characteristic elements of a stimulus and integration refers to the selective use of such characteristic using various strategies. The particular relevance to education is noted by Goldstein and Blackman p.171

> **'What is especially valuable about integrative complexity is that the personality variable is related to the environmental variable in an articulated manner. Individuals vary in the complexity of their abilities to process information. The environment varies in the complexity of information it contains.'(42)**

The stimuli presented to students during the learning process are many and varied and go well beyond the instructional material. Only the recognition of the interplay between material and method, subject and teacher, can lead to any valid theory of instruction.

The final cognitive trait discussed in relation to cognitive style is that of field dependence / independence a theory developed by Witkin and associates. (43) Field dependent subjects are those who are dependent on their environment for their perceptions. Field independent subjects are able to develop ideas of their surroundings on a more interpretive level and in his later work, whilst still using the technique of recognising embedded figures in various orientations Witkin was able to suggest that the more 'differentiated person, that is the field independent person :

> **'perceives the field as more discrete and structured, has a more definite sense of body boundary, a sense of individualised standards,and is less likely to use primitive, indiscriminate defenses such as massive repression and primitive denial (44).**

The translation of cognitive style theory, since it is a theory of individual organisation and difference, into educational practice has proved erratic and difficult.

One approach has been to broaden the concept and to refer to learning style rather than cognitive

style. This tends to locate the theory in education rather than in cognitive psychology, and whilst recognising the influences of persistent cognitive traits, also stresses the possibility of influencing learning outcomes by recognising and manipulating variables affecting the predisposition to learn of the student. It is this orientation which is considered particularly valuable in the construction of this thesis and the examination of pedagogy in post leaving certificate classes.

Attempts to distinguish Learning Style from Cognitive Style had their origins in the work of Dunn et al. (45) Dunn defined learning style as:

> **'the manner in which at least 18 different elements from four basic stimuli affect a person's ability to absorb and retain.' (46)**

The four stimuli are identified as: environmental, emotional, sociological and physical, and the 18 elements include sound, light, temperature, design, motivation, persistence, responsibility, need for structure, working alone, working with another student, working with many students, working with a team of students, working with an adult, working with a combination of adult and peers, perceptual strengths, intake, time of day, and need for mobility.(47)

Having established the credentials of other variables it was then proposed that a system of matching be introduced so that optimal learning outcomes would be achieved and a student's learning style and indeed that of the teachers could be identified by use of appropriate measures.

A major criticism of this approach is that whilst the identification of variables affecting learning certainly contributes to more relevant discussion of the teaching/learning process, the definition of learning itself seems to be inadequate in the light of present learning theory some of which was discussed earlier in the chapter. For example Hyman & Rossoff (48) complain that the definition quoted above:

> **'does not tell us what the student does as he or she learns, but only how certain elements affect a person's ability to "absorb and retain" '.**

We have already seen in some detail that the problem of what constitutes learning is bound up with what constitutes knowledge and it is certainly a seminal problem in education. It is a problem which also must be addressed later in the context of the relevance of the pedagogy and material of the final years of post primary education, but for the moment the emphasis will remain on the constituents of an individual's approach to a learning environment and the possibilities or restrictions placed by that style.

Later definitions of learning style have tried to bring back the narrower notion of cognitive style into an all embracing concept:

> **Learning styles are characteristic, cognitive, affective and physiological behaviours that serve as relatively stable indicators of how learners perceive, interact with and respond to the learning environment.' - Keefe (49)**

A characteristic of cognitive style is the apparent permanence of the set of traits exhibited by the individual. It may be possible to accommodate them but not to change them. Whilst the above definition of learning style also places some emphasis on 'relative' stability the inclusion of increasing numbers of variables have led some researchers such as Davidman (50) to assert that teaching and learning is a dynamic operation with fluctuating relationships such that:

> **'learning style, which is a student element in the teaching relationship, is not an enduring intractable trait, but a malleable trait'.**

It is clear that there are many variables which are at play during student teacher interaction which can promote or inhibit learning and the attempts to identify such variables form a major part of

educational research.

Academic Achievement Variables

Educators, depending upon their area of educational activity, will have different aims for their students and different methodologies for achieving those aims. However, the term 'academic achievement' would at first glance appear to be largely unambiguous in that it suggests the successful completion of some kind of agreed curriculum validated by an agreed form of assessment. But there appears to be at least two distinct starting points for a description of what exactly 'academic achievement' entails. One may be the student; this type of achievement being the end product of 'student centred' learning. In this educational model the needs of the student are assessed and a flexible curriculum is developed. The potential,inclination and needs of the student are evaluated and the educational or academic achievement of the student is measured against the student centred criteria. The locus of the curriculum design is the student.

On the other hand academic achievement can be the successful completion of, and validation in, a course of study superimposed on the student body by educators who seek to define a 'core curriculum' which in their view constitutes a basic education followed by a higher or more specialised education. This type of curriculum would claim to be objective in the sense that the standard is set, not regardless of the student body, but certainly not using the student body as the starting point. The starting point is a discrete body of knowledge which is considered to constitute the necessary components of an 'educated person.' There are several examples of studies which seek to describe what kind of students are successful - the second approach mentioned above. Gender differences are an especial source of interest. In a study of academic achievement amongst Irish Secondary School students Bolger (52) found that gender differences did indeed manifest themselves as a function of the form of the test method rather than of the contents of the test itself and the characteristics which the test is designed to measure. Males performed significantly better on multiple choice type tests as opposed to those demanding the written essay or account type answers. This finding is apparently supported in other countries. In a study of 750 'Irish Adolescents' Bender (53) examined gender differences in several variables, one of which was academic achievement. This research indicated that females 'as a total sample and by social class' were more academically successful than males. Some attention will be given to male/female scores in this study, and whilst it is possible in some environments to take cognisance of gender differences and apply suitable compensatory strategies, the final year of formal school does not appear to be such an environment. Nor does it appear to the environment to modify other variables which have been examined in the Irish context with relation to academic achievement. Osborne (54) compared the academic achievement of students attending Roman Catholic and Protestant secondary school students in Northern Ireland and other research followed the major British trend of examining access to and success in secondary education amongst various socio-economic groups. Mention has already been made (Chapter 1) of the continuing interest in access to secondary education and the conflicting theoretical views of compensatory or difference education have been discussed. The predictability of student scores in standardised tests of achievement from data such as home background and personal characteristics resulting from same is exemplified in such studies as those of Archer and Edwards (55) and in a study which begins to approach the problem of school modified variables and their effects Bill (56) examined the factors involved in students leaving secondary school early in Northern Ireland and found that such students had less regard for teachers and the work of the school, had immediate work prospects as a major motivator and in general performed less well of tests of attainment. The problem addressed in the present study is one of a different kind - that is - of increasing numbers of students remaining at school because of the lack of employment opportunities and the desire for increased qualification, and inhabiting a school environment more geared to the academic 'stream' students who were in a

position to remain at school and benefit from additional education in spite of a fairly inviting employment market.

Studies in the use and effectiveness of a second language in educational achievement have played a large part in Irish Educational research. The role of the Irish Language in the final examination equation can be quite significant in a very tangible way in the allocation of additional 'bonus' marks for those students who choose and are able to answer their examination questions through the medium of Irish. At a more esoteric level Dutcher (57) conducted case studies in the Philippines, Canada and Ireland as to the efficacy of learning school subjects through a first or second language. The findings indicated that there was no general formula applicable and that factors such as parental attitudes towards the second langauge and its acceptance within the community as a whole are significant factors in the success or otherwise of learning through the second language.

The impact of the externally defined educational goals of examination success plays a large part in determining the pedagogy. The area of language teaching has been particularly prone to the criticism that students become highly proficient in grammar but 'cannot speak the language'. The indications appear to be that in spite of attempted reform in language curricula the impact of the final examination is still strong. Clancy (58) found that even with the new emphasis on communicative skills in French language teaching the test format remained the dominant instructional method.

The literature describing achievement variables on the wider front is quite considerable and varied. It ranges from major district wide intervention strategies, which, whilst clearly are inappropriate in this research, do isolate variables which researchers consider relevant to academic achievement, to studies such as that of Loewer (59) which examined whether the administration of pop-music quizzes would motivate students to greater achievement. Major intervention strategies at multi-school level tend to emphasis academic achievement in what might be termed basic 'survival skills' in Language arts and mathematics although the various variable emphasis is relevant here. Patterson (60) reports a district wide experiment in improved student/teacher/parent/counsellor communication techniques in conjunction with various behaviour modification strategies as effective enhancers of achievement. Klausmeier (61) lists a number of teaching implements - filmstrips, audiocassettes etc. - developed on a district wide basis to improve student achievement; Wright (62) explains how tutoring in high expectations in regard to academic achievement and entrance to third level courses improved both achievement and self-esteem and Marsh (63) cites the recognition of local priorities, staff training and the capacity to carry out reform as leading to school change and improvement. Each of these studies assumes achievement in criteria which are either internally defined or are defined by standardised testing, neither of which obtains in this study.

It seems appropriate to group research into academic achievement variables into either that which addresses personal characteristics and that which addresses organisational characteristics. But it is worthwhile to note that some research does address the problem of what kind of academic achievement is being measured and how appropriate the measurement is. Meverech and Amiran (64) note that the use of criterion referenced testing is associated with improvement in mathematical skills; Chansarkar and Raut-Roy (65) discovered that generally students performed better when a variety of evaluative techniques are used and that weaker students perform better when traditional examinations are not used whilst a further study into the effects of multiple choice/essay type examination differences by White-Blackburn, et al. (66) failed to find any significant difference in performance on the contrasting formats. Frisbee (67) established a significant relationship between time spent on a subject and performance within the school, but no significant relationship between time spent on school work and final course grades.

Amongst variables which might be classed as personal traits, anxiety is examined with conflicting findings. Whilst Matthews (68) found what she called both state and trait anxiety at the low levels were moderately associated with high performance on measures of verbal and numerical reasoning, Carrier et al. (69) found that anxiety was not necessarily detrimental to performance. Performance points were assigned to an experimental group by Slavin (70) and were derived from a pretest base score. Students who received the points achieved more than the control group. Mukherjee (71) gave lectures to an experimental group on the importance of mathematics and this effected gain in both attitude towards and achievement in mathematics over the control group. Reading ability figures prominently as a variable in academic achievement. Wade (72) established a relationship between raising achievement scores in Social Studies assessment and the provision of reading and study skill instruction and Hurov (73) found a strong correlation between low academic achievement and a reading level in the bottom 20 percentile range. Increased achievement in reading skills was obtained amongst subjects by Crano & Johnson (74) by giving specific training in perceptual and spatial skills, and from a cohort of four variables Chandran et al. (75) linked prior knowledge and reasoning skills to high achievement.

Organisational variables identified as influencing academic achievement often focus on the long standing problem of streaming or non-streaming; self contained or mainstreamed classes. The controversy is well beyond the bounds of this discussion except to reiterate that students are increasingly remaining at school who formerly would not and the ability of such students in 'academic' subjects would not be of the same kind as those students of previous years who chose to remain in school. However since 'streaming' also entails the ability to redefine the learning goals - a great criticism being that lower streams are offered a 'watered-down' syllabus, such considerations are inappropriate. But Kerckhoff (76) found that high ability students gained more than would have been expected and low ability students less in streamed rather than non-streamed educational environments, and in a study of mathematics classes Kluwin (77) students again recorded more significant gains in 'mainstreamed' classes rather than in 'self-contained' classes, some of the reason being given as higher expectations, more demanding material etc. Access to computers is an increasing area of interest in assessing the impact of variables on achievement. Further mention is made of computers later, but again the logistics of the environment of the present study make such access at the moment impractical. The case for computer aided education, no matter how user friendly seems as yet unproven and research such as that of Lockhead (78). A series of variables were examined in relation to academic gain in mathematics, amongst them computer aided learning. Significant variables included gender, age, and learning material but not access to computers. Rather more favourable results were obtained with other hardware resources by Raphelson (79) who found slide presentations as part of the instructional method improved performance on course examinations. Much debate at the moment in Ireland relates to the length of the school holidays and school productivity. Productivity is never clearly defined,and is often s ambiguous and generalised as some of the curriculum documents mentioned earlier. It is obviously a concern elsewhere since Mangino and Ligon (80) report the use of district wide summer schools as part of a state wide compensatory programme. As a conclusion it is worth mentioning the work of Levin (81) who compared four intervention strategies for their instructional and cost effectiveness. These included computer access, lengthening of the school day,reducing class sizes and finally tutoring. The measured outcomes were in reading and mathematics. Tutoring came out most favourably of the four variables.

INDIVIDUALISATION OF LEARNING

There is a vast amount of empirical and theoretical literature on the individualisation of learning. Yet the literature which pertains specifically to the area of education discussed in this thesis is surprisingly sparse. Educational innovation seems to need 'breathing space' and to germinate in

soil which is relatively free of other growth. Consequently research proliferates at the beginnings at lower primary and lower junior levels and at first year undergraduate level. But there seems to be a surprising agreement (without any apparent empirical justification) amongst those involved in teaching at final public examination level that the one and only possible effective pedagogy is the full frontal assault on the material, and in the eyes of many, including it must be said -the paying public - the 'cram' school is the quintessence of efficient education. A reasonable starting point of a discussion of attempts which have been made to individualise learning, attempts which seem to have some relevance to the task in hand, would appear to be the assertion (in fact a criticism of some established individualised learning systems) by Brigg (82) that:

> **'The systems are not, of course, preoccupied with method to the neglect of content, but the rationale for the method is usually clearer than the rationale for the goals.'**

Influential Studies of Individual Differences

Two different learning strategies were identified by Pask et al. (83) These strategies were termed holist and serialist. Associated with these two strategies are two distinct learning styles described as 'comprehension learning' and 'operation learning'. Some of the attributes of subjects exhibiting the holist strategy and comprehension learning style would be the ability to take a wide view of a problem, to use illustrations and anecdotes in descriptions. The use of the 'overall' view in which wider implications of problems are used to eventually construct the part from the whole is also typical of this approach. Pask also details the limitations of such approach resulting from too strict an adherence. A major difficulty such subjects encounter is the arriving at conclusions on the basis of too little evidence. Pask called such activity 'globetrotting'. Characteristics of serial strategy and operational learning style include regular stepwise progression through well defined sequences, and the shunning of the broad view favoured by the holists. An overly strict adherence to this strategy results according to Pask in 'improvidence' where the final solution can well be missed when the connection of the parts to the whole is not seen. He sees the ideal, as is the case with other learning style theorists, as the ability to utilise one or other strategy according to the needs of the moment, and this results in the most effective learning. Pask does not suggest that one style is superior to another; both are appropriate but over reliance on either is to be avoided.

The clash of the 'synthetic' and the 'analytic' or the 'arts' and the 'sciences' has a long been a feature of educational debate, but the recent writings of psychologists seeking empirical evidence in studies of brain lateralisation has often been esoteric to say the least. The left-brain/right brain controversy has been described as 'the fad of the year' (84) Since this was written as a prelude to the assertion that: 'brain lateralisation has been seized upon to explain almost everything under the sun' the ardour has abated somewhat and as with most educational 'fads' it has assumed a more reasoned and respected niche in the theory of individual difference. As a result of the identification of certain types of mental activity with the left or right side of the brain, the focus inevitably fell on school learning and its demands upon the split brain conclusions such as those of Ornstein (85) are common:

> **'Split and whole-brain studies have led us to a new conception of human knowledge, consciousness and intelligence. All knowledge cannot be expressed in words, yet our education is based almost exclusively on its written or spoken forms. We seem unable to expand our ideas of education and intelligence, perhaps because we have no way to measure such progress. But the artist the dancer and mystic have learned to develop the non verbal portion of intelligence.'**

The more extravagant claims of the proponents may well have abated, but the validity of the critique of one directional methodology has directly led to developments in educational practice

which seek to diversify the type of responses required from students to attest to levels of achievement. The constant demands from educators for a variety of assessment techniques to incorporate continuous assessment, open-ended questions or indeed open book examinations are responses to research which continues to demonstrate the complexity of learning and the learner. The compromise which eventually percolates to practice is again illustrated in the words of Levy (86):

> **'The two brain myth was founded on an erroneous premise: that since each hemisphere was specialised, each must function as an independent brain, But in fact, just the opposite is true. To the extent that regions are differentiated in the brain, they must integrate their activities. Indeed it is precisely that integration that gives rise to behaviour and mental processes greater than and different from each region's special contribution... Normal people have not half a brain nor two brains, but one gloriously differentiated brain, with each hemisphere contributing its share.'**

Producing categories in a similar manner to Pask both Kolb (87) and Gregorc (88) have identified distinctive learning styles. Kolb suggests a cyclical sequence of learning styles starting with concrete experience and leading on through observation and reflection and the formation of abstract concepts to the fourth stage of hypothesis testing by experimentation which in turn leads to new concrete experiences. He devised a Learning Style Inventory measure in which it is possible to discover the importance the learner attaches to any one of the stages in relation to any other.

Gregorc also produced four categories of learning style and identified the concrete and the abstract as major factors. He found those who were concrete sequential learners - learners who preferred structured learning environments with lots of practical experience and concrete random learners -learners who also prefer practical experience but who operate in a less structured manner making 'intuitive leaps.' The abstract sequential learner prefers the structured approach but operates 'symbolically' requiring little concrete experience as do the abstract random learners who prefer a less structured approach enjoying such strategies as 'group discussion' A word of caution was introduced by the work of Laurillard (89) who suggested that learning style might well be less important than the situation in which the students find themselves in the determination of the style which they might use. It was found difficult to categorise subjects into one or other style since they were 'thoroughly sensitive to situational demands'.

The work of Entwistle et al. (90) included the analysis of the responses of 767 university students and investigated motivation for study. Three major orientations to work were discovered, each orientation resulting from a different motive. the orientations are (1) meaning - the search for personal understanding (2) achieving - the search for high marks or grades and (3) reproducing - memorizing. The student with the meaning orientation is intrinsically motivated and often independent of the directed lessons; the achieving student is extrinsically motivated by the prospect of success - a positive reinforcement and the reproducing student is extrinsically motivated by the fear of failure or censure. The student in search of meaning tends to adopt Pask's holist method and can often fall into the trap of 'globetrotting',and the reproducing student tends towards the serialist method which often leads gaps in understanding. The achieving student is the pragmatist and uses varying styles which will lead to the desired end result. Schmeck (91) commends the work of Entwistle since it originated with the 'learning situation' and 'worked backwards' towards the learner. Schmeck suggests that this contrasts with the personality trait approach developed outside the context of learning then superimposed on it.

Large Scale Programmes Attempting to cater for Individual Differences.

To a greater or lesser degree most educational institutions, certainly at primary and secondary level, make some kind of provision, rudimentary as it may be, to address differences amongst students. Remedial education seeks to cater for those students who are unsuccessful in regular classroom work, guidance education seeks to address individual problems which may be affecting school performance. Most secondary schools will 'stream', sorting students into permanent class groupings according to scores on ability tests, or 'set similarly sorting students for each or groups of subjects. Many other groupings of students have been tried to vary the standard classroom format with the intention of individualising education.

As we have noted, radical upheaval of established practice to form elements of experimental education generally take place in junior education, or in education not affected by external assessment. Open education and team teaching, for example, developed in junior schools and make the occasional foray into secondary education, but where such variation survives it is on a local and small scale. The Free School movement developed largely within private education often with the active antagonism of educational bodies. Summerhill (92) was less an experiment in educational methodology as in educational philosophy although there is no doubt that one of the greatest constraints on many students is the physical coercion to attend and conform - just as it is a spur to others.

Large Scale individualisation at secondary level seems to concentrate on instructional outcomes and instructional strategy and two examples of such interventions follow. Talmage (93) says that the designers of individualised learning programmes:

> **'have to account for six transactional components: teacher learner rôles; management of learning environment; grouping; modes of presentation; time and pacing and learning activities.'**

As an example of a programme accounting for such components Talmage includes a programme known as Individually Guided Education developed by Klausmeier and others and used in a large number of school districts in Wisconsin in an anthology of individualised learning systems. (94)

> **'I.G.E. is conceptualised as a comprehensive alternative system of schooling designed to produce higher educational achievements by providing effectively for differences amongst students in rate of learning, learning styles and other characteristics. (95)'**

For the purposes of this review we will note the school organisational features of such a programme rather than list all the necessary features of implementation. The basic organisational unit of the system is described as the Multiunit. This replaces the class as the unit. The multiunit encompasses a section of the student body and is a group of experienced and inexperienced teachers (and in the American context, teacher's aides) which plans, carries out and evaluates as a hierarchical team instructional programmes for each student in the unit.' The organisers point out that whilst staff rôles change considerably, new positions are not necessary for the running of the operation. Such revised rôles are claimed to be more efficient in that:

> **'Teachers may be stronger or weaker in certain instructional groupings. One may be excellent in tutorial activities, another in small group activities, and still another in large group activities' (96)**

The changed rôle of the principal is the assumption of 'more direct administrative responsibility for developing improved educational practices' and as we see below, this particular leadership

characteristic is one which seems to be common to 'effective schools'.

The instructional model of the programme includes the statement of objectives for the whole student population, the estimation of the range of possible objectives for the sub -groups, the assessment of the level of achievement and motivational levels and learning style of each student within the unit and the setting of instructional goals for each student. The implementation of the programme is characterised by flexibility necessary to cater to each student. For example one element is the variation of time spent by each student in one-on-one interactions with teacher, in independent study, in small group activity etc.etc. The attainment of objectives is assessed and lack of success leads back to the planning objectives level for the individual and successful attainment leads on to the next sequence of activity.

Whilst there are many examples of programmed learning using materials which are either 'geared' to all or certain abilities, these often fail because as elements of curriculum reform they do not extend to redefinition of staff rôles. Successful utilisation of such material depends on the enthusiasm of the teacher and their ability to incorporate them into existing and often inappropriate structures.

As an expression of instructional goals, the idea of mastery learning has gained many adherents in recent years. As expounded by Block and Bloom (97) it appears to offer the science of programmed learning with the humanity of affective education. Again the main element is the clear and unequivocal statement of educational goals. According to Bloom the use of mastery learning ensures that:

> **'most students become very similar with regard to learning ability, rate of learning, and motivation for further learning. Theoretically almost all students can learn to a relatively high level anything the schools have to teach.' (98)**

The three key elements to successful learning are the definitions of the type and level of attainment required, the rate of learning required, and the affective characteristics of the learner in relation to the learning task. The learning task is the unit of instruction. The overall instructional strategy is similar to that of Klausmeier in that broad objectives are set and then smaller sub units defined. Bloom talks about inequality of treatment and equality of outcomes rather than equality of opportunity stating that:

'equality of outcomes is a realistic possibility for most teachers who carefully and systematically apply appropriate instructional means to student differences'.(99)

There is a good deal of irony in the possibility of increasing technology, for example in computer applications, playing a rôle in the individualisation of learning which is considered often to err on the side of humanism. Even in Bloom's theory of mastery learning the organisational problems are well beyond the means of the classroom teacher in isolation and other forces are necessary to make the theory practical - if nothing else, as Klausmeier notes above, because of the abilities and inclinations of individual teachers. Bloom outlines his mastery learning in the following terms:

> **'1. Mastery of any subject is defined in terms of sets of major objectives which represent the purposes of the course or unit.**
>
> **2. The substance is then divided into a larger set of relatively small learning units, each one accompanied by its own objectives, which are part of the larger ones or thought essential to their mastery.**
>
> **3. Learning materials are then identified and the instructional strategy selected.**
>
> **4. Each unit is accompanied by brief diagnostic tests to measure the student's developing progress (the formative evaluation) and identify the particular problems**

each student is having.

5. The data obtained from administering the tests is then used to provide supplementary instruction to the student to help him overcome his problems. (100)

It is clear therefore that major programmes which stress instructional goals and clear objectives, programmes which might be thought of as material or subject centred, require a careful consideration of individual student characteristics to be successful.

Small Scale Studies of General Application

There are many examples of studies which have examined the implications of taking into account individual learning styles for general application within educational institutions and which have relevance to the task in hand. In particular the problems faced by low achievers in various aspects of academic life have received attention. Reference has already been made to the use of tutoring as an instructional device in regular and remedial education. An interesting perspective on a possible reason for its success is provided by Sarbin (101) who suggests that students have different requirements in respect of valuational responses to school activities. Some students may be well satisfied with marks and the prospect of more academic success to come whilst others may have little or no regard for such reward:

'The pupil's positive performances are met with the teacher's esteem response when esteem has not yet become a supplement to respect and caring as the valuational responses that reinforces conduct.'

The valuational response of respect and caring might well be seen to pertain more to junior school than to secondary in a developmental framework, but a similar view has been taken at post secondary college level by Talbot (102). Low achieving students are described as preferring the interpersonal aspect of communication rather than the relational style (relating past performance to present performance to predict future performance.) The teacher will benefit from knowledge of the student's preferred response.

An interesting and largely unexplored (except in areas of special education) aspect of individual difference is that of levels of attention span and the type of attention given by students to the task. Perhaps one of the most often used commands in the classroom is 'pay attention'. Singer (103) appeals to those involved with young people not to discourage fantasy which he describes as the 'foundation of serenity'. One of the major classroom misdemeanours is 'daydreaming'. Singer argues that a proportionate amount of 'daydreaming' might well be an essential characteristic of a well-balanced personality.

'Research indicates that children whose games are poor in make believe and fantasy are likely to have trouble recalling and integrating details of events which they hear about.'

Attention-span is a well known phenomenon in the world of advertising and popular music. It is difficult to imagine a commercial interest succeeding which requires attention-spans of 40 minutes or beyond of consistent and unvarying activity as is often the case in a classroom. Attempts have been made in the learning environment to heighten attention by manipulation of variables again in relation to deficit models of teaching. Ross (104) describes conditions in which the presentation of stimuli may be made more effective and more attention holding. Such conditions include: novelty, complexity, uncertainty, surprise, conflict and change. Sheehan & Neisser (105) describe work which demonstrate that greater recall of presented material is achieved by the use of imagery and recent work amongst college students by Bryant et al. (106) uses reminiscence as a cognitive strategy as a means to achieve 'positive effects' and greater 'well - being'.

Testing is the method by which recall of material is evaluated and testing is another area of educational activity which individual differences are seen to significant - that is - not the actual ability required to perform the test but the approach to the very process of testing and the way in which it is presented. Attempts have been made to teach test techniques and each year newspapers are full of 'helpful' advice for testtakers. Is it possible to improve the test performance of a candidate assuming that the 'material' has been mastered and memorised; is it possible to provide what Dolly et al. (107)) called 'training in testwiseness'? A good deal of effort goes into 'guessing' and predicting questions but Dolly found that the results of specific training in test-taking principles and skills did not yield significant improvements in testwiseness. The coping with tests is often seen as the responsibility of the pastoral care department of a school. Hamblin (108) states that:

> **'Relative failure in examinations may stem from destructive anxiety, a lack of study skills in certain key areas, and habitual patterns of coping which are both costly and unviable. The pastoral team will need to analyze the contributory factors.'**

Apart from addressing problems of personality in relation to examinations Hamblin suggests that the pastoral team should be on the look out for 'inappropriate study methods' and organise 'self-help' group discussion on examination techniques.

Finally in a brief overview of general provision for individual difference it is necessary to mention the physical setting and some research findings related to setting. Just as the traditional learning equation is teacher plus student equals learning, so the traditional setting for the transaction is as Sommer (109) pointed out:

> **'The rectangular room with its straight rows of chairs and wide windows intended to provide for ventilation, light, quick departure, ease of surveillance, and a host of other legitimate needs as they existed in the early 1900's'**

Sommer himself conducted studies amongst college students finding that seminar participation often correlated significantly with location in room. These findings have been shown to be common to other learning environments. Adams and Biddle (110) identified an 'action zone' in classrooms in which most interaction happened. This was defined as the centre-front pattern and this pattern emerged regardless of grade, sex or age of teacher, or of subject matter. There are clearly reasons why some students, given the choice, will locate themselves in one area of the classroom or the other, but Levinger and Gunner (111) found that alienation and 'psychological barriers' may not only reflect existing teacher pupil relationships but may actually develop as a result of students finding themselves in certain seating arrangements. In a study of college students and faculty members, Topping and Dunlap (112) found that the single most significant of the physical variables was the 'desire for light'. Krantz and Risley (113) found that learning varied significantly according to the crowdedness of the environment.

There have been many variations on the 'rectangular room' and studies to test the effectiveness of changes in the physical setting of learning. The open learning environment seems to have passed its most popular stage and studies do not seem to indicate that learning significantly increased as a result. But other differences have been noted. Harvey et al. (114) found that children in open environments exhibited freer expression of feeling, more voluntary participation, and higher independence. The amount and diversity of goal related activity increased and the novelty or answers was higher with less emphasis on rote and stereotyped answers. But experimentation with physical setting seems to have settled into the inevitable niche which radical innovation seems to eventually find and is summed up by Hetherington and Morris (115):

> **'While it is unlikely that the American Public School System will convert to the**

open classroom model, many schools already offer both types of classroom, the traditional and the open attempting to assign students and teachers to the one which seems best suited to their own needs, predispositions and abilities.'

Small Scale and Subject Specific Adaptations to Individual Differences.

There must be very few teachers who at some stage or other have not wondered whether the approach they were taking towards the teaching of a particular class was ineffective, and how best they might increase their effectiveness. Again primary education provides copious examples of subject specific strategies to try to individualise and vary the approach to learning. Mathematics has gone through many 'revolutionary' approaches often involving the introduction of additional learning material. For example Holt (116) provides a graphic and dramatic account of the effects of the introduction of Cuisinaire Rods (117) into a class of students with severe learning problems:

'Then as I watched the dark haired boy saw. Something went 'click' inside his head, and for the first time, his hand visibly shaking with excitement, he reached without trial and error for the right rod. He could hardly stuff it into the empty space. It worked. The tongue going round in the mouth, and the hand clawing away at the leg under the table doubled their pace. When the time came to turn the rods over and fill the other empty space, he was almost too excited to pick up t he rod he wanted, but he got it in. "It fits, it fits!", he said and held up the rods for all of us to see.'

Perhaps such drama is not the currency of most mundane classrooms, but certainly the elation often experienced by immediate success in more junior classes is often only reserved for the publication of exam results in the higher echelons.

Other 'material' innovations in various subjects such as S.R.A. reading schemes or Nuffield Mathematics and Science have all tended to stress the varying rates at which students learn and to cater for these individual rates. Teachers using programmes such as these found that administration and monitoring increased dramatically although often self-monitoring is an integral part of such schemes.

The use of self monitoring in individualised programmes has taken on a new significance with the rapid deployment of computers in schools.

'Slow students ' could find in a robot-like machine a private tutor, kind considerate and patient. The computer can be programmed to know individual backgrounds, levels of achievement, strengths and weaknesses, personal temperament and even tastes and hobbies. Such 'robots' already exist in classrooms..For bright students, the only limits will be their own individual talents and imagination. A student might listen to a lecture delivered at Harvard, plug into countless data bases, use computer conferencing facilities to discuss and share ideas, or converse with another student in another part of the world. In short, the chip revolution can contribute to making education a truly democratic process in which students can realise their full potential.(118)

It would appear that the argument that computers should be part of education is now conceded and that the debate is now turning not so much to - should they be there, but what should be done with them and for what kind of learning are they appropriate? Research such as that described by Zelman (119) is now becoming more prevalent. Computer Education like all other types must be adapted to suit different learning styles. Zelman found that students learning LOGO who believed

that:

'Intelligence is a stable global trait judgeable by other people, and that effort is risky because it might demonstrate low intelligence'

did not become 'incremental learners' through an 'inductive teaching method.' Canelos (120) investigated the effect of computer aided instruction on a group of college freshmen of mixed learning style. He found that when the learning was accompanied with both ' visual and verbal' feedback as opposed to just 'verbal' feedback as part of the programme then learning was significantly improved. Rowland and Stuessy (121) found that the use of computer tutorial programmes as part of computer aided instruction were more successful in gaining high achievement scores for those students exhibiting 'external locus of control, field independence and/of high discrimination skill.' Herrmann (122) experienced difficulty in incorporating word processing lessons into writing classes and concluded that:

> **'Teachers must become sensitive to the compatibility of their teaching style with the learning style of their students, and modify their techniques accordingly, providing a structure loose enough for students who benefit from autonomy, yet tight enough for those who prefer to work within explicit guidelines.'**

Mandinach (123) discovered that junior high school students who were most successful learners in the 'computer environment' were those who were cognitively flexible and who displayed the 'spontaneous use of self-regulated learning processes,' and Fischer (124), probably to no one's surprise, found that computer programming, whatever about applications, is, on the Piagetian model of cognitive development, a formal operational activity.

Research on the learning and teaching of mathematics seems to be inevitably drawn towards a discussion of gender differences, as indeed do studies of language and literacy. However in addition to sex or perceived sex rôle as predictors of ability in mathematics, studies such as those of Van Blerkom (125) found that field dependence/independence cognitive styles correlated significantly with mathematics scores and Davey (126) reports that greater success in reading is gained by a child exhibiting a 'reflexive cognitive tempo' and that the 'impulsive tempo' child will make greater gains in reading if matched with a 'reflexive' teacher. In an interesting experiment Rozin et al. (127) found that children who were experiencing reading difficulties found that progress became possible using Chinese characters and they hypothesised that contributory factors were novelty (see above) and the 'concrete' nature of the characters as opposed to the highly abstract phonemes of English.

The hallmark of the effective teacher as we see below seems to be the ability to vary teaching skills and manage learning in a creative and constructive manner constantly taking into account the complexity of the individual student.

Classroom and School Effectiveness

The emphasis in research in the classroom and the observant participation of classroom interaction has led to the compilation of voluminous detail and intricate assessment. The work of Flanders (128) is a famous example. The investigation of classroom minutiae led to some interesting conclusions. He states that the aim of research on classroom effectiveness is to:

> **'discover relationships between teaching behaviour and measures of pupil growth'**

but

> **'...it is a little ridiculous to spend the time and energy to assess pupil growth only to conclude that the pupils in the classrooms taught by the experimental teachers**

learned more, or did not, but failed to collect data which helps to explain why the results turned out the way they did..Interaction analysis provides information about the verbal communications which occurred, and this often helps to explain the results.'

Flanders designed the Interaction Analysis Categories (F.I.A.C.) and provided detailed instructions as to the most effective method of tabulating observations. The seven observable categories included under Teacher talk are: Accepts feeling - accepting and clarifying pupil attitudes in a non-threatening manner; praises or encourages - pupils behaviour is reinforced by teacher action; accepts or uses ideas of pupils - clarifying developing or building ideas suggested by pupils; asks questions - direct teacher pupil interaction; lecturing - giving facts or the teacher's own opinions; giving directions -commands or orders with which a pupil is expected to comply; and criticising or justifying authority - classroom control with 'extreme self reference'. The two pupil categories include: Response - Teacher initiated response with limited student freedom and Initiation - Pupils expressing their own ideas and going 'beyond the existing structure'. The final category is Silence or confusion - pauses or periods when 'communication cannot be understood by the observer'.(129)

An observer of classroom interaction would enter a tabulation into one of the categories every 3 seconds so that a forty minute lesson would include 800 observations. Flanders found that in American schools 68% of lesson time was made up of teacher talk, 20% pupil talk and 12% in silence and confusion (130). These findings have been replicated extensively and of particular interest to this study Wragg (131) found that pupil talk diminished through the secondary school from 32% in the first year to 23% in senior cycle and Delamont (132) recorded a 'high' of 80% teacher talk in History and Geography classes. Teacher effectiveness and classroom climate consists of many variables and it may well be that incessant teacher talk is the preferred learning style of many students or the most effective teaching style in given circumstances. However many students clearly are uneasy with long sessions of listening and silence and it was suggested that one of the possible reasons for the success of cross-age tutoring in accommodating 'reluctant' learners to general school activity was the facility of allowing student input and initiation of conversation. Studies have shown that in one to one tutoring the tutee (student) initiated 47% of the conversation in tutorial sessions (133) Observation of 'negative, comments by Flanders (134) led to the conclusion that such comments were often generalised to the person rather than to the specific incident so that student behaviour is in fact modified towards the comments. Again it was found in tutoring that 76% of all value judgements by the tutors on the tutees were positive. (135)

Much of the research and theory presented previously has been specific to classroom practice although ramifications for general school effectiveness are fairly obvious. Classroom practice is often a microcosm of school practice. Authoritarian schools generate authoritarian classrooms. It has already been suggested that it is possible for classroom practice and climate to be different from and even at odds with general school policy and practice. Research into what constitutes an effective school rather than effective classrooms tends, quite naturally, to concentrate on the administration of the school. Also research on school effectiveness tends to stress instructional goals. Short et al.(136) conducted a study to test the relationship between the student's perception of the classroom learning environment and the teacher's perception of the instructional involvement of the school principal. Student's perceptions of favourable learning environments correlated positively with teachers perception of principal's instructional involvement, although students also perceived these teachers as 'aloof and formal'.

Stevens (137) lists the characteristics of an effective school as: high academic achievement, low rates of vandalism and absenteeism, a sense of community and a stable staff and they suggested that the following eight factors were present in effective schools: (1) schoolwide measurement and recognition of academic success (2) orderly environment, (3) emphasis on curriculum articulation,

(4) instructional support, (5) high expectations, (6) collaborative staff planning, (7) instructional leadership, and (8) parental involvement. A similar list of factors contributing to pupil achievement found within effective schools is given by Stevens (89): (1) principal expectations,(2) teacher expectations, (3) time on task, (4) classroom organisation, (5) reinforcement and feedback, (6) tutoring, (7) recitation and (8) parental involvement. The effective school is seen to derive from effective principalship which:

> **'uses status and power to set strategic goals for the school; functions as the instruction leader of the school by using instruction management strategies; uses knowledge and skills necessary for effective instruction; develops a school climate characterised by specific conditions; and exhibits an open, professional and collegial style.' (138)**

and to continue through the effective teacher who according to accrued research exhibits at least 15 characteristics:

> **'tend to be good managers, use systematic instruction techniques, have high expectations of students and themselves, believe in their own efficacy, vary teaching strategies, handle discipline through prevention, are caring, are democratic in their approach, are task oriented, are concerned with perceptual meanings rather than with facts and events, are comfortable interacting with others, have a strong grasp of subject matter, are accessible to students outside of class, and tailor teaching to student needs. (139)**

Effective schools research has also examined the strength of school influence over factors such as social deprivation. Brookover (140) asserts that whilst the influence of a schools social or racial component clearly can contribute significantly to the educational outcomes, nevertheless, 'differing characteristics of the schools themselves greatly contribute to these differences', whilst Dabney (141) suggests that within socially deprived schools teacher effectiveness can achieve results comparable to socially more amenable schools:

> **'(the teachers effectiveness)...was due to her strong leadership, high expectations, organisation and monitoring skills, ability to make students aware of lesson objectives, use of positive reinforcement, and democratic classroom practices.'**

A long term study conducted by the education department of the University of Lancaster followed the careers of over 2 000 children in 50 London junior schools and taking seven years to complete found that the quality of a school a child attended was four times as important as the child's age, sex or background in attaining academic achievement and in mathematics it was ten times more important. A conclusion was that quality of school could virtually eliminate the effects of class.(142)

It is interesting to note that Blust et al. found that schools which were effective in the areas of cognitive skills were also equally successful in non-cognitive areas whereas ineffective schools were equally ineffective in both domains.(143)

In the area of school, teacher and classroom effectiveness there is substantial agreement as to the factors which constitute the overall effectiveness of the schools. In relation to our present concerns it is especially interesting to note the almost unanimous assertion that the monitoring, encouragement and promotion of high academic standards characterise effective schools and classrooms. Equally germane to this thesis is the general agreement that effectiveness is multi-factored and whilst many factors are appended to teacher, principal or school descriptions they clearly can be attributed to the complex nature of the learning process and the individuality of students presenting themselves for education within schools.

individual differences of the learners. Much of the theory and research is generalised to all learning environments. The specific learning environment which is examined in this thesis, is, not one in which individual difference has traditionally been considered a significant variable either in the means or in the end - at least any individual difference other than, in the final analysis, general ability.

Rationale for Choice of Operational Variables and methodological procedures.

It is clear from the foregoing that the research on educational variables which may or may not affect achievement is voluminous and varied. The problem of the researcher in this area is to attempt to come to terms with the complexity and establish a working genre for the testing of variables singly or in combination and in a manner that explains the context in which they are found. Reference can now be made again to the influence of Lewin (see above) and the research which grew from his work in the area of academic achievement and influential variables especially in the combination of variables and variable interaction.

The idea of interaction of personal variables with environmental variables is to be found in models of matching, an example of which is the Aptitude Treatment Interaction. This derived from a view of experimental psychology which had been seen to have acquired two quite distinct emphases - the one which explored the effects of variables upon organisms -the experimental emphasis, and the one which explored personal characteristics and correlated these characteristics with inclinations - the correlational emphasis. Cronbach (143) discussed the dichotomy and concluded that:

> **The greatest social benefit will come from applied psychology if we can find for each individual the treatment to which he can most easily adapt. This calls for the joint application of experimental and correlational methods.**

He calls for an operational strategy which would move towards fulfilling this need (144):

> **We should design treatments, not to fit the average person, but to fit groups of persons with particular aptitude patterns. Conversely, we should seek out the aptitudes which correspond to (interact with) modifiable aspects of the treatment.**

Research, then, into the interaction of variables is both descriptive and prescriptive. Within the terminology of Aptitude Treatment interaction - the Aptitude refers to the personal characteristics - the correlational emphasis, and the treatment, the educational processes applied - the experimental emphasis.

Interaction analysis began by using established measures of personality or aptitude or intelligence and trying to establish if such variables would modify the effects of different approaches to teaching. Put another way, it is an attempt to synchronise personal and environmental variables so that there is a match (145):

> **'A match' or 'best fit' of individual to environment is viewed as expressing itself in high performance, satisfaction and little stress in the system, whereas a 'lack of fit' is viewed as resulting in decreased performance, dissatisfaction and stress in the system.'**

Criticisms of the A.T.I. model were expressed by Bracht who examined 90 studies and concluded that the results were largely insignificant.(146) Cronbach has suggested (147) that other variables may have to be accounted for in the total view of the interaction other than student aptitudes and instructional methods - that the literal A.T. may be too simplistic and that all aspects of the

may have to be accounted for in the total view of the interaction other than student aptitudes and instructional methods - that the literal A.T. may be too simplistic and that all aspects of the 'ecological' situation have to be addressed. Also Cronbach and Snow (149) argued that in his criticism Bracht only regarded as true interactions those in which experimental treatments reacted inversely with aptitudes - for example where structured instruction worked well with less able students and where non-structured instruction worked well with more able students - that is where the interaction is disordinal. Ordinal interactions where one treatment worked consistently better - for example where positive verbal feedback worked better with both less able and more able students than did written comments, were not considered authentic A.T.I.s.

A further suggestion is that better results might be achieved - following Cronbach's own suggestion that other factors need to be addressed, is that the early psychometric emphasis has limited the horizons of the research. (150)

Latterly research has indeed gathered apace in the examination of influential variable interaction and hypothetical models have been devised. Weinert and Treiber (151) in a review of available literature suggest four 'provisional generalisations regarding the 'complex pattern of relationships among independent, dependent and mediating variables.' These four assumptions include:

> **(a) Formal schooling (the formal organisation of learning and teaching processes) seems to significantly influence cognitive development, regardless of the child's age.. (b) The quantity of schooling, even when other influences are controlled, has a main effect on the results of achievement and intelligence test scores. (c) The appropriateness of teaching materials and the quality of instruction have a weak, but consistent effects on the mean achievement scores attained in the classroom.. (d) The impact of schooling is not restricted to cognitive development, but also extends to self-evaluation systems, (e.g. performance expectancies, self confidence, causal attributions of success and failure), social attitudes and emotional development.**

A model is produced in which the dependent variables of school quantity (level of attendance, length of schooling and active learning time) and quality, together with the mediating variables of student (readiness,achievement prerequisites, motives. study habits etc.) and context, feed into the what are termed the idiosyncratic and active assimilations of the context (the learning process) and produce the dependent variables of knowledge, cognitive strategies and operations and mental abilities and self evaluation.

Weinert (152) asserts that it is virtually impossible to discover instructions for teaching from psychology alone:

> **'.how and how often one should try to influence intentionally the child's development relates not only to psychological insights, but also to beliefs concerning the appropriateness of instructional treatments for developmental goals.'**

Federico (153) suggests that even the identification of variables which might be described as relatively stable aptitudes for learning and the application of appropriate treatments is a much more complex issue than it first appears. He says that producing strategies based on such analysis may well produce students who are 'instructional system dependent'. Recognition must be given to the fact that aptitudes whilst apparently having stable attributes, have dynamic characteristics which require 'transient teaching tactics:

> **'This can be accommodated by designing a dynamically adaptable instructional system in which students actively and continuously select the instructional**

treatments that are most appropriate to their idiosyncratic states.'

Snow (154) after a major review of interaction literature and in a further response to some critical reviews of the success of variable interaction research reached the following conclusions:

> **1. Aptitude-treatment interactions exist. They are ubiquitous in educational learning. 2. There are many complex combinations...pushing conventional theoretical thinking and statistical methodology to the limit. 3.No particular ATI hypothesis has been sufficiently confirmed or understood to serve as a basis for instructional practice..but the subtle and shifting complexities of educational situations make all generalisations probabilistic. 4. Measures of general ability (g) enter interactions more frequently than other indicants of aptitude..(g) can be interpreted as "ability to learn" as long as it is clear that the term refers to a complex of processes and skills and that a somewhat different mix of these constituents may be required in different learning tasks. 5.Perhaps the strongest G x T interaction involves treatments that differ in the structure and completeness of instruction. In high structure treatment the teacher or instructional materials and arrangements maintain as high level of external control..relative to low structure treatments where learners act more independently and rely more on their own structuring. 6.Special ability constructs(fluid,crystallized, verbal,spatial etc.) enter into ATI but less frequently and less consistently.. A key issue is the understanding of ability and prior knowledge as they integrate in learning processes. 7.Personality and motivational aptitudes enter a wide variety of ATI patterns. Perhaps the strongest A x T result here involves anxiety and aspects of achievement motivation. 8.Other personality variables also interact but have not been studied sufficiently to yield generalisations. No single personality variable seems to be consistently important.**

He contrasts the type of research from the ATI perspective with that of researchers who look to 'elementary information-processing components' as sources of difference in performance. The ATI perspective is that:

> **'important aptitude differences are found in the adaptive organisation and reorganisation of component processes during cognitive test and learning task performance'.(155)**

It is a distinction made at the very outset between cognitive style and learning style.

Within the last few years examples of research using the interaction model have increased and the applications are quite varied. Of particular interest are studies such as that of Lens (156) who examines the notion of motivation and future time perspective - F.T.P., which has a dynamic aspect and a cognitive aspect:

> **'The dynamic aspect is conceived of a disposition to ascribe high valence to goals even if they can only be reached in a more distant future..The cognitive component is conceived as a disposition to take into account the long term consequences of present behaviour.**

His study with Van Calster and Nuttin (157) examined whether the motivation to perform cognitively is a function of attitudes towards the future and the effect of such a performance, and the prediction was made that future attitudes would be significant when mediated by motivation to achieve. In both cases the correlations showed high achievers had strong motivation and low achievers weak motivation. Other studies by Lens (158) have examined a the effects on examination performance - highly relevant to this study. A distinction is made between academic

achievement (cumulative) and examination achievement (immediate. Using the variables need achievement and test anxiety, the indications were that optimal results were obtained by students with intermediate variable scores. Too much or too little of both variables interfered with performance.

Expectation has also been postulated as having motivational effects upon the way students approach and perform a task. d'Ydewalle (158) set up a learning task for which two types of assessment were constructed. Subjects were given a word learning task then informed that they would be assessed either by free-recall or by a recognition test. However the assessments were alternated, and subjects either received an expected mode of assessment or an unexpected mode of assessment. Significant differences were reported in assessment performances such that different expectations of the type of assessment led the subjects to process the information differently and use 'working memory' differently.

The complexity of the problem of variables within the classroom was illustrated by the work of Schneider and Helmke (159) who constructed a structural model of measures of cognitive aptitudes, classroom instructional quality and different kinds of achievement on the basis of their total data over several classrooms. They explain that across-class differences might well mask within-class differences since in a study of mathematics in fifth grade classrooms the model accounted for learning outcome in classrooms with a 'meritocratic learning climate or teacher style' but not in classrooms with a 'compensatory or remedial learning or teacher style.'

Snow has proposed two models of A.T.I. which he feels particulary applicable to a specific objective (eg.academic success) rather than a long term 'life goal' as were expressed in the curriculum documents quoted above. The one he calls the 'compensatory model':(160)

> **'A treatment that proves especially appropriate for a person deficient in some particular aptitude may be functioning as an 'artificial' aptitude. It contains the information processing functions that the learner cannot provide for himself'**

and the other is the 'preferential model' in which the student performs in different environments and expresses likes or dislikes with consequent results or outcomes, and obviously both models can be applied to the same subject.

Elshout (161) says that there is a difference between real variation of performance and the level of performance. Models which attempt to explain the latter are what he calls 'pure models of action' but:

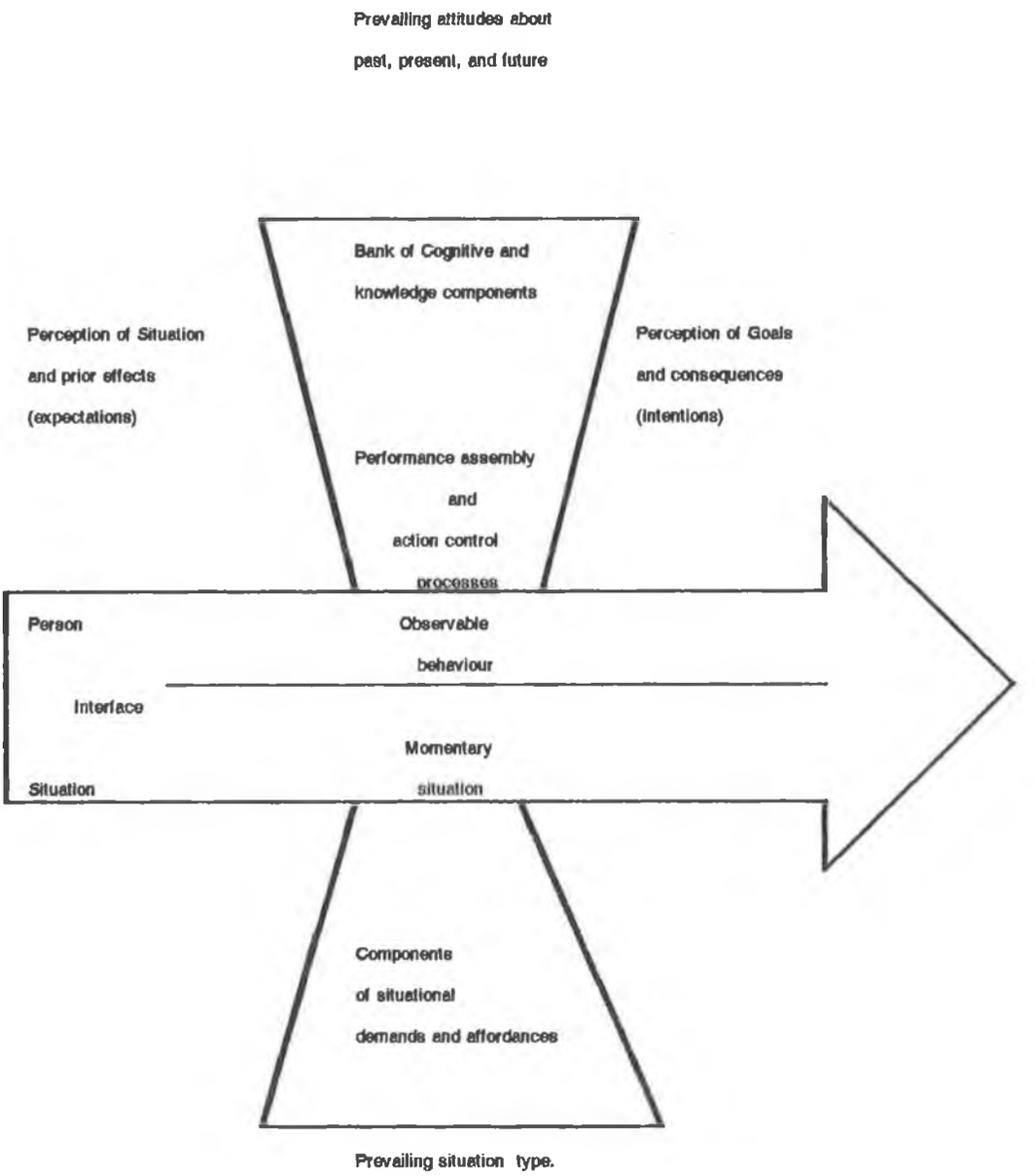
> **'most variation such as between the older and the younger, between the more experienced and the less experienced of the same age, and, within the same person, between routine and real problems will have to be treated differently'**

One such model is presented by Snow (162) and is illustrated here.(Fig 2.1) . He claims that such a model implies that:

> **The person-situation interaction not only limits the generality of any particular cognitive performance model, but may also introduce qualitative as well as quantitative moderating variables...thus aspects of personality and motivation also come into the picture, and complex aptitude processes are suggested.**

The person's cognition and cognitive organisation is surrounded by attitudes, expectations and intentions. These cognitive components of the person are fed into the interface of person and

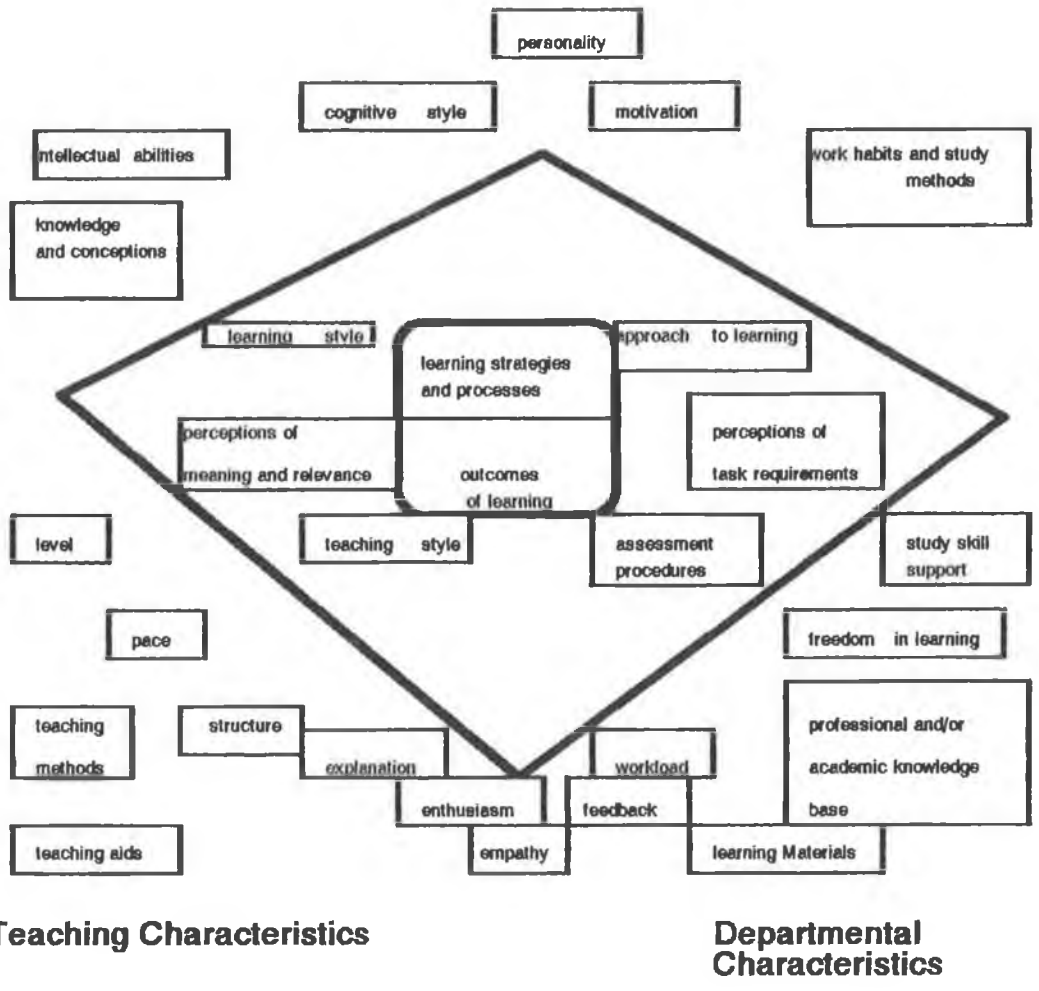
situation, the characteristics of which are modified momentariness of the situation to produce the learning outcome.



A schematic organisation of key aspects or person-situation interactions in learning from instruction (Snow)

Entwistle (163) has constructed what he calls a 'heuristic model of the teaching-learning process which he says:

'lacks detail but it indicates how future research could develop within it, following different paths and at different levels..The position of the components is intended to indicate the relative closeness of relationships within the three domains, and also to imply connections across domains. (eg. level/knowledge and conceptions; pace/intellectual abilities; structure and explanation/cognitive style; enthusiasm and empathy/personality.'



A heuristic model of the teaching-learning process (Entwistle)

The message from the interaction research is that learning environments are complex places in which complex individuals perform complex tasks. This leads to difficult research problems and

incomplete solutions. However interaction analysis, in that it clearly demands accountability of person, treatment and environment in which ability, aptitude, and situational variables are examined, seems to be appropriate for the study of the type of educational activity which is the subject of this study. It examines 'real variation of performance.'

Cronbach and Snow have suggested three possible sources for hypotheses regarding Aptitude Treatment Interaction:(164):

> **(1) derived from review of literature; (2) derived from aptitude variables of particular importance for cognitive and personality development, and (3) comparisons of controversial instructional methods.**

This is a formula which is applied to this particular study.

In order to conform to the central situational characteristic of momentariness (the interface with observable behaviour in Snow's model) it is necessary to examine in some detail the particular environment under discussion in this study to distinguish clearly the nature of the situation from other classroom environments. The level of momentariness which it is possible to describe is obviously limited to logistical constraints and research design - at best this might be said to be generalisable momentariness, which borders on the contradictory, but which nonetheless is progression beyond the 'pure model of action'. One view of academic achievement is that it is student centred. The criterion is the needs and potentiality of the student and, as such, achievement goals are modifiable and to some extent flexible. A second view of what constitutes educational achievement and one which clearly obtains within formal examination classes is that the nature of achievement is externally determined and its construction and format is beyond the control of the teacher. It is also non-modifiable from within the school. A difference is also found in the pedagogies deemed necessary to be applied to ensure the different types of achievement.The former view of educational goals clearly stimulates much more 'experimentation' in curriculum delivery and is more usually found in the earlier years of education. The latter curriculum - the examination curriculum - is one which attracts for the most part a pedagogy which is unidirectional and extremely formal.

The nature of this view of academic achievement necessarily limits the alternatives possible. The wide unquestioned usage would seem to indicate that the present pedagogy is effective, but the evidence presented here to this point certainly suggests the possibility of multi-variable interaction in most educational settings. It is a pedagogy which can best be described as instructional in the sense of an instructor interpreting and passing on units of subject material to be assimilated and reproduced by a student audience which is for the most part receptive and passive. Even more, the instructor is also the means whereby the student body can anticipate and master the final examinations. The assessment procedures are externally determined. The only significant variable is considered to be student ability with some reference occasionally being made to teacher or school effectiveness - generally how close they approach the model of unidirectional instruction within an authoritarian instructional model of educational.

If a multivariable interaction of variables is established then modification should be possible as described previously in discussions of interaction studies.

The problem, then, which is identified is that during the life time of a student from first class to Leaving Certificate Class - the impetus for educational practice shifts from student-centredness to subject centredness; from broad idealistic educational goals to increasingly narrow instructional and pragmatic goals apparently demanding a direct and uncomplicated pedagogy. Before engaging upon an empirical study of this kind it is important to establish the principles of derivation of these perceived problems and the choice of approach to them.

In a lucid account Cohen and Nagle (1) describe the intuitive process of problem perception and strategy development in research.

> **'It is a superficial view, therefore, that the truth is to be found by ''studying the facts''.It is superficial because no enquiry can get under way until and unless some difficulty is felt in a practical or theoretical situation. It is the difficulty or problem which guides our search for some order amongst the facts' (166).**

The perception of the problem is intuitive since:

> **'no rule can be given whereby men ask significant questions'**

or

> **'be sensitive to difficulties where others walk by untroubled.'**

It is not the intuition of the rabbit out of a hat variety that instigates research, constructs hypotheses or discovers relevant variables for testing.

> **'We cannot take a single step forward to any inquiry unless we begin with a suggested explanation or solution of the problem or difficulty which originated it. Such tentative explanations are suggested to us by something in the subject matter and by our previous knowledge.'**

Therefore, the previous knowledge of an educator gleaned from many years of experience in assessing the impact the many variables of a complex environment which may or may not affect his/her efficiency and the required academic outcomes leads that educator to a perception of difficulties which others may indeed pass by untroubled. Having intuitively derived the existence of the problem from previous knowledge, the subject matter (the literature) is examined and an empirical study is tentatively proposed. It may be that a similar problem has been examined in a different way. It may be that a different problem has been examined in a similar way. It is for this reason that such emphasis was placed earlier on the concept of ecological validity of educational research and later on the approach to complex interactive problems. A problem from previous knowledge (experience) may not be testable by methodologies derived in artificially contrived short term experiments.

What is it then about the pedagogy of the final years of schooling which constitutes a problem to those educators who are troubled? Put simply it may well resolve itself into Kob's teachers of students and teachers of subjects, (cf. Chapter 1: Teacher A and Teacher B). It is a pedagogy which rests on at least four assumptions, the validity of which owes much to the tradition of usage:

- First assumption: The most effective presentation of learning material to a final year student is unidirectional, formal and authoritarian. The teacher is the holder and the interpreter of the material and is the sole instructor in the most efficient manner of its reproduction within the examination framework.
- Second Assumption: The currency of the educational environment - the learning material - is clearly defined with closed boundaries The purpose of the exercise is to produce appropriate answers, not for the most part generate questions.
- Third assumption: Student ability is the most significant, if not the only significant variable correlating with the academic achievement of successful examination results.
- Fourth Assumption: the unquestioned goal is aspired to, shared and appreciated by the student body as a whole.

These assumptions lead to a pedagogy in which:

- Material is formally presented to the class of students.
- Material is formally received by the students.
- The material not the student dictates the method of presentation.
- The material and presentation is unmodified irrespective of student characteristics.

The successful outcome of the process is measured in terms of success in the final examinations and teachers and schools are considered successful or unsuccessful on the basis of such results.

In any account of academic achievement and its antecedents there is implied or enunciated a view or definition of what constitutes academic achievement. We have indicated exactly what constitutes such achievement for the purposes of this study. But any research on academic achievement will be determined by this view. For example: if an educator views such achievement as itself modifiable - that research finding might well raise questions about the set goals to be attained - then the research conclusions might well include such considerations. Conversely if the educator feels that the academic goals are non-modifiable, or beyond the range of influence to the extent that their effect is extremely influential on pedagogy, then research might be well take a more descriptive avenue - simply what kind of students are more likely to succeed or fail in academic achievement. A third kind of approach, that whilst modification of the goals might be beyond the reasonable scope of the educational practitioner, some modification of pedagogy might be possible to (a) satisfy well established and documented principles of educational theory and practice and (b) enhance for as many students as possible the academic achievement which they so patently desire. The achievement literature is of the 'active' kind and interactive literature in particular stresses various levels of modification. It seems that this third area of research is one to which requires a great deal more attention and contributions.

In the search for variables which might be tested in an interactive analysis in the environment described above, a return to the interaction literature reveals two broad categories of variables - the person and the environment, the observable behaviour and the momentary situation. The variables must also be seen to present within the interaction. This presence is manifested either in the observable behaviour of the subjects or in the organisational structure of the environment. The outcome variable is clear - academic achievement expressed in the scores obtained on examinations. In a sense this type of academic achievement is both immediate and cumulative (167) since whilst the actual examination is immediate, it's pervasive presence is felt throughout the instructional period so that other forms of assessment are seen to be 'trials', 'mocks' or 'acclimatisations'. The methodology of ascribing operational scores to the variety of examination subjects involved in the total achievement score is described in the next chapter.

This particular period in the student's career is generally perceived to be influenced by certain pervasive personal variables, and interaction research seems to confirm these perceptions. We have seen the prominence and the significance of general ability in numerous studies in the cohort of interaction variables with academic achievement. There is no doubt that it is considered significant by the majority of those educators involved with senior students and this belief is often the engine which drives the teaching methodology. There will be no attempt to distinguish different types of general ability. This is not considered necessary in this particular study since the range of strategies needed to master the range of subject examinations is comprehensive. Both Need Achievement and Attitude to Education (168) have been shown to interact with achievement scores amongst high school students. The long term goal of a final public examination seems to

require a long term commitment and ' perceived instrumentality of such a performance '. Motivation theorists have suggested various types of achievement motivation. Ausubel et al.(169) distinguished task oriented and ego-enhancing motivation the latter type referring to the desire for self-esteem. Success in examination classes might well enhance self-esteem which increases motivation in a circular direction and since Coopersmith (170) found that self-appraisal and self-esteem were significantly related to academic achievement, the variable self-esteem was added to the personal cohort of variables to be tested. A group of personal variables has been constructed therefore containing General Ability, Need Achievement, Attitude to Education and Self-Esteem.

Since the teacher as the mentor, continuous assessor, adjudicator and predictor with the educational environment is such an influence, the effect of the teacher could have some bearing on the level of self-esteem. Also much interaction literature has focused on the distinction between field-dependent and field-independent subjects (171). A measure of teacher compatibility was therefore considered appropriate to measure classroom attitudes and a measure of school compatibility to measure broader attitudes. These constructs form part of what is described in Snow's model as: Components of Situational demands and affordances. The measures are of Teacher Preference and School Alienation.

Finally two variables were examined which have provided perhaps the most persuasive findings to date from the interaction literature and which might be said to belong in part both to the situational and the personal domain. Many experiments described above have examined the classroom structure -high or low, custodial or laissez faire, etc. etc. and have apparently without exception found significant correlations with academic achievement. The structured approach to instruction as outlined above obtains in the environment under examination. A measure of Dogmatism adapted for school use was used to test the structural preferences of the subjects. The non-structured student is characterised as preferring a 'heuristic cognitive processing' (172) and a measure of student curiosity was used to gather data. A separate measure was used for curiosity since, whilst curiosity correlates positively with creativity and negatively with dogmatism (see next chapter), it seems that whilst dogmatism as a situational construct in the classroom refers to a preference for an instructional strategy, curiosity refers to an aptitude for knowledge gathering - a cognitive aptitude. It is conceivable in this sense that a student may be curious yet prefer 'momentarily' a dogmatic instructional strategy under the modifying influence of achievement motivation for examination success.

The main purpose of this work is to test for significance the interaction of the eight variables with academic achievement. The research is designed as student-centred study. However, whilst the presence of the second element in the three element classroom equation - the teacher, is accounted for from such a perspective, it was decided to examine teacher variables also from a teacher perspective but with the narrow aim of testing for the presence of a possible match or mismatch of student teacher variables since this is clearly an element in the total concept of learning style (173). As such this may well add some additional pertinent data to the main thrust.Three teacher variables were chosen which would provide data on possible match/mismatch with students: Teacher Dogmatism, Teacher Flexibility and Teacher Role Definition.

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PART II EMPIRICAL RESEARCH

3. METHOD

The aim of the experimental section of the thesis is twofold: (1) to examine the significance of selected variables identified as constituents of learning style influencing learning outcomes as measured by performance on the leaving certificate examinations and (2) given the results of part one, to predict such learning outcomes on the basis of these variables.

Statement of Hypothesis

Many variables operate during the teaching/learning process in educational institutions. Some of these variables are under the direct mediation of these institutions. This experiment will test the hypothesis that such variables are highly significant in the level of academic achievement attained by students, and are at least as significant as intelligence/general ability which is often considered to be the dominant or only significant variable in such achievement.

Specifically it is proposed to examine the hypothesis that the variables of need achievement, attitudes to education, dogmatism, teacher style preference, academic self-esteem, level of curiosity and alienation from school, correlate significantly with academic achievement at post primary school as measured by performance in the leaving certificate examinations.

Methodology

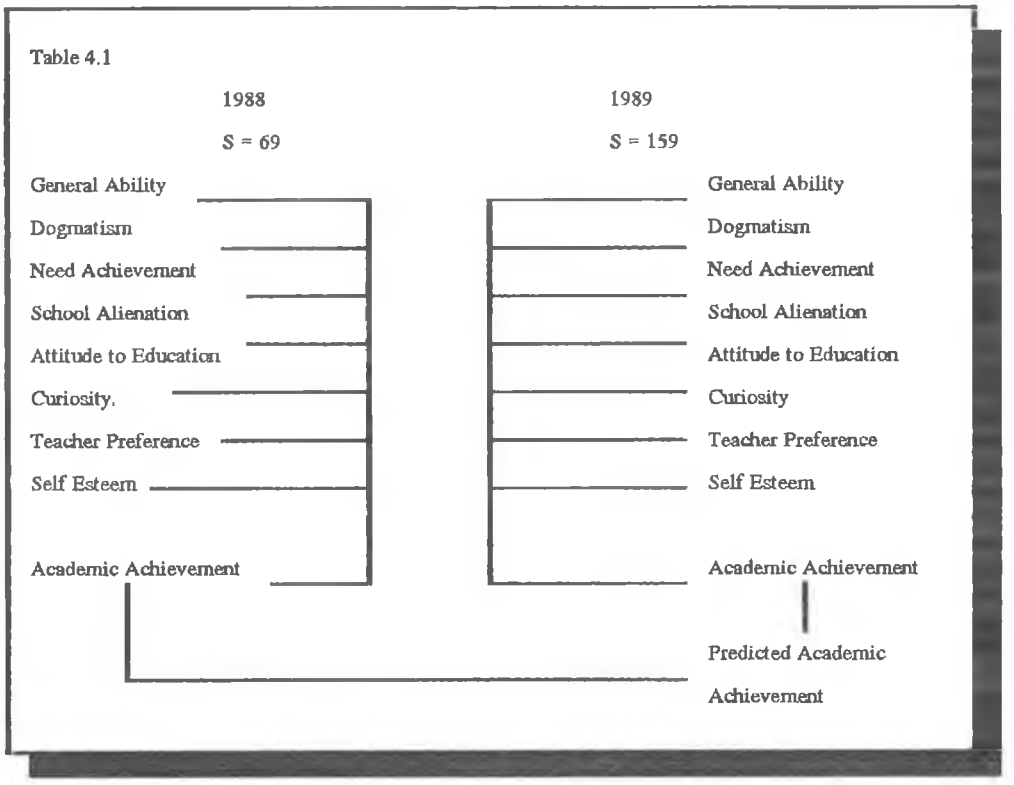
The experiment was conducted over a period of three years. The subjects of the experiment were students in senior cycle in two mixed community colleges under the control of a vocational education committee, and a boy's diocesan secondary school. The students were administered a questionnaire containing seven subsections each reflecting a school mediated variable. Subjects scores on a test of general ability and on the leaving certificate examinations were correlated with the results of the questionnaire.

In the first year 64 students were given the questionnaire and in the second year 115, and in the third year 73. The questionnaire consisted of seven subsections each concerning a school mediated variable. The seven variables were: dogmatism, school alienation, attitude to education, self-esteem, curiosity, need achievement and teacher preference. A score for each subject was also obtained on general ability administered on entry to second level. Finally the scores for each subject at leaving certificate examination were obtained and were converted into 'points'. The system of conversion to points of leaving certificate examination scores is detailed below in the section 'Operational Definition of Variables'. Correlations were made of all scores obtained by variable, by year and by sex. Attempts were then made to predict the 'points' score of subjects in years two and in year three and to compare for statistical significance any difference between predicted scores and actual scores. Sample items from each questionnaire are given in the section ''data instruments'' in this chapter. The method employed in the thesis is outlined graphically in Table 4.1.

In addition the use of partial correlation (1) was made in all subject groups to control for the influence of general ability.The composite score for the three years combined was similarly analyzed.

Each variable is correlated with academic achievement in the 1988 group. On the basis of scores obtained with the 1989 group a predicted academic achievement is obtained for this group. The predicted achievement is then tested for significant difference with the actual academic achievement of the 1989 group. Provision is also made to correlate scores of males and females in both groups.

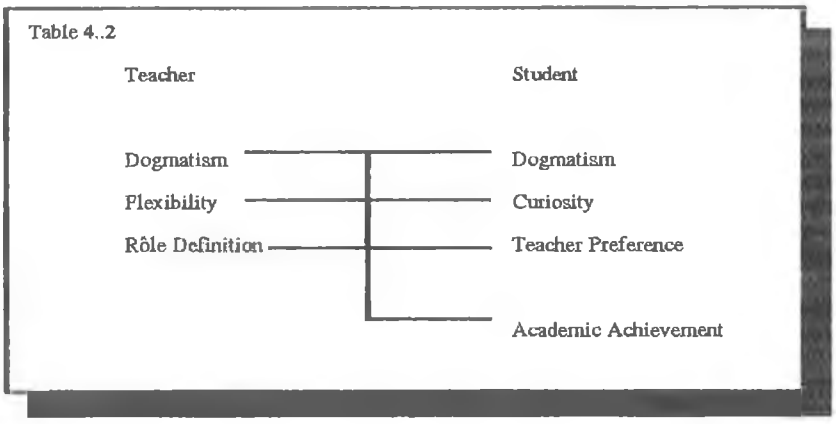
Table 4.1



Since this study is primarily an examination of those variables which pertain to the student, a rigorous study of the rôle of the teacher per se was not considered to be part of the remit. However some consideration has been given to the matching of teacher and learner and some teacher variables have been examined. It has already been noted that the variables operating within the educational process are varied and legion and no study could possibly hope to address them all. Large scale studies have been instigated using a quite different methodology to that of rigorous statistical analysis to study all aspects of large institutions, notably participant observation using the ethnomethodological framework. This study whilst addressing student variables which are possibly significant in the learning process and capable of modification, fully recognises the existence of other variables which may well be significant. It is possible that none of the chosen variables will be significant, a prospect which in itself would raise intriguing implications.

A study of teacher variables, for example, would be a study in itself. To select some variables is not to deny the presence of others; it is simply to conform to the aims of the study of emphasis on the one element within the tripartite process -student. However, even given these parameters, it is of some interest to address one particular aspect of teacher activity since this has already been mentioned in relation to the individualisation of instruction - that is the matching of teaching and learning styles. An identification of some particular teacher characteristics commonly used in the matching exercise could well be of relevance in the construction of a theory of instruction and education.. With this end in view teachers who are involved in leaving certificate courses were

invited to complete a questionnaire seeking information on Dogmatism, Teacher flexibility, and Rôle Identification. The specific rationale for each variable is explained below.



Operational definitions of variables

The following variables were measured in each of the student subject groups: general abilities, dogmatism, need achievement, school alienation, attitudes to education, curiosity, self esteem and teacher preference. Academic achievement was then assessed on the basis of performance at public examination (Leaving Certificate). The teacher variables measured were: dogmatism, rôle flexibility and rôle definition.

General Abilities.

The A.H.2. test of general abilities is a widely used instrument given to students on entry to second level school. Its main purpose is to enable school administration to stream students on entry and this can be achieved quite simply by reference to the composite raw score of the three subsections. For the purposes of this study a standardised age specific score (mean=100) was used. The authors explain that their test is one of "general reasoning"(1). It is not within the scope of the thesis to enter into the intelligence controversy, and it may well be debatable whether or not "general ability" is synonymous with "intelligence", but bearing in mind Gillham's(2) observation that:

> **"in the late seventies few psychologists gave an intelligence test without a sense of unease, without a note of apology (or defensiveness) as if engaging in some shameful act"**

some qualification must be attempted as to the precise use of the test in this context. Most users of the instrument in a school setting would expect it to predict with some degree of accuracy the future academic performance of the student or at least give some indication of academic potential. It is doubtful whether the administrators of the test in general agree either with Garcia (3) that: ' they are engaged in a: social conspiracy to label particular groups inferior and to propagate the status quo'

or in Hernnstein's words (4):

> **deeply important predictions about school, occupation, income..the predictions are not perfect, for other factors always enter in, but no other single factor matters as much in so many spheres of life.**

but there is no doubt that many teachers feel that each child has a certain ability, whether endowed by nature or nurture, in his particular subject and that this ability conspires with amount of effort, teacher effectiveness and possibly other variables to produce academic results. Furthermore there is a general feeling that whatever the shortcomings of such tests, they do measure an aptitude for the type of activity necessary to perform adequately in the school setting and, even if this aptitude can be expressed no more elegantly than the ability to conform to the demands which educational structures themselves create, have predictive value. In correlation studies of another of Heim's tests. the A.H.5., correlations were found from a low of 0.24 amongst graduate students of education in tests of education theory to highs of 0.43 and 0.54 amongst G.C.E. grammar school students, and air force cadets in attainment in aviation science and engineering(4).

In a discussion of the comparatively low correlations of predictive tests on entry to school with later academic achievement, Webberley et al.. point out that:

> **"such correlations are as high as could be expected given that good examination performance depends upon do many other factors than ability, such as industry, health and teaching efficiency."**

It is precisely the influence of "other factors" that thesis seeks to investigate and measure.

Leaving Certificate Examination.

The leaving certificate examination is the highest level of academic achievement available within the second level system, and as such, success in this examination represents the main academic aspirations of second level students. For the purposes of this study, levels of achievement in each subject examination were awarded a score similar to the "points" awarded to students on the basis of these results by third level institutions for entry requirements. Credit was given for all passes , whether at higher level or ordinary level. Third level institutions usually give no "points" for grades scoring less than a "B" at the ordinary level although all passes may qualify for matriculation. The allocation of points in this study is detailed in table 4.3

Table 4.3

Points awarded for leaving certificate examination results.

HIGHER LEVEL	ORDINARY LEVEL	POINTS
A		6
B		5
C	A	4
D	B	3
E	C	2
F	D	1

No extra credit was given for success in the "prestige" subjects such as mathematics. All passes were given credit plus the E and F at the higher level. Most third level institutions recognise a limited number of passes for entry credit, eg. the "best six results" obtained.

Again, no less than in the matter of general ability, methods of assessment such as public examinations must be approached with considerable temerity. In that they provide a yardstick beyond the control of classroom teachers by which student achievement can be measured, they are generally accorded the accolade "there isn't anything better" by both educators and non-educators alike. For the purposes of this thesis observations will be restricted to the caveat against any undue claims vis a vis academic achievement as reflecting anything other than competence in the defined curriculum and the defined assessment procedures.

The results of each subject then, are noted, scored according to Table C and correlated with the other variables constituting the parts of the experiment. The scores of year one subjects were used to predict the scores of year two subjects and the scores of year one and year two subjects used to predict the scores of year three subjects. The predicted and actual scores were compared and tested for significant difference.

Dogmatism

Much of the present work on dogmatism derives from the research of Rokeach (5). He uses the term 'closed-minded' as interchangeable with the term 'high-dogmatic', and identifies open-minded subjects as having:

> **'the capacity to distinguish information from the source of information and to evaluate each on its own merits.'**

Rokeach aimed to identify a cognitive style which would be independent of the content of thought; characteristics of thought which for example, would be applicable to any 'extreme' opinion. Much of his work related to class, elitism, and authoritarian belief systems, but the studies also have special relevance to the operation of education institutions, whether it be in the day to day running, in the ordering of the curriculum or in the enunciation of a school regime and ethos. There is interest in the performance of high dogmatic students in a low dogmatic environment and vice versa, and in the interaction of teacher/pupil relationships from the perspective of studies in dogmatism. Hunt and Miller (7) for example, found that high dogmatic subjects had less tolerance for inconsistencies than low dogmatics. and Smith (8) found that high dogmatics were more likely to be conversant with arguments contradictory to their own beliefs than were low dogmatics. Taylor and Duneete (9) showed that decisions made by high dogmatic students were more confident, faster and more accurate, and Robbins (10) suggested that low dogmatic subjects used more information before making a judgement, but were less able to organise new beliefs and integrate them into their existing belief systems in the problem solving process. This would seem to have particular implications for the ability of students to successfully attempt 'open-ended' or 'closed' questions - the difference between assessment in non-controversial mathematical problems and open-ended project work in the humanities.

Mention is often made of the 'ethos' of a school. This could well refer to the level of direct or indirect intervention in the matter of law and order, general day to day running or methods of instruction by the school authorities, or to the level of participation by all members of the school in such policy matters. The scale of dogmatism will be correlated with other variables and with the

performance of students in particular subjects to ascertain if high levels of dogmatism are significantly linked to performance in specific subjects. Whilst dogmatism is an attribute of personality. albeit environmentally mediated, the level of dogmatism manifested by policy directors within the school will create a climate in which students exhibiting similar dogmatic tendencies could be expected to flourish.

Self-Esteem

Coopersmith (11) defined self-esteem as:

> **'a personal judgement of worthiness that is expressed in the attitudes an individual holds towards himself. It is a subjective experience which the individual conveys to others by verbal reports and other expressive behaviour.'**

Much of Coopersmith's work relates to the influence of parents on the self-esteem of their children, and the reports of the effects of high\low esteem mothers and fathers, but relevant to educational practice are findings that (12): '(high esteem subjects) present their ideas in a full and forthright fashion; lack of self-preoccupation permits them to consider and examine external issues'

whereas:

> **'This greater awareness of themselves (low self-esteem subjects) distracts them from attending to other persons and issues, and is likely to result in a morbid preoccupation with their difficulties.'**

Students bring with them on entry to school attributes of high or low self esteem, but the school may well be influential in either reinforcing or mediating already existing levels. This mediation is either direct in the form of interpersonal contacts between staff and student or student and student, or indirect in the form of generalised verbal or written comments on behaviour or work. Alternative learning strategies employed with younger students in which individualised or small group tuition is presented in informal environments are often designed to 'increase the confidence' of students in their own ability. Students who have low self confidence at senior cycle level may resort to 'grinds'.

If Coopersmith's observations that levels of self-esteem relate to levels of distractibility are correct, then it should follow that increased self-esteem in academic tasks will lead to increased academic achievement.

Need achievement

The early influential work on need achievement (n'ACH) was begun by McClelland (13) and developed in collaboration with others (14). A distinction is made between the positive motivation to achieve success and the negative motivation to avoid failure. Two extreme types were identified those with high and low n'ACH. A person with high n'ACH is one whose motivation to succeed heavily outweighs their motivation to avoid failure. Major findings of the research include the different behaviours of the two types in 'achievement related contexts'. High n'ACH types are more realistic in choosing manageable tasks and persisting longer in those tasks, whilst readily

changing from tasks regarded as too difficult. Low n'ACH subjects tend to choose tasks which are too easy or too difficult and to persist longer in tasks which are obviously beyond them. They seem to lack realism in both choice of task and in application. Paradoxically low n'ACH subjects seemed to be attracted by predictability either of success in very easy tasks or of failure in very difficult tasks. Ausubel et al. (15) noted that motivation towards academic achievement has as one of its constituents task orientation in addition to ego-enhancement and social approval. Task orientation related more closely to n'ACH and an interesting aspect of high task orientation is its reference to future goals as opposed to immediate gratification. The implication of a student studying for examinations in the future which in turn promote longer term prospects is obvious.

As is the case with self-esteem, it seems fairly clear that students carry with them into the school environment previously acquired levels of need achievement, but equally the school procedures create new elements of n'ACH or reinforce existing trends. If it is shown that low n'ACH students fare less well in academic achievement and that schools are in a position to mediate the levels of n'ACH within their students, then it would seem desirable that such mediation should take place in the interests of good educational practice. In this respect an interesting dilemma arises between the concepts of intrinsic and extrinsic motivation. Lepper,Greene and Nisbet (16) discovered that young children who were ' unrewarded' (by 'stars', 'ribbons' etc.) persisted significantly longer with their activity than did those children who were rewarded - the implication being that an activity which is seen solely as a means to an end is not sufficiently rewarding in itself. If n'ACH correlates significantly with academic achievement, does this imply an even greater emphasis on extrinsic motivation -the reward - in the interests of such achievement and even less emphasis on the content - learning for its own sake?

Curiosity

It would seem probable that given the curriculum directives, examination preparation and logistics of classroom organisation, not all senior cycle students approach their learning tasks in the same way nor are they equally comfortable in the senior cycle environment. Whilst there may be some scope for the 'creative' answer in say essay writing or artistic composition, senior cycle learning tasks are perceived to be specific, well defined, and designed to supply answer rather than generate questions. Guildford (17) suggested a set of traits which combine to make up 'creativity' amongst which he included word fluency, associational fluency, expressional fluency and ideational fluency. Two traits of particular interest to this study and having relevance to the curiosity measure are 'spontaneous flexibility' defined as the 'ability to produce a great variety of ideas with freedom from inertia or perseveration' and ' adaptive flexibility' in which ' a problem is solved which requires a most unusual type of solution and for which conventional solutions will not work'.

This approach to 'creative' problem solving moves away from the traditional notion of the 'creative' type being necessarily musical or artistic embracing as it does all kinds of intellectual activity. The relationship of 'creativity' to 'intelligence' is also of relevance to this thesis. In a famous study Getzels and Jackson (18) demonstrated some correlation between creativity and intelligence up to a certain level and Torrance (19) confirmed an absence of correlation beyond I.Q. 120. Significantly he also found that teachers rate high I.Q. students as better students than high creativity students, the latter often being described as 'unruly' and 'less friendly'. Clear preference was given by teachers to high I.Q. over high creativity. A measure of curiosity has been used in this instance since measures of creativity,as such, tend to be highly individual and technically laborious to administer. The term 'curiosity' encompasses a significant number of

creative traits and, as was pointed out previously, curiosity measures correlate well with individual tests of creativity and are amenable to group administration.

School alienation

A student may be alienated from schools or schooling in general, or from a specific school.Reasons for such alienation may be many and varied. The measure used in this study relates to alienation from a particular school. Transfers from one school to another are relatively common occurrences and this often produces changes in student behaviour, either positively or negatively, towards learning. The generation of alienation within a student by school practice is a well documented field as the existence of many 'pupil friendly' schools. Alienation may derive from a general feeling of not belonging to a school or from interpersonal conflict with teachers or peers. Seaman (20) distinguished five aspects of alienation -powerlessness, meaninglessness, normlessness, isolation and social estrangement. The alienated student, according to Seaman, feels unable to influence proceedings within the school, and sees little of no relevance in what is happening. This student will conform where appropriate, but will not hesitate to break the rules when there is little chance of being caught. The account of the 'hidden curriculum by Jackson (21) illustrates the student's attempts to conform with the aim of satisfying day to day pressures. A major factor in the alienation of student is the labelling of that student as 'deviant' by authority figures within the school. That is, the student fails to conform either overtly through success in the regular curriculum or covertly through guile in the 'hidden curriculum'.

An alienated student may continue within the school for the length of time school authorities feel they can practice satisfactory containment, or until the student feels that the futility of attending outweighs the social pressure or academic advantage of staying. Behaviour which is considered deviant in one establishment may well be considered quite acceptable in another. As Erikson (22) points out:

> **'Deviance is not a property inherent in certain forms of behaviour; it is a property conferred upon these forms by audiences which directly or indirectly witness them.'**

Teacher preference

The students view of what constitutes a good teacher or of an amenable learning environment could well be, according to Gordon (23), a result of their orientation to, or acceptance of highly bureaucratic structures. He says that students eager to comply with the direction of teachers prefer a formal, traditional school, whereas those who rest uneasily amongst conforming bureaucratization prefer the informal permissive environment. This difference in student preference lies at the heart of traditional cognitive style theory and is often the only attribute discussed in relation to the theory. As we have already noted at length this paper attempts to broaden the parameters of the theory by including other variables as necessary components of learning style. The teacher preference variable is the one most easily identifiable with classroom practice and pupil/teacher interaction.

Attempts to match teaching and learning styles represent applications of the theory of field

dependence/independence which is more to do, according to Witkin (25) with 'deep cognitive structures influencing perception, intellectual domain and personality trait. It may well be within the school's ambit or power to mediate such cognitive constructs, but other far more accessible variables, may also be at work in composing pupil's learning style. Teacher preference is one manifestation of such cognitive tendencies in that the teacher's technique may be in harmony or at odds with the student's learning style.

Attitudes to Education

A major report of the 1960's in the United Kingdom, the Newsom report (26) which was to consider 'the education between the ages of 13 and 16 of pupils of average and below average ability' begins with the famous quote of an ex-student:

> **'A boy who had just left school was asked by a former headmaster what he thought of the new buildings.''It could all be marble'' he replied, ''but it would still be bloody school''.'**

A great deal of attention has already been given to the idea of cultural difference and the alienation of many students from the prevailing culture of the school. Many students are culturally 'at home' in school; many schools accurately reflect the cultural background of these students and actively discourage those students deemed to have culturally incompatible backgrounds. In the 1950's Jackson and Marsden (27) were concluding their influential study of education and the working class in the following terms:

> **'The education system we need is one which accepts and develops the best qualities of working class living and bring these to meet our central culture. Such a system must partly be grown out of common living and not superimposed on it.'**

The lack of a sense of accommodation in an alien culture is not the only source of negative attitudes towards education.In an increasingly utilitarian society, education is seen by many as having little or no function in securing gainful employment. This facility is in such short supply that even if academic achievement other than that of the very highest attainment opened employment opportunities, its scarcity renders education useless to the many who see no other purpose in education. The idea of education as an end in itself is probably no longer one which holds students attention the way it formerly did.It

Teacher characteristics

A cohort of three measures was presented to teachers involved in the education of the student subjects. 23 completed responses were obtained. In presenting teachers with this battery of questionnaires the aim was to investigate the correlation of teacher variables and similar student variables to ascertain if there was a significant match or mismatch of teaching/learning styles. It will also be possible to examine the academic achievement of matched and mismatched students.

(1) Dogmatism:

Dogmatism has been identified as a variable which contributes to the organisation of learning (28) and as such is a constituent in the array of variables making up the learning strategy of an individual. The dogmatism scale administered to teachers is the original scale developed by Rokeach (29), an adaptation of which was included in the battery of scales administered to the students.

(2) Teacher flexibility:

The literature has indicated that rigidity and dogmatism are related, and like dogmatism, rigidity, the opposite of flexibility, presages attitudinal preferences in relation to the prevailing school environment and curriculum organisation. The measure employed here identifies those teachers who are susceptible to innovation and change and those who adhere rigidly to a well defined set of unchanging educational values.

(3) Teacher role definition:

The perception of a teaching role is an essential ingredient in the construction of teacher attitudes towards the student, the class, the school and education in general. Perceptions (30) of teaching rôles can be so different one from another that it is stretching the concept 'profession' to suggest that all teaching rôles might be classified as belonging to the one profession - the teaching profession. The teacher rôle definition instrument will establish perceived rôle priorities amongst the teachers and the results will be correlated with the student view of teacher rôle and student school alienation.

Mention has already been made of differences in approach to learning tasks, and such differences are examined in the teacher measures as will teacher differences in organisational preference. Rokeach (31) observed that:

> **'most research on cognitive activity has ignored the miniature social system in which it is necessarily taking place, as if to say that thinking is a purely private affair, a purely intrapsychic process. It is hoped that by pointing to the social situations within which thinking takes place, we will become more sensitised to them so that future research on the cognitive process will give them greater due.'**

Subsequent research has indeed moved towards greater sensitisation, notably in the work of such educationists as Bronfenbrenner (32):

> **'Whether and how people learn in educational settings is a function of sets of forces or systems at two levels -(a) the relations between the characteristics of the learner and his or her surroundings in each of the principle environments in which he lives and (b) the relations and interconnections that exist between these environments. The scientific study of both sets of relations as they affect learning constitute the ecology of education and represent a necessary and major focus for educational research.'**

Even learning theories which owe much to behaviourism and are narrowly instructional in outlook such as those of Gagné recognise that more factors than simply student aptitude impinge on the process:

> **'As the manager of instruction, it is the teacher's job to plan, design, select, and improvise the arrangement of these external events with the aim of activating the necessary learning processes.'(33)**

DATA INSTRUMENTS

An outline is given of each data instrument with information on usage, validation and reliability. Sample items are given for each measure. A full list of all items in each measure is given in the appendix.

(1) A quick measure of achievement motivation

This is a ten item measure by Smith (34) of need achievement, usually abbreviated to nACH. A reliability of 0.56 (split-half, odd-even) is recorded.

INSTRUCTIONS: Read each of the following statements. If you think that it is true, underline TRUE. If you think that it is false, underline FALSE. Please do not miss out any statements. Even though it may be difficult, you must decide one way or another.

(1) I don't think I'm a good trier.

TRUE FALSE

(2) I would sooner admire a winner than win myself.

TRUE FALSE

High Scores indicate high achievement motivation.

(2) A measure of curiosity

An investigation into the curiosity of children resulted in this measure developed by Maw and Maw (35). Mention has already been made of correlation studies of curiosity and creativity and Maw and Maw found that high curiosity students selected those proverbs which implied taking a risk or moving away from the status quo significantly more frequently than low curiosity students.

INSTRUCTIONS: Which saying do you believe? All of you know what proverbs are. Many people use them. If you read proverbs you find some that say things which are opposite to what others say. Below pairs of proverbs are listed. Please mark the one of the pair which you think is true for most of the time.

(1) ____ Look before you leap.

____ Who stands still in the mud sticks in it.

(2) ____ It is better to be safe than sorry.

____ Nothing venture, nothing have.

High Scores indicate high Curiosity level.

(3) The Figart Version of the Rokeach Dogmatism Scale

This is a development of the Rokeach Dogmatism Scale (see below) by Figart (36) for use in schools. A split half reliability of .674 is reported. Cohen and Harris (37) used this scale in a correlation study of dogmatism, conservatism, conformity and neurotic anxiety, finding significant correlations. It is a 50 item scale.

INSTRUCTIONS: If you find the statement says what you think is true all of the time, put a circle

around the plus (+) sign next to the statement. If you find that the statement does not say what is true put a circle around the minus sign (-) next to the statement. If you find that the statement says what is so some of the time and what is not so some of the time, put a circle around the zero (0) next tot he statement.

1. Some people are for what is true, all the rest are always against what is true.

+ 0 -

2. We must believe what important people say. If we do not, we will not know what is going on the in the world.

+ 0 -

High scores indicate a high level of Dogmatism

(4) Self Esteem inventory

This is the short form of the self-esteem inventory developed by Coopersmith (38) which has been used extensively subsequently. The short form consists of 25 items and the test/retest reliability is reported at .70 over a period of three years.

INSTRUCTIONS: Put a tick in the box LIKE ME if the statement describes how you usually feel. Put a tick in the box UNLIKE ME if the statement does not describe how you usually feel.

LIKE ME UNLIKE ME

(1) I often wish I was someone else.

(2) I find it very hard to talk in front of the class.

High Scores indicate a high level of Self-Esteem

(5) Active/passive inventory of preferred teacher behaviour.

This inventory is a development of Gordon's (39) School Environment Preference Schedule by Cohen (40) for use with senior school students. It is a 17 item survey with a choice of 5 responses for each item. A retest reliability of .840 is reported.

INSTRUCTIONS: Please circle the number which best indicates your preferences.

1 strongly agree; 2 agree; 3 uncertain; 4 disagree; 5 strongly disagree.

(1) I prefer teachers who make attendance at their classes compulsory.

1 2 3 4 5

(2) Class discussion usually helps me to understand concepts used by the teacher.

1 2 3 4 5

High Scores indicate a preference for a more informal, less structured teaching environment.

(6) School opinion questionnaire

This 7 item measure by Cohen (41) was derived from Burbach's (42) original measure. In widespread applications in English secondary schools correlations of .79 were reported with the remaining items of the longer measure. A choice of 5 responses is offered for each item.

INSTRUCTIONS: Below are some statements about your school with which some students would agree and some disagree. Please put a circle around the number which indicates your opinion about your school.

1 strongly agree; 2 agree; 3 uncertain; 4 disagree; 5 strongly disagree.

(1) I can't make much sense out of what happens at this school.

1 2 3 4 5

(2) I feel I really am part of this school community.

1 2 3 4 5

A high score indicates school compatibility, a low score school alienation.

(7) The Education Scale.

This is a 22 item scale developed by Rundquist and Slatto (43), and whilst it is quite old it has been well used and the items are not dated. The reliability has been tested by both split half(.83) and test/retest (.65) measures. Each item offers a choice of five responses.

INSTRUCTIONS: Read each item carefully then circle quickly the number belonging to the phrase which best expresses your feeling about the statement.

1 strongly agree; 2 agree; 3 uncertain; 4 disagree; 5 strongly disagree.

(1) A person can learn more by working for four years than by going to secondary school.

1 2 3 4 5

(2) The more education a person has, the more they are able to enjoy life.

1 2 3 4 5

A low scores indicates a positive view of education.

(8) The A.H.2. test of general abilities.

This is a test designed by Heim,Watts and Simmonds (44) which is made up of three parts - verbal, numerical and perceptual. Re-test and split level scores of reliability of over .80 are reported. Significant correlations are also reported with other tests of general ability such as Raven's progressive matrices and the W.I.S.C.

SAMPLE ITEMS: Each section consists of forty items which produce a raw score convertible to a standardised score.

Verbal: Which of the six lower words means the same as or the opposite to the top word:

large

overfed wise rich small castle light

1 2 3 4 5 6

Numerical: 4 is to 12 as 3 is to

5 4 8 7 10 9

A B C D E F

Perceptual: This section contains examples of the traditional nonverbal sequential pattern items.

(9) Teacher attitude to innovation and change

This scale, originally developed by Trumbo (45) and adapted by Georgiades (46), was designed to test the hypothesis that resistance to change and innovation would correlate with rigidity of thinking. (see above).

It is an eight item measure.

PLEASE CIRCLE ONE RESPONSE FOR EACH ITEM AS FOLLOWS:

1 strongly agree; 2 moderately agree; 3 slightly agree; 4 slightly disagree; 5 moderately disagree; 6 strongly disagree.

(1) If I could do as I please, I would change the kind of work I do every few months.

1 2 3 4 5 6

(2) One can never feel at ease in a job where the ways of doing things are always changing.

1 2 3 4 5 6

High score indicates flexibility and receptivity to change.

(10) Teacher role definition instrument

Cohen(47) developed this instrument to examine three aspects of teacher role: director of learning, member of a profession and liaison between school and community. It was used in a correlation study of the views of college students and head teachers on the nature of teacher's work and duties. INSTRUCTIONS: You are invited to circle the appropriate number after each item to indicate how strongly you feel each teacher should or should not do the following things.

1 absolutely must; 2 preferably should; 3 may or may not; 4 preferably should not; 5 absolutely must not.

(1) Help students acquire good manners and speech.

1 2 3 4 5

(2) Turn a blind eye to infringements of school rules at times.

1 2 3 4 5

Low score indicates a 'progressive' attitude, high score a 'traditional' attitude.

(11) The Rokeach Dogmatism Scale

The version used here is Form E of the famous dogmatism scale developed by Milton Rokeach. Form E is a 40 item measure. It has been repeatedly tested for reliability by test/re-test. Scores range from .71 to .91. Rokeach comments that: 'the reliabilities are quite satisfactory when we remember that the dogmatism scale contains quite a strange collection of items that cover a lot of territory and seem to be unrelated to each other.' (48)

INSTRUCTIONS: Please circle the responses as appropriate after each item.

1 I agree very much; 2 I agree on the whole; 3 I agree a little; 4 I disagree a little; 5 I disagree on the whole; 6 I disagree very much.

(1) The principles I have come to believe in are quite different to the principle believed in by most people.

1 2 3 4 5 6

(2) The highest form of government is a democracy and the highest form of democracy is a government run by those who are most intelligent.

1 2 3 4 5 6

Low score indicates high dogmatism, high score low dogmatism.

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4. RESULTS

SUMMARY OF METHODOLOGY AND RESULTS

(1) Methodology

The arrangement of the Results is as follows: a correlation matrix is given for correlates of each of the variables one with another in each of the three separate groups involved in the experiment. A composite matrix is also given for the three subject groups combined. Predicted academic achievement scores are compared statistically with actual academic achievement scores to test for significant difference. A comparison is also made of the performance of males and females in each group on the tests of general ability and in the scores of academic achievement.

Correlations are examined in the combined year groups for collinearity and multiple regression is used to identify variables which contribute insignificantly to the correlations. Maximum effect variables are identified and grouped.

Blocking is used to subdivide variables to identify the influence of factors such as high or low general ability and high or low academic ability. Analysis of Variance is used to test for significance within and between blocks.

The combined scores are examined under partial correlation to control for the variable general ability.

A correlation matrix is given for the three teacher variables examined and comparisons are made on the scores obtained on teacher variables with those obtained on related students variables. These variables are tested for normality of distribution and descriptive statistics are used to ascertain match/mismatch of teacher/student variables.

Cluster analysis is used to examine the grouping of the variables within the four quartiles of academic achievement.

Simple Linear Regression (Pearson Product Moment Correlation Coefficient r) is used for the most part but due note is taken of the limitations of correlation techniques in addition to their strengths:

'The presence of a correlation between two variables does not necessarily mean that there is a causal link between them. Even though concomitance (correlation) between events can be useful in identifying causal relationships when coupled with other methodological approaches, it is a dangerous and potentially misleading test for causation when used alone.' (1)

In each of the Correlation matrices the nine variables are compared one with another and the correlations which yield a statistically significant result are indicated by an asterisk.

Use is made of Fishers Z transformation of r 'that has an approximately normal sampling distribution irrespective of p or n.'(2). (See Appendix 1.3 for detailed statistics).

Results

(1) Correlation coefficients within the three subject years separately and within the combined subject groups.

● The highest correlation achieved in each instance was between general ability and academic achievement points.

- Curiosity correlated significantly with academic achievement points in each group.
- Dogmatism correlated negatively with academic achievement points in all groups and significantly in all but he 1989 - 90 group.
- Only self-esteem did not correlate significantly with academic achievement within the combined groups.
- Significant correlations between several variables suggested the presence of col-linearity.
- Scores obtained by male and female subjects in general ability and academic achievement Points in each of the three groups showed no significant difference.
- Predicted scores of academic achievement for the 1988 - 89 group obtained from the scores of the 1987 - 88 group differed significantly from their actual scores, but the predicted scores of the 1989 - 90 group did not differ significantly from their actual scores.

(2) Analysis of Variance of high/low factors of general ability and academic achievement

- The variable general ability correlates significantly with academic achievement within the first quartile only.
- Significant negative correlation is observed within the second and third quartiles with attitude to education.
- Dogmatism correlates negatively with academic achievement within each quartile, and significantly within the third.
- Within the four quartiles of academic points significant correlations were obtained in the first and last with general ability.
- The highest correlation was in the first quartile with school alienation and each subsequent quartile produced lower correlations.
- Teacher preference correlates significantly only within the first quartile.
- Analysis of Variance produced greatest difference between first and last quartiles in general ability, dogmatism and curiosity.
- There was no significant difference between any quartile of academic achievement points and self-esteem.

(3) Partial Correlation:

- The highest correlating variable with academic achievement points, general ability, was partialed out and variables which remained significant were: dogmatism. curiosity and school alienation.

(4) Collinearity:

- High internal correlations between variables indicate collinearity. Near-collinearity is identified with the variables Teacher Preference, School Alienation and Self-Esteem.
- Multiple regression is used to identify and eliminate variables with least effect and an optimum variables model is devised for the remaining variables.

(5) Multiple Regression

● A reduction of variables is effected and the optimum combination of fewest variables is deduced. The model of optimal variable effect consists of ability, attitude to education, dogmatism, curiosity and need achievement. school alienation, teacher preference and self esteem exhibited characteristics of near-collinearity

(6) Cluster Analysis

● Within the first and last quartiles of subject scores on academic achievement points distinct groupings are identified with different members in each group. Groupings are identified within the second and third quartiles but less distinctly. Within the first quartile the two groups consist of ability, curiosity, teacher preference and school alienation on the one hand, and need achievement, self esteem, attitude to education and dogmatism on the other; within the last quartile the first group consists of ability, teacher preference, curiosity and need achievement and the second group consists of school alienation, attitude to education, dogmatism and self esteem. The difference between groupings is greater within the last quartile. Generally well defined groups appear in the first and last quartiles, less well defined groups in the second and third quartiles.

(7) Teacher Variables:

● Teacher dogmatism correlated significantly with teacher flexibility. Significant difference was noted between the remaining teacher variables and related student variables.None of these variables achieved the significance level for normality and skewness was ascertained. In each case the skewness of the teacher variables was opposed to the skewness of the student variables.

DETAILED RESULTS AND TABLES

Table 5.1 Correlation Matrix (Negative Correlations in *Italics*)

Variable	Correlation Matrix							
	General Ability	Need Ach.	Dog	Teacher Prefer.	School Alien.	Cur	Self Esteem	Att. to Education
General Ability								
Need Achievement	0.235							
Dogmatism	*0.059*	*0.233*						
Teacher preference	0.315*	0.039	*0.139*					
School Alienation	*0.075*	*0.022*	*0.301**	0.019				
Curiosity	0.297	0.245	*0.099*	0.375*	0.099			
Self Esteem	*0.132*	0.233	*0.104*	*0.129*	0.014*	0.075		
Attitudes to Education	*0.075*	0.116	*0.224**	0.201	0.408*	0.062	0.421*	
Academic Points	0.454*	0.175	*0.338**	0.199	0.195	0.281*	0.230	0.194

*p<.05

Table 5.1 A correlation matrix comparing the correlation coefficient (r) for each of the measures of the battery of questionnaires administered to the subjects following the second year of the senior cycle course in 1987 - 1988. (Matrix format taken from Tuckman Pg 344)

Table 5.1 shows Statistically significant correlations were obtained between: (in descending levels) Academic Achievement and General Ability, Attitude to Education and Self Esteem, Attitude to Education and School Alienation, Academic achievement and Dogmatism, Curiosity and Teacher Preference ,General Ability and Teacher Preference,Self Esteem and Curiosity, Academic achievement and Curiosity and School Alienation and Dogmatism. The most significant correlation (0.454) was obtained between Academic Achievement and General Ability.

For each group the scores obtained in measures of academic achievement and general ability amongst male and female subjects were compared to establish any significant difference between scores by sex.

Table 5.2

Comparison of male and female scores in measures of general ability.

	MALE	FEMALE
N=	27	37
MEAN=	100.4074	98.83784

Analysis of Variance

Source of Variation	Sum Squares	d.f.	Mean Square
Between Groups	38.45446	1	38.45446
Within Groups	7927.545	62	127.8636
Total	7966 63		

F (variance ratio) = MS between/MS within = .3007458

p = 0.585382

Table 5.2. A comparison of the scores obtained on the measure of academic ability by male and female subjects in the senior cycle group of 1987 - 88

Table 5.3

Comparison of male and female scores in measures of Academic Achievement

	MALE	FEMALE
N=	27	37
MEAN=	12.62963	14.18919

Analysis of Variance

Source of Variation	Sum Squares	d.f.	Mean Square
Between Groups	37.98553	1	37.98553
Within Groups	3793.972	62	61.1931
Total	3831.938 63		

F (variance ratio) = MS between/MS within = .6204218

p = 0.433888

Table 5.3. A comparison of the scores obtained on the measure of academic achievement by male and female subjects in the senior cycle group of 1987 - 88

In the 1987 - 88 groups there was no significant difference in scores on measures of academic achievement and general ability between male and female subjects.

Table 5.4 shows Statistically significant correlations were obtained between (in descending levels): Academic Points and General Ability, Self-Esteem and School Alienation, Attitude to Education and School Alienation, Attitude to Education and Self-Esteem, Academic Points and School Alienation, Dogmatism and General Ability, School Alienation and Teacher Preference, Academic Points and Attitude to Education, Teacher Preference and Need Achievement, Teacher Preference and Dogmatism, Curiosity and General Ability, Curiosity and Attitude to Education, School Alienation and General Ability, Curiosity and Teacher Preference, Teacher Preference and General Ability, Self Esteem and Need Achievement, Academic Points and Dogmatism, Academic Points and School Alienation, Academic Points and Need Achievement, Academic Points and Self Esteem, and Academic Points and Teacher Preference.The highest correlation was obtained between Academic Points and General Ability. (0.5664)

Table5.4 Correlation Matrix (Negative Correlations in *Italics*)

Variable	General Ability	Need Ach.	Dog	Teacher Prefer.	School Cur Alien.		Self Esteem	Att. to Education
General Ability								
Need Achievement	.1455							
Dogmatism	*.2970**	*.0568*						
Teacher Preference	.2006*	.2973*	*.2831**					
School Alienation	.2344*	.0081	*.1839**	.3156				
Curiosity	.2739*	.1623	*.1030*	.2233*	.1981*			
Self Esteem	.0408	.1998*	*.1895**	.1608	.4767*	.0934		
Attitude to Education	*.1290*	*.1231*	*.0080*	*.0533*	*.4539**	*.2436**	*.3412**	
Academic Points	.5664*	.1927*	*.1939**	.1858*	.2916*	.3677*	.1893*	*.2050**

p < .05

Table 5.4 A correlation matrix comparing the correlation coefficient (.r) for each of the measures of the battery of questionnaires administered to the subjects following the second year of the senior cycle course in 1988 - 1989

Table 5.5

Comparison of male and female scores in measures of general ability

	MALE	FEMALE
N=	27	37
MEAN=	100.519	98.973

Analysis of Variance

Source of Variation	Sum Squares	d.f.	Mean Square
Between Groups	.804969	1	.804969
Within Groups	11732.14	113	103.8331
Total	11733.95	114	

F (variance ratio) = MS between/MS within = 0.0077525

p = 0.929992

Table 5.5. A comparison of the scores obtained on the measure of General Ability by male and female subjects in the group of 1988 - 89

Table 5.6

Comparison of male and female scores in measures of Academic Achievement

	MALE	FEMALE
N=	27	37
MEAN=	100.519	98.973

Analysis of Variance

Source of Variation	Sum Squares	d.f.	Mean Square
Between Groups	96.58309	1	96.58309
Within Groups	4966.078	113	44.12458
Total	5062.661	114	

F (variance ratio) = MS between/MS within = 2.1888723

p = 0.141794

Table5.6. A comparison of the scores obtained on the measure of academic achievement by male and female subjects in the group of 1988 -89

In the 1988 - 89 groups there was no significant difference in scores on measures of academic achievement and general ability between male and female subjects.

The following table shows the results of a comparison of actual academic achievement scores and predicted academic achievement scores of the 1988 - 1989 group - the prediction based on the correlation of general ability and academic achievement points in the 1987 - 88 group

Table 5.7 Comparison of predicted and actual academic achievement scores

	Predicted Points	Actual Points
N =	114	114
Mean =	15.00226	12.26316

Analysis of Variance

Source of Variation	Sum Squares	df	Mean Square
Between Groups	427.716	1	427.716
Within Groups	6237.978	226	27.60167
Total	6665.693 227		

F (variance ratio) = MS between/MS within = 15.49602

p = 0.000110

Comparison of predicted and actual academic achievement scores of the 1988-89 subject group.

There is a statistically significant difference between the predicted scores of academic achievement and the actual scores, the actual scores being lower than the predicted scores. The prediction was based on the highest correlating variables.

Table 5.8 is a correlation matrix for the third of the subject groups - that of 1989 - 90

Statistically significant correlations were obtained between (in descending levels): Academic Achievement and General Ability, Teacher Preference and General Ability, Need Achievement and General Ability,Academic Achievement and Need Achievement, Academic Achievement and Teacher Preference, Academic achievement and Curiosity, Teacher Preference and Need Achievement, Self Esteem and General Ability, Curiosity and Need Achievement,Self Esteem and Teacher Preference, Self Esteem and Dogmatism, Curiosity and General Ability, and Attitude to Education and Dogmatism. Once again the highest correlation is obtained between General Ability and Academic Achievement (.7047)

Table 5.8 Correlation Matrix (Negative Correlations in *Italics*)

Variable	General Ability	Need Ach.	Dog	Teacher Prefer.	School Alien.	Cur	Self Esteem	Att. to Education
General Ability.								
Need Achievement	.4799*							
Dogmatism	*.0375*	*.1053*						
Teacher Preference	.5155*	.3008*	*.0474*					
School Alienation	.0499	.0081	.0063	.0804				
Curiosity	.2735*	.2804*	*.0297*	.2215	.1890			
Self Esteem.	.2995*	.1137	*.2742**	.2878*	.0563	.0934		
Attitude to Education	.0672	.1078	.2361*	.0294	.0656	*.0690*	*.0482*	
Academic Points	.7047*	.3741*	*.0482*	.3598*	.2268	.3154*	.0018	.0218

* p < .05

Table 5.8 A correlation matrix comparing the correlation coefficient (.r) for each of the measures of the battery of questionnaires administered to the subjects following the second year of the senior cycle course in 1989 - 1990.

Table 5.9 Comparison of male and female scores in a measure of General Ability

	MALE	FEMALE
N =	37	35
MEAN=	100.519	98.973

Analysis of Variance

Source of Variation	Sum Squares	d.f.	Mean Square
Between Groups	127.8025	1	127.8025
Within Groups	7951.975	70	113.5996
Total	8079.778 71		

F (variance ratio) = MS between/MS within = 1.1250255

p = 0.292484

Table 5.9. A comparison of the scores obtained on the measure of General Ability by male and female subjects in the senior cycle group of 1989 -90.

Table 5.10 A comparison of male and female scores in Academic Achievement

	MALE	FEMALE
N =	37	35
MEAN =	12.89189	15.48571

Analysis of Variance

Source of Variation	Sum Squares	d.f.	Mean Square
Between Groups	121.009	1	121.009
Within Groups	2486.31	70	35.51872
Total	2607.319 71		

F (variance ratio) = MS between/MS within = 3.406909

p = 0.069153

Table 5.10 A comparison of the scores obtained on the measure of Academic Achievement by male and female subjects in the senior cycle group of 1989 -90.

In the 1989 - 90 groups there was no significant difference in scores on measures of academic achievement and general ability between male and female subjects.

The following table shows the results of a comparison of actual academic achievement scores and predicted academic achievement scores of the 1989 - 1990 group - the prediction based on the correlation of general ability and academic achievement points in the previous two groups combined.

The table indicates that there is no statistically significant difference between the predicted scores of academic achievement and the actual scores.

Table 5.11

	Predicted Points	Actual Points
N =	72	72
Mean =	12.79433	14.15316

Analysis of Variance

Source of Variation	Sum Squares	d.f.	Mean Square
Between Groups	66.43356	1	66.43356
Within Groups	12111.78	142	85.29422
Total	12178.21	143	

F (variance ratio) = MS between/MS within = .7788754

p = 0.378977

Table 5.11 Comparison of predicted and actual academic achievement scores.

Table 5.12 Correlation Matrix (Negative Correlations in Italics)

Correlation Matrix

Variable	General Ability	Need Ach.	Dog	Teacher Prefer	School Alien.	Cur	Self Esteem	Att. to Education
General Ability								
Need Achievement	.2942*							
Dogmatism	*.1655**	*.1357**						
Teacher Preference	.2912*	.2423*	*.2820**					
School Alienation	.1360*	.1631*	*.1902**	.2028*				
Curiosity	.2687*	.2159*	*.1724**	.2954*	.1666*			
Self Esteem	.0463	.2051*	*.1071*	*.0171*	.3736*	.1412*		
Attitude to Education	.1179	.1222	.0355	*.0153*	.0394	*.0732*	.4341*	
Academic points	.5342*	.2031*	*.2887**	.2199*	.2466*	.3188*	.0611	.1659*

* p < .05

Table 5.12 A correlation matrix comparing the correlation coefficient (r) for each of the measures of the battery of questionnaires administered to the subjects following the second year of the senior cycle course in all three years combined.

For the purposes of an overview of all subjects for n = 252, the three subject years were combined and correlations were found significant in each case for academic achievement points except for Self Esteem. This correlation matrix is summarised below in the form of a significance level matrix.

Table 5.13

Correlation Matrix

Variable	General Ability	Need Ach	Dog	Teacher Pref	School Alien	Cur	Self Esteem	Attitude to Ed
General Ability								
Need Achievement	***							
Dogmatism	**	*						
Teacher Preference	***	***	***					
School Alienation	*	**	**	**				
Curiosity	***	***	*	***	**			
Self Esteem		**			***	*		
Attitude to Education							***	
Academic points	***	***	***	***	***	***		**

*** = p < .001 ** = p < .01 * = p < .05

Table 5.13 A summary matrix showing significance level of correlations obtained on the combined scores of all three experimental groups.

Table 5.13 shows all the variables except self-esteem and school alienation correlating at the .001 level or higher with academic points. Other highly significant levels were obtained between teacher preference and general ability,need achievement, dogmatism and curiosity; by general ability with need achievement and curiosity; by curiosity with need achievement, and by self esteem with school alienation.

There next follows an examination of the variables general ability and academic achievement points in greater detail, specifically the high/low factors to establish if significant differences were present in correlations within high and low subject scores compared to total subject scores and if significant differences existed between high and low subject scores.

(2) EXAMINATION OF HIGH/LOW SCORES IN GENERAL ABILITY AND ACADEMIC ACHIEVEMENT SCORES

The four quartiles of each variable were established then the correlations within each quartile of each variable with academic achievement points was noted. Comparisons were made of each individual variable within the four quartiles to check for significant difference using analysis of variance (Scheffé and randomised block design).

Table 5.15

Correlations of first quartile of General Ability scores

Variable	General Ability	Need Ach.	Dog	Teacher Prefer	School Alien.	Cur	Self Esteem	Att. to Educ.
Academic points	.3547**	.3016*	.0287	.1789	.1592	.2906*	.1008	.1272

* p < .05 ** p < .01

Correlations of each variable with academic points amongst the first quartile of scores of General Ability.

Correlations remain significant between Academic Points and General Ability (p <.01) and Need achievement and Curiosity (p < .05). In the total subject group Curiosity correlated higher than Need Achievement and Dogmatism, Teacher Preference and School Alienation all correlated significantly.

Table 5.16

Correlations of second quartile of General Ability scores

Variable	General Ability	Need Ach.	Dog	Teacher Prefer	School Alien.	Cur	Self Esteem	Att. to Educ
Academic points	.2288	.0309	.2134	.3097*	.2022	.2322	.1366	.3267**

* p < .05 ** p < .01

Correlations of each variable with academic points amongst the second quartile of scores of General Ability.

Amongst this subdivision teacher preference correlates significantly at the .05 level and Attitude to Education correlates negatively at the .01 level. Neither variable correlated significantly within the first quartile, nor were any significant correlations amongst the first quartile repeated within the second.

Table 5.17

Correlations of second quartile of General Ability scores

Variable	General Ability	Need Ach.	Dog	Teacher Prefer	School Alien.	Cur	Self Esteem	Att. to Education
Academic points	.0279	.0609	.4254**	.0521	.4060**	.0149	.1963	.35234**

* p < .05 ** p < .01

Correlations of each variable with academic points amongst the third quartile of scores of General Ability

Dogmatism and Attitude to Education correlated negatively at the .01 level whilst school alienation correlated positively at the same level. Within the total subject group only Dogmatism correlates both negatively and significantly and the correlations of School Alienation and Attitude to Education within this quartile are quite striking when compared to the total subject group.

Table 5.18

Correlations of second quartile of General Ability scores

Variable	General Ability	Need Ach.	Dog	Teacher Prefer	School Alien.	Cur	Self Esteem	Att. to Education
Academic points	.0416	.0645	.3453	.0209	.2380	.2611*	.31988	.0928

* p < .05 ** p < .01

Correlations of each variable with academic points amongst the fourth quartile of scores of General Ability.

The only significant correlation amongst the fourth quartile between academic points and the remaining variables was that with curiosity at the .05 level. Dogmatism was higher than quartiles one and two but below the level of significance. General Ability was insignificant within both the third and fourth quartiles. Whilst high scores within the variable general ability correlated significantly with scores in academic achievement, low scores did not.

The following tables illustrate the correlations which were obtained amongst the four quartiles of the variable Academic Points.

Table 5.19

Correlations of first quartile of Academic Achievement scores

Variable	General Ability	Need Ach.	Dog	Teacher Prefer	School Alien.	Cur	Self Esteem	Att. to Education
Academic points	.3638**	.4139	*.4668*	.2639*	.4288**	.2611*	.2501*	.0348

* p < .05 ** p < .01

Correlations of each variable with academic points amongst the first quartile of scores of Academic Achievement.

Significant correlations were observed between Academic Achievement points and General Ability, Need Achievement, Teacher Preference, School Alienation, Curiosity and Self Esteem. Unlike the correlations amongst the total subject scores, Need Achievement and School Alienation correlated higher than General Ability.The correlations observed within the first quartile of academic achievement scores contrast quite dramatically with those of the second quartile in which no statistically significant correlation is observed.

Table 5.20

Correlations of second quartile of Academic Achievement scores

Variable	General Ability	Need Ach.	Dog	Teacher Prefer	School Alien.	Cur	Self Esteem	Att. to Education
Academic points	.1129	.0709	*.1399*	*.1026*	.0203	*.0526*	*.0059*	*.0328*

* p < .05 ** p < .01

Correlations of each variable with academic points amongst the second quartile of scores of Academic Achievement.

Table 5.21

Correlations of third quartile of Academic Achievement scores

Variable	General Ability	Need Ach.	Dog	Teacher Prefer	School Alien.	Cur	Self Esteem	Att. to Education
Academic points	.0179	.1625	.0170	.1219	.1317	.2168*	.0506	.1164

* p < .05 ** p < .01

Correlations of each variable with academic points amongst the third quartile of scores of Academic Achievement.

Table 5.22

Correlations of fourth quartile of Academic Achievement scores

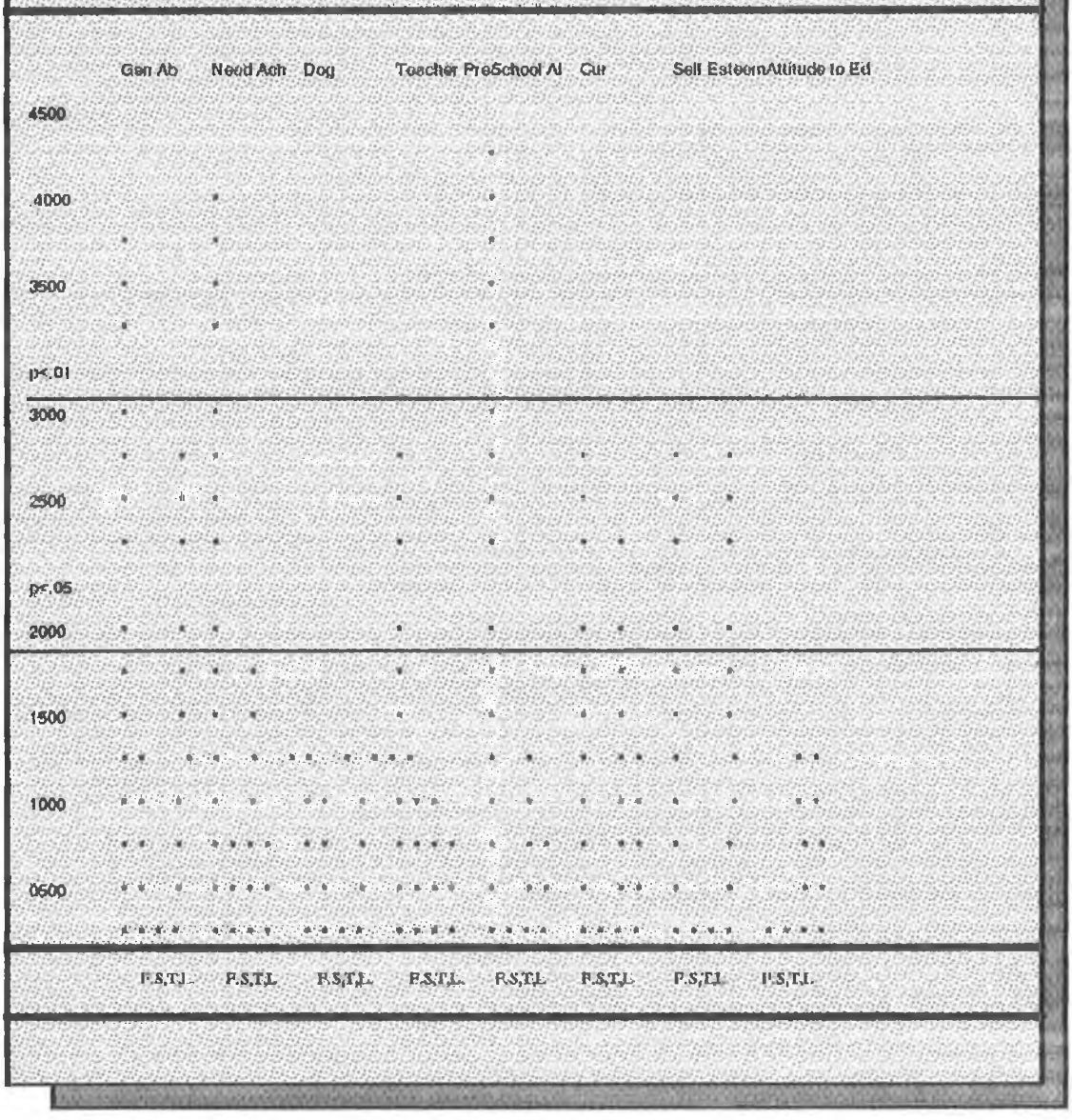
Variable	General Ability	Need Ach.	Dog	Teacher Prefer	School Alien.	Cur	Self Esteem	Att. to Education
Academic points	.2774*	.0598	.1481	.0592	.0914	.1218	.2526*	.1358

* p < .05 ** p < .01

Correlations of each variable with academic points amongst the fourth quartile of scores of Academic Achievement.

Table 5.22 shows that within the fourth quartile General Ability correlates significantly with Academic Achievement as in the first quartile, but the only other significant correlation is that of Self Esteem which does not correlate significantly in the composite subject scores.Table 5.23 is a graphical summary of tables 5.18 to 5.22 indicating that it is within the first quartile of Academic Achievement scores that correlations are highest with the remaining variables.

TABLE 5.23 GRAPHICAL SUMMARY OF TABLES 5.18 TO 5.22 CORRELATIONS OF EACH QUARTILE OF ACADEMIC ACHIEVEMENT WITH EACH OF THE OTHER VARIABLES.



The various significance levels are indicated by a line. The three variables correlating above the .01 level are each First Quartiles in General Ability, Need Achievement and School Alienation respectively. Within the second and third quartiles combined there is only one significant correlation.

The following tables show the results of Analysis of Variance performed on the remaining variables within each of the four quartile divisions of the variable Academic Points to test for significant difference.

TABLE 5.24 ANALYSIS OF VARIANCE TABLE FOR THE FOUR QUARTILES OF ACADEMIC POINTS WITH THE VARIABLE TEACHER PREFERENCE

	First Quartile	Second Quartile	Third Quartile	Fourth Quartile
MEAN =	58.96293	52.43939	53.34524	52.58165

Analysis of Variance

Source of Variation	Sum Squares	d.f	Mean Square
Between Groups	1658.046	3	552.6181
Within Groups	22810.92	273	83.33849
Total	24468.97	276	

F (variance ratio) = MS between/MS within = 6.61447

p = 0.000250 F test has achieved significance.

There is a significant difference between at least two of the quartiles of Teacher Preference. Comparison of means tables are produced for quartiles significantly different.

Table 5.25 COMPARISON OF MEANS: TEACHER PREFERENCE

MEAN	EST STD.E	NO. OF GROUPS	95% C.I.	t Value	df	p (two tailed)
FQ - SQ = 6.486532	1.677304	4	3.184415 - 9.78865	3.867236	273	0.000139
FQ - TQ = 5.580668	1.594385	4	3.441815 - 8.719561	3.500214	273	0.000543
FQ - LQ = 6.364282	1.640717	4	3.134195 - 9.59437	3.878984	273	0.000132

No significant difference was observed between S.Q and T.Q; between S.Q. and L.Q. and between T.Q. and L.Q.

The First Quartile is significantly different from the Second, Third and last quartiles with the greatest differences being between the first and second and first and last.

TABLE 5.26 ANALYSIS OF VARIANCE TABLE FOR THE FOUR QUARTILES OF ACADEMIC POINTS WITH THE VARIABLE DOGMATISM

	First Quartile	Second Quartile	Third Quartile	Fourth Quartile
MEAN =	100.4915	104.3424	105.0000	108.8082

Analysis of Variance

Source of Variation	Sum Squares	df	Mean Square
Between Groups	1284.339	3	428.113
Within Groups	19914.92	273	72.94842
Total	21199.26	276	

F (variance ratio) = MS between/MS within = 5.869707

p = 0.000678 F test has achieved significance.

At least one quartile is significantly different from at least one other

Table 5.27 COMPARISON OF MEANS; DOGMATISM

MEAN	ESTIMATED STD.ERROR	NO. OF GROUPS	95% C.I.	t Value	df	p (two tailed)
FQ - SQ = -3.760943	1.567219	4	-6.846334 to -.6755508	-2.399755	273	0.017077
FQ - TQ = -4.519519	1.489742	4	-7.45138 to -1.585657	-3.033088	273	0.002654
FQ - LQ = -8.328738	1.533033	4	-9.344827 to -3.306649	-4.126942	273	0.000049

Table 5.27

No significant difference was observed between S.Q and T.Q; between S.Q. and L.Q. and between T.Q. and L.Q.

The First quartile of Dogmatism differs from the second and third quartiles with increasing significance form the .05 level through .01 to the .0001 level.

TABLE 5.28 ANALYSIS OF VARIANCE TABLE FOR THE FOUR QUARTILES OF ACADEMIC POINTS WITH THE VARIABLE NEEDACHIEVEMENT

	First Quartile	Second Quartile	Third Quartile	Fourth Quartile
MEAN =	6.537037	5.909091	6	5.618438

Analysis of Variance

Source of Variation	Sum Squares	d.f	Mean Square
Between Groups	26.769	3	8.923
Within Groups	702.1407	273	2.571944
Total	728.9097	276	

F (variance ratio) = MS between/MS within = 3.469357

p =0.016685 F test has achieved significance.

Table 5.27

COMPARISON OF MEANS: NEED ACHIEVEMENT

MEAN	ESTIMATED STD.ERROR	NO. OF GROUPS	95% C.I.	t Value	df	p (two tailed)
F.Q - S.Q = .6279461	.2942744	4	.04860661 to 1.207286	2.133879	279	0.033745
F.Q - L.Q= .9205987	.2876554	4	.3538965 to 1.487301	3.198129	279	0.001546

No significant difference was observed between F.Q and S.Q; between S.Q and T.Q; between S.Q. and L.Q. and between T.Q. and L.Q.

The significant differences between the First Quartile and the Second and Third Quartiles are in descending order. (.05 and .01)

TABLE 5.28 ANALYSIS OF VARIANCE TABLE FOR THE FOUR QUARTILES OF ACADEMIC POINTS WITH THE VARIABLE CURIOSITY

	First Quartile	Second Quartile	Third Quartile	Fourth Quartile
MEAN =	16.92593	15.66364	14.86905	13.93151

Analysis of Variance

Source of Variation	Sum Squares	df	Mean Square
Between Groups	315.5917	3	105.1972
Within Groups	3695.694	273	13.53734
Total	4011.285	276	

F (variance ratio) = MS between/MS within = 7.770895

p =0.000054 F test has achieved significance.

Table 5.29

COMPARISON OF MEANS: CURIOSITY

MEAN	ESTIMATED STD.ERROR	NO. OF GROUPS	95% C.I.	t Value	df	p (twotailed)
FQ - SQ = .8279461	.2942744	4	.04950661 to 1.207288	2.133878	273	0.033745
FQ - LQ= .9205987	.2878554	4	.3538965 to 1.487301	3.198129	273	0.001546
SQ - LQ=1.93213	.6249434	4	.7018008 to 3.162460	3.091687	273	0.002196

No significant difference was observed between F.Q. and S.Q.; between S.Q. and T.Q. and between T.Q. and L.Q.

Of the three significant differences within the quartiles of the variable Curiosity by far the greatest is that between the first and last quartiles. There is no significant difference between the First and Second Quartiles.

Table5.30 ANALYSIS OF VARIANCE TABLE FOR THE FOUR QUARTILES OF ACADEMIC POINTS WITH THE VARIABLE ATTITUDE TO EDUCATION

	First Quartile	Second Quartile	Third Quartile	Fourth Quartile
MEAN =	30.75926	33.43939	40.84524	39.93151

Analysis of Variance

Source of Variation	Sum Squares	d.f	Mean Square
Between Groups	4804.804	3	1601.60
Within Groups	99969.77	273	366.2629
Total	104974.6	276	

F (variance ratio) = MS between/MS within = 4.372819

p = 0.005004 F test has achieved significance.

Table 5.31

COMPARISON OF MEANS: ATTITUDE TO EDUCATION

	MEAN	ESTIMATED STD.ERROR	NO. OF GROUPS	95% C.I.	t Value	df	p (two tailed)
FQ - SQ =	-10.08598	3.338101	4	-16.65771 to -3.514243	-3.021472	273	0.002754
FQ - TQ =	-9.172248	3.435105	4	-15.93496 to -2.40954	-2.670151	273	0.008037
FQ - LQ =	-7.405844	3.147969	4	-13.60327 to -1.208422	-2.352579	273	0.019354
SQ - TQ =	6.492113	3.250652	4	-12.89169 to -.9253918	-1.997173	273	0.046800
SQ - LQ =	-7.405844	3.147969	4	-13.89169 to -1.208422	-2.352579	273	0.019354

No significant difference was found between T.Q. and L.Q.

Each quartile was significantly different one from the other with the exception of the third and the last quartiles. The most significant differences were between the first quartile and the second and third quartiles (.01 level)

TABLE 5.32

ANALYSIS OF VARIANCE TABLE FOR THE FOUR QUARTILES OF ACADEMIC POINTS WITH THE VARIABLE SELF ESTEEM

	First Quartile	Second Quartile	Third Quartile	Fourth Quartile
MEAN =	11.07407	11.62121	11.71429	11.05849

Analysis of Variance

Source of Variation	Sum Squares	df	Mean Square
Between Groups	25.28329	3	8.427764
Within Groups	6141.034	273	22.49463
Total	6166.318	276	

F (variance ratio) = MS between/MS within = .374686

p =0.771347 F test has achieved significance.

F test has NOT achieved significance.

None of the quartiles of self esteem were significantly different one from the other.

TABLE 5.33 ANALYSIS OF VARIANCE TABLE FOR THE FOUR QUARTILES OF ACADEMIC POINTS WITH THE VARIABLE SCHOOL ALIENATION

	First Quartile	Second Quartile	Third Quartile	Fourth Quartile
MEAN =	30.46296	30.86979	28.96428	27.45205

Analysis of Variance

Source of Variation	Sum Squares	df	Mean Square
Between Groups	515.4358	3	171.811
Within Groups	9470.341	273	34.68909
Total	9985.776	276	

F (variance ratio) = MS between/MS within = 4.952796

p = 0.002304 F test has achieved significance.

F test has achieved significance.

Table 5.34 COMPARISON OF MEANS: SCHOOL ALIENATION

MEAN	ESTIMATED STD.ERROR	NO. OF GROUPS	95% C.I.	t Value	df	p (two-tailed)
FQ - LQ = 3.0109068	1.067171	4	.92965148 to 5.092166	2.8490822	273	0.004733
SQ - TQ = 2.005411	.969803	4	.99123926 to 3.912698	2.0699891	273	0.039395
SQ - LQ = 3.5176424	1.000404	4	1.5481427 to 5.487143	3.5162219	273	0.000512

No significant difference was found between F.Q. and S.Q. and between T.Q. and L.Q.

The greatest differences within the variable School Alienation were between last Quartile and the first two Quartiles.

TABLE 5.35 ANALYSIS OF VARIANCE TABLE FOR THE FOUR QUARTILES OF ACADEMIC POINTS WITH THE VARIABLE GENERAL ABILITY

	First Quartile	Second Quartile	Third Quartile	Fourth Quartile
MEAN =	111.2222	103.1212	99.13095	96.47945

Analysis of Variance

Source of Variation	Sum Squares	d.f	Mean Square
Between Groups	7573.143	3	2524.381
Within Groups	22370.14	273	81.94191
Total	9985.776	276	

F (variance ratio) = MS between/MS within = 30.80886

p = 0.000001 F test has achieved significance.

Table 5.36 COMPARISON OF MEANS: GENERAL ABILITY

MEAN	ESTIMATED STD.ERROR	NO. OF GROUPS	95% C.I.	t Value	df	p (two-tailed)
FQ-SQ = 8.10101	1.661021	4	4.830953 to 11.37107	4.8369592	273	0.000002
FQ-TQ = 12.09127	1.578905	4	8.9828716 to 15.19967	7.6590091	273	0.000001
FQ-LQ = 14.742774	1.624788	4	11.544047 to 17.94153	9.0746619	273	0.000001
SQ-TQ = 3.9902674	1.498974	4	1.0589137 to 6.92161	2.6798729	273	0.007813
SQ-LQ = 6.64176	1.637542	4	3.614793 to 9.668727	4.3197259	273	0.000022

No significant difference was found between T.Q. and L.Q.

Highly significant differences were found between the First Quartile and the three other Quartiles, also between the second and each of the three others. Clearly the largest and most consistent differences were within this variable.

Table 5.37 summarises graphically the within variable differences and illustrates levels of significance, General Ability showing the greatest within variable difference and Self Esteem showing no within variable difference.

TABLE 5.37 SIGNIFICANT DIFFERENCES BETWEEN THE QUARTILES OF ACADEMIC ACHIEVEMENT AMONGST THE OTHER VARIABLES

GENERAL ABILITY	FQ - SQ *****	CURIOSITY	FQ - SQ -
	FQ - TQ ******		FQ - TQ **
	FQ - LQ ******		FQ - LQ *****
	SQ - TQ **		SQ - TQ -
	SQ - LQ ****		SQ - LQ **
	TQ - LQ -		TQ - LQ -
NEED ACHIEVEMENT	FQ - SQ *	SCHOOL ALIENATION	FQ - SQ -
	FQ - TQ -		FQ - TQ -
	FQ - LQ **		FQ - LQ **
	SQ - TQ -		SQ - TQ *
	SQ - LQ -		SQ - LQ ***
	TQ - LQ -		TQ - LQ -
DOGMATISM	FQ - SQ *	SELF ESTEEM	FQ - SQ -
	FQ - TQ **		FQ - TQ -
	FQ - LQ ****		FQ - LQ -
	SQ - TQ -		SQ - TQ -
	SQ - LQ -		SQ - LQ -
	TQ - LQ -		TQ - LQ -
TEACHER PREFERENCE	FQ - SQ ***	ATTITUDE TO EDUCATION	FQ - SQ -
	FQ - TQ ***		FQ - TQ **
	FQ - LQ ***		FQ - LQ **
	SQ - TQ -		SQ - TQ *
	SQ - LQ -		SQ - LQ *
	TQ - LQ -		TQ - LQ -

P < .05 (*); .01 (**); .001 (***); .0001 (****); .00001 (*****); .000001 (******) -
NO SIGNIFICANT DIFFERENCE

PARTIAL CORRELATION

Given the consistency with which General Ability correlated most significantly with Academic Achievement Partial Correlation was used to control for the influence of General Ability. Table 5.38ff. below shows the partial correlation of each remaining variable with Academic Achievement in the scores of the three groups combined. A partial correlation table is provided below for the correlation of each variable with academic achievement, and the sequence is followed by a summary table of these results.

Table 5.38 Partial Correlation for Dogmatism and Academic Achievement

	Dog.(y)	Pts.(x)	Gen.Ab.(z)
Dog.(y)	-----	.2677	.1655
Pts. (x)	.2031	-----	.5347
Gen.Ab.(z)	.2942	.5347	-----

Partial Correlation = -2145

Table 5.39 Partial Correlation for Need Achievement and Academic Achievement

	nACH.(y)	Pts.(x)	Gen.Ab.(z)
nACH.(y)	-----	.2031	.2942
Pts.(x)	.2677	-----	.5347
Gen.Ab.(z)	.1655	.5347	-----

Partial Correlation = .0461

Table 5.40 Partial Correlation for Curiosity and Academic Achievement.

Cur.(y)	Pts.(x)	Gen.Ab.(z)	
Cur.(y)	-----	.3188	.2667
Pts.(x)	.3188	-----	.5347
Gen.Ab.(z)	.2667	.5347	-----

Partial Correlation = .2163

Table 5.41. Partial Correlation for School Alienation and Academic Achievement.

	Sch .Al.(y)	Pts.(x)	Gen.Ab.(z)
Sch.Al.(y)	-----	.2466	.1360
Pts.(x)	.2466	-----	.5347
Gen.Ab.(z)	.1360	.5347	-----

Partial Correlation = .1483

Table 5.42 Partial Correlation for Teacher Preference and Self Esteem

	Self.Est.(y)	Pts.(x)	Gen.Ab.(z)
Self.Est.(y)	-----	.0611	.0462
Pts.(x)	.0611	-----	.5347
Gen.Ab.(z)	.0462	.5347	-----

Partial Correlation = .0431

Table 5.43 Partial Correlation for Teacher Preference and Academic Achievement.Teacher

	T.P.(y)	Pts.(x)	Gen.Ab.(z)
T.P.(y)	-----	.2199	.2912
Pts.(x)	.2199	-----	.5347
Gen.Ab.(z)	.2912	.5347	-----

Partial Correlation = .0794

Table 5.44 Partial Correlation for Attitude to Education and Academic Achievement.

	Att.Ed.(y)	Pts.(x)	Gen.Ab.(z)
Att.Ed.(y)	-----	.1659	.1179
Pts.(x)	.1659	-----	.5347
Gen.Ab.(z)	.1179	.5347	-----

Partial Correlation = .1226

Table 5.45 Significant correlations with academic achievement after the control for the influence of General Ability under Partial Correlation.

	Dogmatism	Curiosity	School Alienation
Academic Achievement	-.2145	.2163	.1483

CRITICAL VALUE FOR .r WITH N = 250 IS .124 (2)

Significant Correlations were obtained for: Academic Achievement and Dogmatism, Academic Achievement and Curiosity, Academic Achievement and School Alienation after Partial Correlation with General Ability.

● **The statistical formula is taken from Hopkins and Glass(3):**

$$r_{yx.z} = \frac{r_{yx} - r_{yzrxz}}{\sqrt{(1 - r^2_{yz})(1 - r^2_{xz})}}$$

'Partial Correlation can be useful to estimate the correlation between two variables with the effects of one or more other variables statistically removed.'

COLLINEARITY

The study aims to asses the correlations between Academic Achievement and eight school mediated variables. Relatively high correlations between other variables suggest the presence of collinearity. The following statistics did not make use of the Fisher z transformation in order to demonstrate more clearly the multiple regression features of the data.

'One informative way to examine collinearity is to consider what happens if each predictor variable is a response variable in a multiple regression model in which the independent variables are all of the remaining predictors.(4)'

Table 5.46 summarises the results of such a procedure in a correlation matrix. Detailed statistics may be found in the Appendix. Teacher Preference, School Alienation and Self Esteem correlate at the .001 level giving a clear indication of collinearity. The removal of

these variables is demonstrated below. Detailed statistics for the tables can be found in Appendix 5.0. These tables are arranged to illustrate the process of multiple regression which identifies those variables having minimal effect on the correlation with academic points. Tables are also given for various variable groupings, for example, those variables which might be classed as 'personality derived' or 'environmentally derived'.

Table 5.46 Test for Collinearity - Independent Variable as Response Variable

	Dependent variables (r2 adjusted); p < .05 (*), <.01 (**), <.001 (***)							
Independent Variables	General Ability	Need Ach.	Dog	Teacher Prefer.	School Alien.	Curiosity	Self Esteem	Att. to Education
N Ach., Dog., T..Pref., S.Al., Cur.,S. E, At. Ed.	.1626 **							
Gen. Ab., Dog., T.Pref., S. Al., Cur., S E., At. Ed.		.1212 **						
Gen.Ab., N Ach., T.Pref., S. Al., Cur., S E., At. Ed.			.0853 *					
Gen. Ab., N Ach., Dog., S. Al., Cur., S E., At. Ed.				.2403 ***				
G.Ab.N Ach.,Dog.,T.Pref. Cur., Self Est., Att. Ed.					.2861 ***			
G.Ab.,N Ach.,Dog.,T.Pref Sch. Al.,Self Est., Att. Ed.						.1116 *		
G.Ab.,N Ach.,Dog.,T.Pref Sch. Al., Cur., Att. Ed.							.3713 ***	
G.Ab.,N Ach.,Dog.,T.Pref Sch. Al., Cur., Self Est.								.1089 *

All variables show some significant correlation. Kleinbaum et al. point out that perfect collinearity would be a correlation of 1.000, but they suggest that 'near collinearity' is a problem with high correlations (8).

Table 5.47 Cumulative Significance of Variables under multiple regression.

Variables	p
Academic Points/General Ability	
Attitude to Education	0.0168
Academic Points/General Ability	
Attitude to Education Dogmatism	0.0043
Academic Points/General Ability	
Attitude to Education Dogmatism	
Curiosity	0.0013
Academic Points/General Ability	
Attitude to Education Dogmatism	
Curiosity Need Achievement	0.0005
Academic Points/General Ability	
Attitude to Education Dogmatism	
Curiosity Need Achievement	
School Alienation	0.0003
Academic Points/General Ability	
Attitude to Education Dogmatism	
Curiosity Need Achievement	
School Alienation Self Esteem	0.0001
Academic Points/General Ability	
Attitude to Education Dogmatism	
Curiosity Need Achievement	
School Alienation Self Esteem	
Teacher Preference	0.0001

A correlation significance of p <.001 is achieved with Teacher Preference, Self Esteem and School Alienation removed from the collection of variables.

Table 5.48 Cumulative Significance of variables under multiple regression - school generated Variables

	p
Academic Points/General Ability	0.0830
Academic Points/General Ability Attitude to Education	0.0168
Academic Points/General Ability Attitude to Education Curiosity	0.0046
Academic Points/General Ability Attitude to Education Curiosity School Alienation	0.0015
Academic Points/General Ability Attitude to Education Curiosity School Alienation Teacher Preference	0.0006

Table 5.49 shows the increment of variables identified as school generated variables, onto the highest single correlating variable with Academic Achievement Points - that of General Ability. The optimal correlation is achieved by adding Attitude to Education, Curiosity, School Alienation and finally Teacher Preference to achieve a correlation p = < 0.0006. The removal of the variables School Alienation and Teacher Preference results in a correlation significance of p < .01 Table 5.50 shows the increment of variables identified as personality generated variables modifiable by school practice, onto the highest single correlating variable with Academic Achievement Points - that of General Ability. The optimal correlations is achieved by adding Dogmatism, Need Achievement and finally Self Esteem to achieve a multiple correlation p = < 0.0024

Table 5.50 Cumulative Significance of Variables under multiple regression.

Variables	p
Academic Points/General Ability	0.0830
Academic Points/General Ability Dogmatism	0.0175
Academic Points/General Ability Dogmatism Need Achievement	0.0058
Academic Points/General Ability Dogmatism Need Achievement Self Esteem	0.0024

The significance level of p <.01 is not increased with the addition of the nearly collinear variable Self ' Esteem.

Table 5.51 shows the multiple regressions of each of the variable groups excluding General Ability with Academic Achievement points separately then in combination to achieve a multiple correlation of p = < 0.0014 . This clearly shows the influence of General Ability which increases the significance to p < .0001

Table 5.51 Multiple Regression of variable groups with Academic points excluding the General Ability variable.

Variables	p
Academic Points/Need achievement	
Dogmatism Self Esteem	0.0372
Academic Points/Teacher Preference	
School Alienation Curiosity	
Attitude to Education	0.0095
Academic Points/Need Achievement	
Dogmatism Self Esteem	
Teacher Preference School Alienation	
Curiosity Attitude to Education	0.0014

The multiple regression significance of the three variables defined as personality generated with academic achievement is p = < 0.0372 and that of the four variables defined as school generated variables with academic achievement is p = < 0.0095.

CLUSTER ANALYSIS

Cluster analysis was used to identify groupings of variables amongst the first, second, third and last quartiles of the total subject scores in academic achievement. Groupings in each quartile were then compared for difference or similarity. Reservations are often expressed as to the efficacy and indeed validity of clustering and as Everitt (8) points out:

'There is no universal agreement as to what constitutes a cluster: in fact it is probably true that no single definition is sufficient...that the ultimate criterion for evaluating the meaning of such terms as cluster or similarity is the value judgement of the user.'(p.59-60)

In this particular instance the clustering method is that of Euclidean distance which according to Everitt restricts one to a consideration of 'spherical' clusters, but which nevertheless is instructive in adding a further dimension to the analysis of the data. Firstly a raw data matrix is produced, followed by an input matrix of squared Euclidean distances; then there is a tabulated linkage table using the Unweighted Pair Group Method, and finally a dendogram

illustrating the linkages graphically. This procedure is repeated four times - for each of the four quartiles of the scores on Academic Achievement Points. Occurrences of inclusion in each of the four quartiles of the remaining variables are logged and totalled in the raw data matrix. For example, within the first quartile of Academic Achievement Points there were 5 instances which could also be included within the first quartile of General Ability etc. etc.

Table 5.53 First Quartile - Academic Achievement Points

Raw Data Matrix

	Ab.	Nach.	Dog.	Te. Pr.	Sch.Al.	Cur.	Self.E.	At.Ed
First Quartile	5	22	6	14	12	13	18	29
Second Quartile	15	15	23	15	16	22	20	12
Third Quartile	22	18	14	19	16	15	17	18
Last Quartile	30	17	9	24	28	22	17	13

Occurrence within the four quartiles of the remaining variables

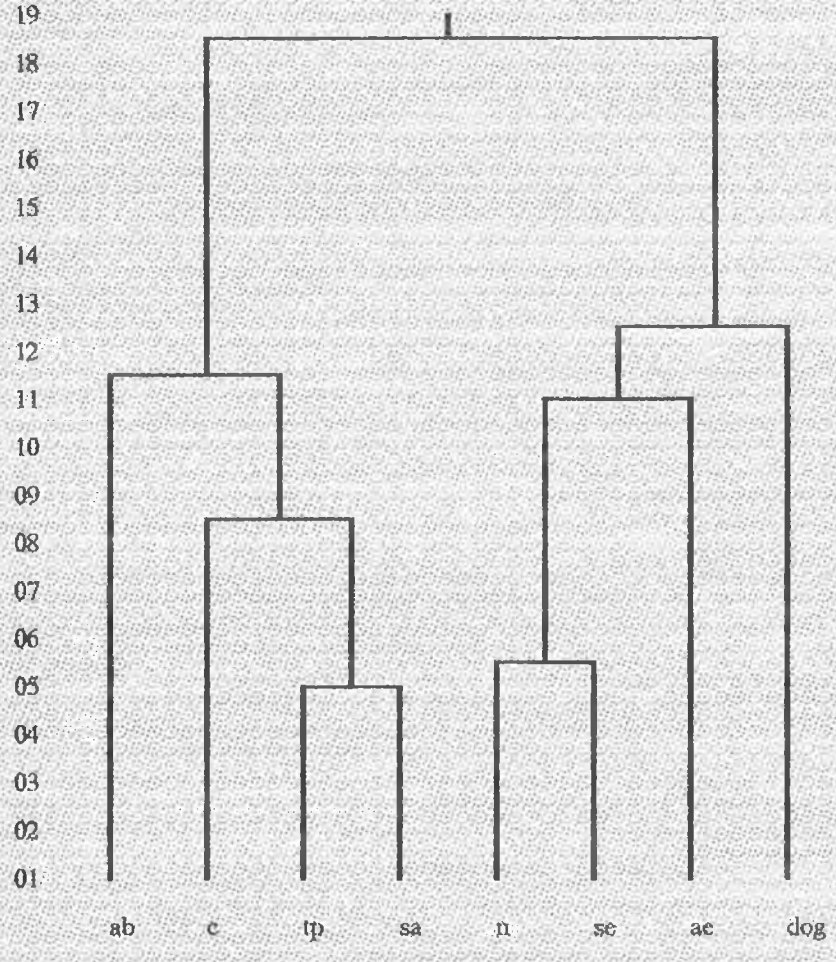
Table 5.54 Euclidean Distance Matrix

	Ability	Nach	Dog	T.Pr.	Sch Al.	Cur	Self.Est.	Att. Ed.
Ability	0	21.772	31.780	11.225	9.487	15.033	19.698	29.833
Need Achievement	21.772	0	12.649	10.677	15.033	12.806	6.481	8.602
Dogmatism	31.780	12.649	0	21.401	24.698	18.439	12.083	12.728
Teacher Preference	11.225	10.677	21.401	0	5.477	8.367	9.695	18.868
School Alienation	9.487	15.033	24.698	5.477	0	8.602	13.191	23.108
Curiosity	15.033	12.806	18.439	8.367	8.602	0	7.616	21.119
Self Esteem	19.698	6.481	12.083	9.695	13.191	7.616	0	21.119
Attitude to Education	29.833	8.602	12.728	18.868	23.108	21.119	19.213	0

Table 5.55 Clusters

Node	Group 1	Group 2	Dissimilarity	Number of objects In fused Groups
1	TP	SA	5.477	2
2	NACH	SE	6.418	2
3	NODE 1	C	8.485	3
4	NODE 2	AE	11.408	3
5	AB	NODE 3	11.915	4
6	NODE 4	DOG	12.487	4
7	NODE 5	NODE 6	18.733	8

Table 5.56 Dendogram



The dendogram illustrates the presence of two distinct variable groupings within the first quartile subjects on scores of Academic Achievement. Within the one group are General Ability, Curiosity, School Alienation, and Teacher Preference, and within the other are Need

Achievement, Dogmatism, Self Esteem, and Attitude to Education.

Cluster Analysis of the Second Quartile of Academic Achievement

Table 5.57 Raw Data Matrix

	Ab.	Nach.	Dog.	Te. Pr.	Sch.Al.	Cur.	Self.E.	At.Ed
First Quartile	18	21	17	21	22	19	21	14
Second Quartile	21	23	17	10	18	24	18	19
Third Quartile	20	10	20	16	21	10	16	17
Last Quartile	8	13	13	20	6	14	12	17

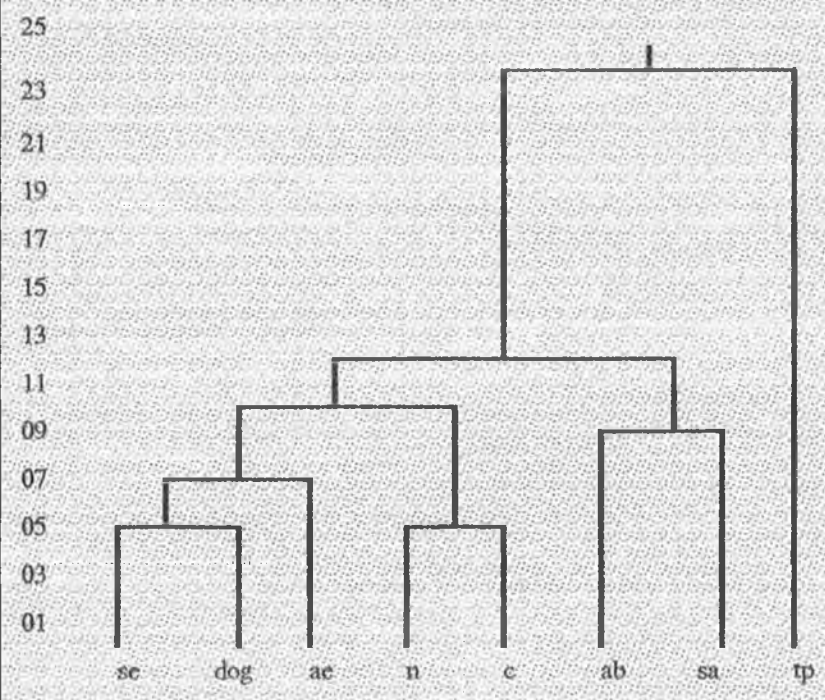
Table 5.58 Euclidean Distance Matrix

	Ability	Nach	Dog	T.Pr.	Sch Al.	Cur	Self.Est.	Att. Ed.
Ability	0	13.304	13.638	29.343	7,874	17.493	13.342	17.833
Need Ach	13.304	0	13.304	28.107	12.288	6.403	8.775	13.964
Dogmatism	13.638	13.304	0	20.075	8.718	12.410	5.851	6.164
Teacher Pref	29.243	28.107	20.075	0	27.731	25.080	23.854	16.941
School Alien	7.874	12.288	8.718	27.731	0	15.166	7.874	14.213
Curiosity	17.493	6.403	12.410	25.080	15.166	0	8.944	10.392
Self Esteem	13.342	8.775	5.831	23.854	7.874	8.944	0	8.718
Attitude to Ed	17.833	13.964	6.164	16.941	14.213	10.392	8.718	0

Table 5.59 Clusters

Node	Group 1	Group 2	Dissimilarity	Number of objects in fused Groups
1	DOG	SE	5.831	2
2	NACH	C	6.403	2
3	NODE 1	AE	7.441	3
4	AB	SA	7.874	2
5	NODE 2	NODE 3	11.298	5
6	NODE 4	NODE 5	13.387	7
7	NODE 6	TP	24.447	8

Table 5.60 Dendogram



The cluster analysis for the second quartile of Academic Achievement identifies a different grouping pattern. The smallest diversity is between Dogmatism, Self-Esteem, and Need Achievement and curiosity, whilst Teacher Preference is the remaining variable linked to the

remaining seven variables in the final linkage.

Cluster Analysis of Third Quartile of Academic Achievement

Table 5.61

Raw Data Matrix

	Ab.	Nach.	Dog.	Te. Pr.	Sch.Al.	Cur.	Self.E.	At.Ed
First Quartile	8	35	21	19	19	22	22	28
Second Quartile	25	14	28	20	20	26	27	21
Third Quartile	25	17	20	25	14	13	13	19
Last Quartile	23	15	13	17	24	19	13	13

Table 5.62

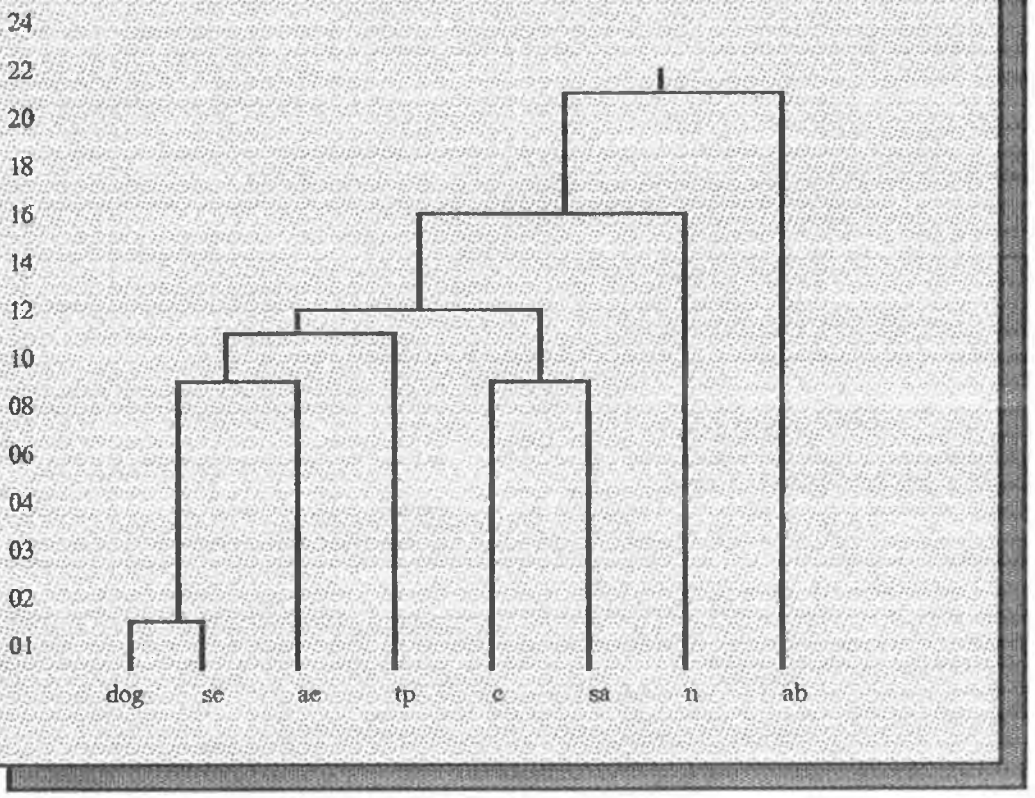
Euclidean Distance Matrix

	Ability	Nach	Dog	T.Pr.	S Al.	Cur	Self.Est.	Att. Ed.
Ability	0	31.273	17.407	13.491	16.371	18.894	18.330	23.495
Need Ach.	31.272	0	20.125	18.974	19.545	18.574	18.601	10.296
Dogmatism	17.407	20.125	0	10.440	15.000	9.487	1.732	9.950
Teacher Pref.	13.491	18.974	10.440	0	13.038	13.892	10.488	11.578
School Al.	16.371	19.543	15.000	13.038	0	8.426	14.238	15.100
Curiosity	18.894	18.574	9.487	13.892	8.426	0	8.544	11.533
Self Esteem	18.330	18.601	1.732	10.488	14.283	8.544	0	11.533
Attitude to Ed.	23.495	10.298	9.950	11.576	15.100	11.533	8.485	0

Table 5.63 Clusters

Node	Group 1	Group 2	Dissimilarity	Number of objects in fused Groups
1	DOG	SE	1.732	2
2	SA	C	8.426	2
3	NODE 1	AE	9.217	3
4	NODE 3	TP	10.835	4
5	NODE 4	NODE 2	12.610	6
6	N	NODE 5	17.686	7
7	AB	NODE 6	19.894	8

Table 5.64 Dendogram



In this instance a generally regular hierarchical pattern emerges with Dogmatism and Self Esteem in close proximity and General Ability the final linked variable to the remaining seven variables.

Cluster Analysis of Fourth Quartile of Academic Achievement

Table 5.65

Raw Data Matrix

	Ab.	Nach.	Dog.	Te. Pr.	Sch.Al.	Cur.	Self.E.	At.Ed
First Quartile	35	30	8	24	15	26	13	9
Second Quartile	8	11	10	18	11	15	12	12
Third Quartile	6	8	13	9	19	7	12	12
Last Quartile	5	5	24	3	9	6	17	12

Table 5.66

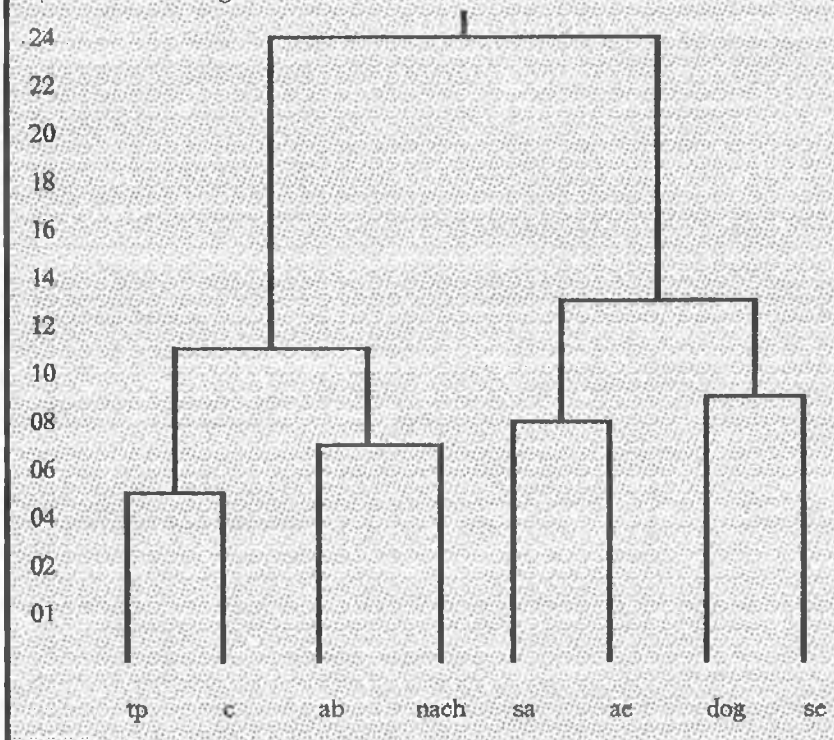
Euclidean Distance Matrix

	Ability	Nach	Dog	T.Pr.	Sch Al.	Cur	Self.Est.	Att. Ed.
Ability	0	6.164	33.257	15.297	24.372	11.489	26.077	30.610
Need Ach	6.164	0	28.879	9.487	19.026	5.831	21.213	25.199
Dogmatism	33.257	28.879	0	27.129	16.793	25.962	8.124	13.229
Teacher Pref.	15.297	9.487	27.129	0	16.319	5.099	19.026	21.517
School Alien.	24.372	19.026	16.793	16.310	0	17.029	10.863	6.858
Curiosity	11.489	5.831	25.692	5.099	17.029	0	18.000	22.428
Self Esteem	26.077	21.213	8.124	19.026	10.863	18.000	0	10.247
Attitude to Ed.	30.610	25.199	13.229	21.517	6.856	22.428	10.247	0

Table 5.67 Clusters

Node	Group 1	Group 2	Dissimilarity	Number of objects in fused Groups
1	TP	C	5.099	2
2	AB	NACH	6.164	2
3	SA	AE	6.856	3
4	DOG	SE	8.124	3
5	NODE 2	NODE 1	10.526	4
6	NODE 4	NODE 3	12.783	4
7	NODE 5	NODE 6	23.502	8

Table 5.68 Dendogram



The dendogram again identifies two distinct groups, but with different members and with a greater difference between the two groups. In the first group are the variables Teacher Preference, Curiosity, General Ability and Need Achievement, and in the second group are School Alienation, Attitude to Education, Self Esteem and Dogmatism.

TEACHER VARIABLES

The following section deals with the examination of teacher variables and compares these with three related student variables.

Table 5.69 Correlation Matrix

Variable	1	2	3
Dogmatism	------		
T/Rôle	0.3135	-------	
T/Flex.	0.4350*	0.3053	------

N = 23. (MALES = 10; FEMALES = 13)

* = p <.05

Table 5.69 A correlation matrix of the three measured teacher variables.

A statistically significant correlation was found between the measures of Teacher Flexibility and Teacher Dogmatism.High scores on the Teacher Measure of Dogmatism indicate lower dogmatic tendency.

The following tables compare the means obtained in related teacher and student measures and test for significance.

Table 5.70 COMPARE MEANS

	Teacher Dogmatism	Student Dogmatism
N =	23	251
MEAN =	160.8696	103.8685

Analysis of variance

Source of Variation	Sum Squares	d.f.	Mean Squares
Between Groups	67439.84	1	67439.84
Within Groups	24939.45	271	92.02747
Total	92379.28	272	

F (Variance ratio) = MS between/MS within = 732.8229

p <.000001

Comparison of means obtained on scores of teacher dogmatism and student dogmatism

Table 5.71 COMPARE MEANS

	Teacher Role	Student Teacher Preference
N =	23	251
MEAN =	43.083	53.79861

Analysis of variance

Source of Variation	Sum Squares	d.f.	Mean Squares
Between Groups	2064.748	1	2064.748
Within Groups	23138.79	271	85.38299
Total	25203.28	272	

F (Variance ratio) = MS between/MS within = 24.1822

p < .000002

Comparison of means of scores obtain on measures of Teacher Role and Student Teacher Preference.

Table 5.72 COMPARE MEANS

	Teacher Flexibility	Student Curiosity
N =	23	251
MEAN =	32.17591	15.31076

Analysis of variance

Source of Variation	Sum Squares	d.f.	Mean Squares
Between Groups	5991.405	1	5991.405
Within Groups	4463.065	271	16.48033
Total	10454.47	272	

F (Variance ratio) = MS between/MS within = 365.1442

p < .000001

Comparison of means of scores obtained on measures of Teacher Flexibility and Student Curiosity.

In each of the three comparison tests significant differences were achieved between teacher and student measures. Table 5.73 below shows the results of the Shapiro and Wilk test for Normality on each of the variables.

Table 5.73 TEST FOR NORMALITY

	Mean	Sum of Squares about the Mean	w	sig.
Student Dogmatism	104.284	19176.84	.9792991	0.212312
Teacher Flexibility	32.17391	709.3043	.9537591	0.351717
Student Curiosity	15.372	3518.404	.9826294	0.448696
Teacher Role	63.91304	947.8261	.9719577	0.727479
Student Teacher Preference	54.012	22190.96	.9912072	0.968440

TABLE 5.73 THE SHAPIRO Wilk Test for Normality conducted on each of the three teacher variables and the three related student variables.

In each case the variable failed to achieve the significance level for normality and the variables were tested for frequency distribution.

The table below indicates the skewness of each variable, and this is further illustrated by a series of Histograms in Appendix 6.0

Table 5.74 Skewness of Distribution

Teacher Dogmatism	Student Dogmatism
-.4132669	-.3760764
Teacher Flexibility	Student Curiosity
.5513613	-.2041338
Teacher Role	Student Teacher Preference
.0491850	-.0379577

Skewness of each comparable teacher and student variable.

In the case of Teacher Dogmatism and Student Dogmatism, both sets of scores are skewed negatively but on the teacher measure, high scores indicate low dogmatism and on the student measure high dogmatism. On the measures of Teacher Flexibility and Student Curiosity scores are skewed positively and negatively respectively, and again on measures of Teacher Role and Student teacher preference similar results were obtained indicating mismatch in each of the three sets of measures.

SUMMARY OF MAIN RESULTS

1. The variable most closely related to Academic Achievement is that of General Ability.

2. Scores of General Ability will most nearly predict Academic Achievement.

3. There is no difference between males and females in General Ability or in Academic Achievement.

4. Other variables are related to academic achievement, but the most significant combination of variables is General Ability, Dogmatism and Curiosity. In the case of Dogmatism the relation is inverse.

5. Such relations are most significant amongst those students with high Academic Achievement and low Academic Achievement. Variable relationships amongst students in the middle range of abilities are less pronounced.

6. It follows then, that even in a teaching/learning environment which is unidirectional, and highly structured, the apparently contradictory personality variables of high Curiosity and low Dogmatism relate to Academic Achievement.

7. It also follows that students having such characteristics are flexible and can adapt to apparently unfavourable learning environments as defined in the theory of teaching and learning styles.

8. The variables General Ability, Curiosity and Dogmatism are related to scores of Academic Achievement in an environment in which teachers present characteristics of inflexibility and high Dogmatism.

9. Teacher/Student mismatching styles are less important than the variables of General Ability, Curiosity and Dogmatism in the prediction of Academic

Achievement.

10. Other variables more associated with successful academic careers such as Self-Esteem, Attitudes to Education, and School Alienation are less significant in predicting Academic Achievement.

11. All eight variables and probably more unidentified, form part of the complex learning teaching environment.

12. The prediction of student achievement requires the monitoring of as many variables as possible.

Table 7.1

ACADEMIC ACHIEVEMENT AND RELATED VARIABLES

HIGH ACADEMIC ACHIEVEMENT

HIGH GENERAL ABILITY *HIGH CURIOSITY*

LOW DOGMATISM

LOW ACADEMIC ACHIEVEMENT

LOW GENERAL ABILITY *LOW CURIOSITY*

HIGH DOGMATISM

AVERAGE ACADEMIC ACHIEVEMENT

UNDETERMINED

Variables which are school modifiable are related to Academic Achievement. Curiosity and Dogmatism are readily modifiable in a sympathetic pedagogy. General Ability reflecting broad intellectual ability may be readily stimulated whithin the school environment.

Table 7.2

INFLUENTIAL VARIABLES

MORE INFLUENTIAL:

General Ability	Curiosity	Dogmatism

LESS INFLUENTIAL:

Need Achievement	School Alienation	Attitude to Education
Teacher Preference		

SUMMARY CORE TABLES (1) MAIN CORRELATIONS

Table Correlation Matrix (Negative Correlations in Italics)

Variable	Correlation Matrix		
	General Ability	Dog	Cur
General Ability			
Dogmatism	*.1655**		
Curiosity	.2067*	*.1174**	
Academic points	.5342*	.2667*	.3188*

* p < .05

(2) COMBINED CORRELATIONS

Table 5.47 Cumulative Significance of Variables under multiple regression.

Variables	p
Academic Points/General Ability	
Attitude to Education	0.0168
Academic Points/General Ability	
Attitude to Education Dogmatism	0.0043
Academic Points/General Ability	
Attitude to Education Dogmatism	
Curiosity	0.0013

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5.DISCUSSION AND IMPLICATIONS

There now follows a discussion of the results obtained for each variable in turn, then special attention is given to the two variables which appeared to enhance the effect of general ability upon academic outcome including a review of other findings in relation to these variables. Finally there is a tentative theoretical enlargement on the results of the study.

General Ability:

The limited scope and connotations of the term 'General Ability' have already been well noted, but it bears repeating that there is no attempt here to suggest that the measure employed indicates the level of 'intelligence' maintained by the subject. The term is used to refer to those measures which are commonly administered to students who enter second level schools and which are used to organise students into what are considered viable instructional groups and to provide some kind of indication of the potential academic ability of the student which the educational institution might seek to realise.

The variable general ability correlated higher than any of the other variables on each of the four correlations made on the available data. Correlations of 0.454; 0.566; 0.705; and 0.534 were obtained on each of the three subject groups and on the combined scores of the three groups respectively. In each case statistical significance was achieved with $p < .05$. On the basis of these correlations predictions were made from the 1987-88 group about the academic performance of the 1988 - 89 group (Table 5.7) and from the scores of these two groups predictions were made about the academic performance of the 1989 -90 group. Predicted scores of academic ability were compared with actual scores of academic ability. Whilst correlations were significant between General Ability and Academic Achievement, Analysis of Variance showed that the predicted scores and actual scores of the 1988 -89 subjects were significantly different,(Table 5.7) whereas when the actual scores of the 1987-88 and the 1988-89 groups were combined to predict the scores of the 1989 - 90 group then the predicted scores were found not to differ significantly from the actual scores (Table 5.11) It would seem that it is feasible to make general predictions about academic potential from such tests of ability in regard to senior cycle academic achievement but it is highly debateable whether accurate particular predictions can be made. We have seen at length that school activity and formal school and public assessment demands certain types of intellectual responses which may well form part of what is considered to be the whole of 'intelligence', and it is likely that those attributes which are measured by tests of general ability and which are used in school administration and prediction are attributes which are used in successful performance in school and school-related tasks. But this is not the whole story. The debate on the nature of intelligence and intellectual development has moved from the position of dogmatic certainty to humble enquiry, -the recognition that if nothing else, the problem is complex. If, as the trend seems to suggest, education policy begins to address other educational objectives than those which most readily lend themselves to assessment, the utility of general predictive tests may decline even further.

After the high correlation of Ability over the total subject range Partial Correlation was applied to determine the significance of other variables with Ability removed. Curiosity and Dogmatism remained significant as did School Alienation but considerably less so.

When the variable General Ability was subdivided into quartiles and an examination of the high/low General Ability factors made, results were inconsistent. Within the first quartile (Table 5.15) the correlation between General Ability and Academic Achievement remained significant ($r = .3547$, $p < .01$), but in no other quartile was significance registered, although the next highest correlation was found within the second quartile. This seems to indicate that the predictive success

of scores of general ability with those of academic achievement are more likely to be accurate amongst those who score highly on measures of general ability, and conversely, a moderate or low score on a test of general ability is not likely to be as accurate a prediction of academic achievement as is a higher score. It is possible that this might lend some weight to the view that those who succeed academically may be those who find the general ambit of educational activity more suited to their intellectual orientation.

When a similar process was applied to the four quartiles of the scores of academic achievement a similar result was obtained within the first quartile. (Table 5.19). A significant correlation ($r = .3638$, $p < .01$) was obtained between General Ability and Academic Achievement, but a significant, but smaller correlation was also obtained ($r = .2774$, $p < .05$) between these two variables within the last quartile, indicating some predictive tendency within those scoring low in academic achievement points. The mid quartiles showed low correlations. (Tables 5.20, 5.21).

Curiosity:

This variable correlated significantly with academic achievement consistently in each of the subject groupings :-0.281, 0.3677, 0.3154, and in the combined group 0.3188. Furthermore, after the use of partial correlation to control for the influence of the general ability variable, curiosity remained significantly correlated with academic achievement (0.2163 Table 5.16). Both within the first quartile of General Ability and that of Academic Achievement, Curiosity correlated significantly with academic achievement (Tables 5.15 and 5.19). There was also a correlation between low Academic points and low curiosity scores within the fourth quartile of General Ability (Table 5.18)This measure was used as group measure which correlated highly with individual measures of creativity, and in the first instance it might seem odd that subjects who score higher in measures of academic achievement which are considered by many to favour non-creative 'end of history' type enquiry also score as more 'curious' on measures such as the one utilised here. The idea of creativity or curiosity can however lead to some misconceptions - the absent minded creative geniuses who forsake all for their art. In other words the term 'creative' often describes a personality trait rather than an intellectual strategy. It is possible to be creative, or exhibit curiosity without aspiring to creative genius, and taken in this light it seems reasonable that those students who are able to move beyond the strict confines of the direct instruction and explicit directives, who are, in common parlance, 'self starters', may well find such a tendency to be to their advantage, when standard sources of information are often fairly basic and sometimes inadequate. I have heard geography teachers, for example, comment that in their subject students who watch programmes on television which demand more than passive somnolence such as documentaries, news, weather, and other informative programmes tend to perform well in their examinations. It does seem plausible that students who do have varying degrees of such capacity will be more successful in intellectual activities in which they take part whether it be speculative cosmology the restoration of antique furniture, or the sitting of senior cycle examinations in a selection of subject areas.

In the test for normality of distribution it was found that the combined measure of Student Curiosity was negatively skewed in the direction of high curiosity scores (-.2041338 : Table 5.73).

Dogmatism:

Dogmatism correlated significantly with academic achievement points in the subjects groups 1987-88 and 1988 - 89 but not in groups 1989 -90. Significance was also obtained under partial correlation using the combined subject scores. However, in each case, including the non-significant correlation of the third subject group the correlation with academic achievement points was negative, the highest being -0.388 in the 1987 - 88 group (Table 5.1). The correlation then exists

between those scoring higher in points and lower in scores of Dogmatism, and this result also might seem at first glance contradictory. We saw earlier in a discussion of Dogmatism academic implications for high or low dogmatics are not cut and dried, and that whilst high dogmatics made decisions which were more confident, faster and more accurate, on the other hand low dogmatics had a greater tolerance for inconsistency and used more information before making a judgement. Clearly when a student is faced with a battery of examinations which represent a wide and varied representative sample of available knowledge, a variety of strategies will be required to perform satisfactorily in such examinations. The workings of the examination marking system are confidential to those involved, but it does seem likely that whilst some subjects ostensibly offer clear cut alternatives requiring confident,fast and accurate decisions, even then there may be demands made of a more circumspect nature requiring the weighing of alternatives - the difference for example between being able to reproduce the proof of a mathematical theorem and being able to decide which particular theorem is applicable to the solving of a particular problem. The negative correlation of Dogmatism with Academic Achievement was maintained within the quartile divisions of Academic Achievement scores but in no case was significant correlation achieved. Table 5.27 demonstrate the consistency of Dogmatism correlations with the exception of the third quartile. A frequency distribution analysis of student dogmatism (Table 5.73) showed the scores to be negatively skewed towards high dogmatic scores and this finding would probably be in agreement with general psychological views of mid to late adolescents who are in general reputed to hold different views at different times but to hold each one vigorously in turn. But it does seem from the findings that the approach a student makes to a learning task - the degree of confidence or conviction, the amount of caution or circumspection - whatever the particular task requires - is a significant variable which is well worth further attention in the overall teaching strategy.Given the significance of the variables Curiosity and Dogmatism within this study, further discussion follows below.

Teacher Preference:

Teacher Preference correlated positively with Academic Ability in the 1988 -9 and 1989 -90 groups, and in the composite group, but not after partial correlation with general ability. That is, on three measures the responses of students who demonstrated a preference for a more 'laissez-faire' and less structured approach correlated with higher points scores in the measures of academic achievement. Whilst the correlations are significant they are weakened by the partial correlation since Teacher Preference correlated more highly with General Ability (0.2912) than with Academic Achievement Points (0.2199 - Table 5.19). When Multiple regression was applied to control for Collinearity and establish the maximum effect cohort of variables, Teacher Preference was the first variable removed as having least effect on the total correlation. Within the first quartile of Academic Achievement Teacher Preference correlates significantly, but is insignificant in the remaining quartiles. The distribution of responses of teacher preference shows a slight negative skew (-.0379577 Table 5.73) which might well represent the fact that most of the subjects were drawn from mixed all ability schools. Such schools have a reputation - whether totally justified or not -of providing the impetus for educational innovation both in curriculum and pedagogy - and are seen as somewhat different in approach to those more traditional schools which present the image of schools which offer a clearly defined product to an equally clearly defined market. The results obtained on this particular measure might also be influenced by what actually happens within a school in addition to the type of teaching approach that particular students prefer.

Need Achievement:

Significant correlations were obtained between Need Achievement and Academic Achievement scores in the 1988- 89, and the 1989, -90 groups and in the combined scores of all three groups, but

the significance was lost after partial correlation with General Ability. The general wisdom amongst those who are involved in teaching senior cycle courses would seem to be that those students who are 'motivated' are the ones more likely to 'succeed' and that such motivation is significant. In fact even in situations in which ability is seen to be the only significant variable some concession may be made to the student's interest or lack of it as contributory to the end result. The source of the 'interest' or motivation is still often seen however as deriving from within the personality of the student or from influences from outside the school. The contrast between, for example, those students who have clear long term goals, and who know precisely the kind of end of school academic achievement result necessary to those goals, and those who enter senior cycle courses with no set goals is quite stark. Again (figure 5.15) the influence of General Ability on Need Achievement is enough to reduce the correlation with Academic Achievement points to non-significance. Within the first quartile of Academic Points, Need Achievement correlated significantly with Academic Achievement, but failed to correlate within the remaining quartiles.

It seems reasonable to suggest that the constant reinforcement that is offered to those students who are able to successfully negotiate their way through the school curriculum - those who have the ability - also instils confidence into the student that more is possible and that goals are achievable.

Self Esteem:

Self Esteem correlated significantly with Academic Achievement in only one of the subject groups that of the 1988 -89 largest group, and even within this group it was one of the weaker correlations. In each of the groups the distribution of scores on the measure of Self-Esteem was skewed negatively (-0.216112, -0.456942, and -0.033366 respectively). Self Esteem correlated significantly with academic achievement within the first and last quartile of that variable (Tables 5.19 and 5.22), but in tests for collinearity self esteem was deemed to be superfluous to the model of minimum significant correlates.

The measure of self-esteem seems to present problems in that the effect of self-esteem or lack of it may be in evidence in different degrees under different conditions. For example social self-esteem may be low and academic self-esteem may be high - the industrious successful student who is poor at sports and unsuccessful in school relationships being badgered for homework to be copied is a favourite topic of school fiction. The problem of wishful thinking may also be a particular problem with measures which demand self-appraisal. Certainly the low correlations obtained in this particular study in comparison with other variables indicate that the measure of general self esteem may be less appropriate as an indicator of useful intervention strategies within the curriculum than a measure which specifically addresses academic self-esteem.

School Alienation:

This measure correlated significantly with Academic Achievement in the subject group of 1988 - 89 and in the Combined Group but became non-significant after partial correlation with General Ability. When each quartile of academic achievement was examined the largest correlation obtained was with School Alienation within the first quartile. But generally correlations amongst this variable were insignificant. The largely non-significant result obtained with this measure is again at first glance surprising and perhaps hints once again at the secret fear of all professionals - that perhaps their expertise is not the only or exclusive variable necessary to their clients well-being. However there may well be some practical inferences to be drawn from the results obtained here. It may be possible that a student is alienated from 'school' or 'the school' but comfortable with a teacher, a number of teachers, a subject, the workings of the school most pertinent to daily activity etc. Teachers should be only too well aware that students express preferences for certain subjects, perform more competently with certain teachers - in other words

exhibit all the complex behaviours associated with interpersonal relationships and documented extensively in the earlier part of the thesis. Also it must be emphasised once more that students who have arrived at senior cycle have either established a rapport with the demands of school life or have at least learned to cope. The senior cycle student body is a non representative sample of the junior cycle student body which entered the school. The distribution of scores shows slight but inconsistent skewness : .011523 in 1987 -88; -0.193962 in 1988 - 89 and -0.075563 in 1989 -90. (APPENDIX B). It is far too facile to conclude that school does not matter. It is an interesting observation that it may not matter quite so much as one might think given that a student perseveres with attitudes which may not be wholly enthusiastic to the environment. It does quite clearly matter momentously if the student is so alienated that they no longer attend and are thus severed from opportunities of access to academic assessment, information and certification.

Attitudes to Education:

It seems reasonable to suppose that those who have most favourable attitudes towards education are those most at home within the system and those who derive most benefit from formal schooling. However it is sometimes quite striking to hear favourable comments on the value of education from those who are least likely to persevere and benefit from it and to hear derisory and dismissive comments from those who will benefit most and use formal schooling as an opening into further education and lucrative employment. There are of course those highly motivated students from educationally aware and ambitious homebackgrounds who have a healthy regard for the benefits of the system and who articulate this view freely.

These comments are by way of preface to an analysis of the correlations achieved between the measure of Attitude to Education and Academic Achievement which proved to be very weak with only the 1989 correlation proving significant and this negatively - a strange result indeed. (Table 5.4; Appendix A). The non-significance of correlations is maintained when the four quartiles of Academic Achievement are examined.(Tables 5-19 to 5-22) Quite clearly the results here are ambiguous and indecisive, but I would suggest that one inference could be that the lack of strong positive correlation could well indicate that expressed attitudes to education may not necessarily reflect the working attitude -in other words that expressed attitudes give vent to an antagonism, to a way of operating, of having to cope with a largely unattractive regime, or that again, as has been suggested above - success in coping and comfort with the system produces complacency and allows freedom to criticise when lack of coping and struggle accentuates and increases the perceived value of the unattainable goal. Also we are again confronted with a group of students who would rightly or wrongly not see themselves as academic in the sense of aspiration to the highest echelons of third level education. Indeed the view is often expressed that education is no longer necessary to 'earn money' especially if the source of income is immediate and available. This view is then contrasted by the instance of many acquaintances who 'went to college' and have no better employment than many who left school at 15 years of age. It is possible that the valuation of education is as much a reflection of socio-cultural attitudes as it is of a genuine association between formal education and post-educational success and advancement.

Significant correlations other than with Academic Achievement:

The influence of Academic Ability has already been noted and controlled for by Partial Correlation but it is interesting to note those variables which correlated significantly with Academic Ability. These included : Teacher Preference which correlated positively with General Ability on each occasion, Curiosity which correlated with General Ability in all but the 1987 group, Dogmatism which correlated, as with Academic Achievement, negatively in the 1988 group and the combined

group and Need Achievement which correlated with General Ability in the 1990 and the combined groups.

Interesting significant correlations obtained in the combined group included Self Esteem and Attitudes to education (0.4341) and Self Esteem and School Alienation (0.3736) These three variables in particular failed to correlate significantly with Academic Achievement contrary to expectations.

Reference has already been made to the tests for collinearity and the removal of variables to establish the minimum number of significant variables. Table 5.49 shows highly significant correlations are achieved with the omission of Teacher Preference, Self Esteem and School Alienation and tables 5.50 demonstrates the maximum effect combination of the variables. The use of multiple regression serves to re-emphasis the influence of General Ability within the various variable combinations.

In summary then, the variable General Ability produced the highest and most consistent correlation with Academic Achievement, and whilst it was possible to predict with some confidence group scores after tests of General Ability, individual scores could be predicted with far less confidence. Other variables also correlated significantly and consistently with Academic Ability, and some retained significant correlation after control for General Ability by partial correlation.

High/Low General ability Correlations

There is a marked lack of consistency amongst the correlations with academic points found in each of the other variables of the four quartiles of general ability (Tables 5.19, 5.20, 5.21, 5.22). General Ability correlated most highly within the first quartile, whilst Curiosity and Need Achievement also correlated significantly. Correlations tended to decrease in the lower quartiles only curiosity correlating significantly within the fourth quartile. This seems to provide some further evidence that those with the greater facility in the skills addressed under 'general ability' are also more likely to succeed in the specific tasks set at the end of their formal schooling and are also most comfortable with those other skills and traits supported by the school system. A more detailed investigation of the four quartiles of academic achievement points was carried out to include an analysis of significant difference of scores between the quartiles.

Again the highest and most consistent correlations were found amongst the first quartile (figs 5.18, 5.19, 5.20, 5.21), but amongst this group higher correlations were found between Need Achievement and Academic points and School Alienation and Academic points than General Ability and Academic points. Within the lower quartiles correlations were again less significant, there being none at all within the second quartile. The findings here seem to reinforce the impression generated above that those who do well are those who enter school most likely to do well.

The analysis of variance (Summary Table fig. 5.30) found within the variables General Ability, Curiosity and Dogmatism, the difference between the quartiles of Academic points scores increases from first to last; -that difference within the scores of academic points were matched by the differences within the respective variables (Dogmatism being a negative correlation as we have noted above), and that the other variables had differences which did not match or only marginally matched the differences between the quartiles of academic points.

High/Low Academic Achievement Correlations

Within the quartiles of academic achievement both General Ability and Dogmatism showed an expected pattern of increasing significant difference. That is, within the First Quartile, General Ability Scores were significantly different from those within the second quartile and so on. Both

Curiosity and Need Achievement exhibited some difference between quartiles in regular sequence. (Tables 5.24 to 5.38). On the other hand the scores in Self Esteem showed no significant difference between any of the four quartiles one with another. Therefore whilst high/low scores of General Ability, Dogmatism and Curiosity tended to reflect high/low scores in Academic Achievement and were significantly different from each other, no such pattern emerged within the remaining variables. The scores of the remaining variables were spread non-significantly amongst the four quartiles of academic achievement. (Summary Table 39)

Cluster Analysis

Cluster Analysis was applied to the quartile groups of academic achievement and two distinct clusters of variables were found amongst the first and last quartiles. Tables 5.53 -56; Tables 5.65 - 68). Within the first quartile General Ability, Curiosity, Teacher Preference and School Alienation formed one cluster, and Need achievement. Self Esteem, Attitudes to Education and Dogmatism formed the other. Within the last quartile the clusters were identical with the exceptions of Need Achievement and School Alienation. Grouping patterns within the mid quartiles tended to be more hierarchical with the final linkage being between a single variable and the remaining seven variables in each case. (Tables 5.57 - 64). Both Cluster Analysis and Analysis of Variance seem to suggest that high and low scoring groups of Academic Achievement display clearer influence of the variables examined than do the mid-range groups.

Teacher Variables:

A total of 23 teachers who taught the subjects responded to the questionnaire which measured dogmatism, flexibility and rôle perception. Teacher variables may well influence academic achievement but are far more problematic and present greater resistance to influence and change. However the Teacher component was added to the overall scheme in recognition of its importance and also, whilst subsidiary to the main thrust, possibly offering some indication as to further and fuller treatment elsewhere.

A further restricting factor to significant findings is the fact that even allowing for a large student subject body. the number of teachers engaged with them over the period of the experiment was limited and response rate amongst teacher subjects was less than total. The respondents numbered 23 and any interpretation based on such figures is obviously extremely tentative.

The correlation matrix Table 5.69 shows that a significant correlation was established between Teacher Dogmatism and Teacher Flexibility. As we see below on examination of the skewness the correlation is between scores of high dogmatism and low flexibility and it would be expected that those teachers who are less dogmatic would be more likely to be teachers who are less fixed in their views of their rôle and more amenable to change. However the purpose of the teacher questionnaire was to examine any relationship there might be between measures of teacher attitude and similar measures of student attitude - to ascertain if the students and teachers exhibited similar or dissimilar dispositions which, according to much theory should be a significant factor in effective learning. Teacher Dogmatism was compared with student dogmatism, Teacher Rôle with Student Teacher Preference and Teacher Flexibility with Student Curiosity. In each case, Analysis of Variance showed that scores on teacher and student measure were unrelated. (Tables 5.70; 5.71; 5.72). The Shapiro and Wilk test for Normality was applied to each variable and again in each case the variable failed to achieve the significance level for normality. (Table 5.73). Frequency Distribution Histograms for each of the variables can be found in Appendix B and a measure of skewness is given. Against expectations the student measure of dogmatism is skewed towards the higher levels of dogmatism whilst the teacher measure is skewed towards the lower levels. An in depth explanation of these findings would be beyond the scope of the thesis and unjustified by the

data, but we have observed that students of adolescence note the vehemence with which views are held at this stage of development notwithstanding the frequent change of view. It is possible that the notion of the stereotypical authoritarian teacher/instructor is no longer appropriate especially amongst teachers who habitually teach adolescent senior cycle students. There certainly seems to be a tendency amongst many such teachers to present alternatives and to listen, if for no other reason than the students themselves increasingly express dissatisfaction with the some of the more traditional pedagogies.

Teacher Flexibility scores were skewed towards low flexibility and student curiosity scores were skewed towards high flexibility. The teacher scores may well represent the current state of the availability of career flexibility. Most teachers are currently resigned to completing their careers in their present teaching position many of course by choice, others through lack of opportunity to do otherwise. Student curiosity scores have been noted and assessed earlier. Whilst elements of the current senior cycle pedagogy can hardly be said to encourage curiosity, and may even, in some instances actively discourage it, it does appear to be to the student's advantage to be curious and creative.

The scores of teacher rôle and student teacher preference were the least divergent of the three pairs with the teacher score skewed slightly towards traditional rôle attitude and the student scores skewed slightly towards 'liberal teaching'.

Student and teacher seem to be mismatched on the measures used here and such mismatch may well be a factor in the overall picture of teacher/pupil relationships. But the aspect of the curriculum under investigation here - the senior cycle, appears to have stronger currents carrying the teacher and student along - the co-operative urge to achieve academic results.

Curiosity and Dogmatism - A Dual Influence.

Recent research on Dogmatism within education shows some conflicting findings. There is a tendency to emphasise the role of dogmatism within the specialised educational activity of counselling - that counselling either within or on the periphery of formal education. There seems to be a measure of agreement on the effects of Dogmatism in this area. Carlozzi's (1) research supported his hypothesis that dogmatism was inversely related to skill in facilitative responding amongst counsellor trainees; Jordan and Hingst (2) found that high dogmatic counsellors were effective with non-ambiguous client problems, but not with complex problems, and that scores on the Rokeach Dogmatism Scale predicted later performance dealing with complex problems; Parkay (3) describes an experiment to reduce dogmatism or close mindedness which he says has a negative correlation with counsellor effectiveness and in a study involving 215 graduate students Carlozzi and Ward (4) established an inverse relationship between dogmatism and 'interpersonal facilitative functioning.'

The relationship between teacher dogmatism and teaching activity is well documented. Level of dogmatism is seen as a significant predictor of the level of implementation of curriculum requirements by elementary school teachers (5) and as an explanation of variance amongst teachers in the planning of instruction (6). In an non-educational setting Kerwin and Schaffer (7) conducted a simulated jury experiment with 216 undergraduate subjects, dividing them into 6 member dogmatic and six member non-dogmatic juries which were given either standard instructions or nullification instructions by the 'judge'. The hypothesis that the Dogmatic 'jurors' would be more influenced by the instruction of the 'judge' was supported by the results. Ohnmacht (8) unexpectedly found that closed-minded did not exhibit characteristics of direct interventionist teaching behaviour, but, as expected, Hough (9) detected less gain in the acquisition of 'human relations skills' amongst high dogmatic preservice teachers. On the other hand Mezoff (10) in another study of human relations training discounts the influence of dogmatism and claims that

field independence is a significant variable, although as we have seen field independence is often listed as a characteristic of low-dogmatics. Willower et al. (11) describe the teaching preference of high dogmatics as more 'custodial' than that of low dogmatics who taught through ' interaction and experience' and Forward (12) established a significant relationship between a group of variables including dogmatism with teacher control style which in turn have a strong effect on student decisions regarding their education. On the other hand Stevens(13) selected a group of teachers variables which he tested for a relation with teacher effectiveness in Junior High School Science and which included dogmatism, and found no significant relationship, and whilst Harrah (14) found no significant difference in levels of dogmatism between elementary and secondary teachers in a state wide survey, she did find significant regional differences.Rust and Kinnard (15) reported a significant relationship between the reported use of corporal punishment and high dogmatism whilst more generally high dogmatic teachers had a preference for a teaching style which favoured 'order and dependence' and was 'exhibitionistic' (16). Amongst trainee science teachers Devore (17) found a greater appreciation of the 'process' skills in those who were 'open-minded', whilst high dogmatic trainee science teachers in the study of Strawitz (18) were less able than low dogmatics to assimilate new beliefs about the subject, and high dogmatism amongst educational managers led to a preference for public relations tasks, rather than instruction and evaluating (19).

Studies of student dogmatism have a more varied range. Simonton (20) established creativity, with its 'opposite point on a single bi-polar personality dimension -dogmatism, as a curvilinear u-shaped function of education. Creativity is seen to flourish within formal education until specialisation takes hold, although as we note below levels of curiosity have also been reported as significantly related to age. Zarembinski (21) refers not to 'formal' education, but simply 'education' when he claims that increased education leads to less dogmatism after his study in which his subjects consisted of 96 functional illiterates between 20 and 60 years and 36 graduate students within the same age range. Stonewater (22) describes Perry's theory of ethical development within college students. This suggests three levels of ethical development culminating in relativism - the idea that a problem may be approached through individual reasoning with the support of authority figures. Dogmatism is seen as belonging to the first stage which is labelled 'dualism' - the idea that each problem consists of just the two opposites. In a study of the instructional preferences of student nurses Renn (23) found a weak relationship between student performance and type of instruction. Amongst the variables tested, self esteem correlated significantly with performance. More work on science process skills (24) by Campbell includes an attempt to lessen dogmatism by providing instruction and information on black scientists. Significant differences occurred within dogmatic groups in processing skills who also received the experimental information. Studies of attainment or cognitive ability show equally varied approaches. The ability of high dogmatic and low dogmatic students was tested in answering higher order and lower order questions by Flake (25), and no effect was noticed either on the responses or the attention behaviour. Hiller (26) identified intellectual self-confidence from a battery of variables, which included dogmatism, as being the best predictor of retention of knowledge gleaned from a prose passage. Learning strategies were changed by Diamond (27) to discover the student characteristics most amenable to change. These included critical thinking skills, self-esteem high school averages and low dogmatism.Rychlicka and Necka (28) conducted an unusual study into effects of dogmatism and intelligence on syllogistic reasoning. In addition to logically valid syllogisms, other syllogisms containing either absurd premises or absurd conclusions were used - the hypothesis being that high intelligence would result in fewer wrong conclusions than high dogmatism. In the event neither variable was significant in determining scores. The conclusion that the results may be explained by the fact that syllogisms are not representative of human intelligence -being a set of artificial rules of inference - is one that might equally be applied to many formal school examinations. Fairhall and Punch (29) found a negative

correlation between dogmatism and aesthetic experience, Sexton (30) discovered a relationship between dogmatism and alienation whilst in a study echoed below relating to curiosity Rubley (31) examined the notion that the onset of logical thought processes in adolescence corresponding to Piaget's stage of formal operations coincides with a reduction in dogmatism. Grumer(32) tested the effect of dogmatism and intelligence on the understanding of satirical writing and found some effect although inconclusive in the context of the main discussion of dogmatic effects.

Curiosity is seen by Rossing and Long (33) as a function of age declining significantly amongst adolescents as a motivation to learn, on the other hand Camp (34) found no deterioration in levels of curiosity with age but found depression as a block to curiosity although he had described previously (35) how the perceived value of an object and the desire for more information was positively related to age in the young and the middle-aged, but not in the older age group. Testing the predictive value of curiosity and anxiety for academic achievement in later school careers, Yost (36) was able to predict sixth grade achievement scores for girls from fourth grade measures of curiosity. In Nigeria, Meduewesi (37) studied several variables including curiosity amongst over 500 rural and urban children, and concluded that age was the main determinant of differences. Similarly Englehard (38) found that grade level correlated inversely with level of curiosity but there was no correlation with gender. In an examination of daydreaming and curiosity amongst gifted 10 - 16 year olds Gold and Henderson (39) discovered a stability of frequency, but a significant change in the content of both variables. Hawkins (40) in an examination of the variable requirements for the acquisition of the four stages of Piaget's developmental theory wonders if curiosity might not be a distinguishing variable of the formal operational change. Mayes (41) describes curiosity as a 'complex function' related to other psychological functions such as motivation, arousal, attention and novelty preference.

The effect of curiosity on learning is an interest of researchers. Schack and Strako (42) asked 308 teachers which criteria they preferred in recommending students for programmes for gifted children. Amongst the four most cited variables were creativity and curiosity. Webb and Baird (43) suggest that the motivated learners include curiosity amongst their attributes. But Davidson and Greenberg (44) identified curiosity as one of the variables which did not distinguish high achieving deprived students from low achievers. Significant variables included verbal information, conceptual ability and cognitive skills. But amongst factors differentiating successful school performance amongst races, curiosity was identified amongst black children by classroom teachers, but not amongst white children (45). And in Harty's (46) experiment with gifted and non-gifted elementary school children the non-gifted were slightly more curious than the gifted.

The subject science again is of interest to researchers into curiosity. Harty et al. (47) found significant correlations between curiosity about science with attitude and interest and positive findings with computers by Menis (48) in Israel show that they provide the curious with an opportunity to improve learning attitudes.Studies have examined the relationship between curiosity and intelligence. No correlation was found by Beer (49) between spatial ability and curiosity nor by Henderson and Wilson (50) between intelligence and curiosity amongst pre-school children. However Greenberger et al. (51) established a significant relationship between problem solving and curiosity amongst elementary school boys, and a lesser relationship amongst girls.

An examination by Jones (52) of the characteristics of those teachers whom students believed best at stimulating curiosity showed that they had enthusiasm, were willing to listen and were humorous, amongst other qualities. Need achievement, often considered to be of some importance to examination success, was found by Greenberger and Entwistle (53) not to be correlated with curiosity. Finally, and quite revealingly, Holmes and Holmes (54) conducted a survey of children's literature published since 1922 and examined it for elements of curiosity. Of the 116 direct references to or instances of curiosity, only approximately 9 % were deemed to be

positive - that is curiosity was perceived as a desirable trait. Over 13% were negative and the remainder neutral. After dividing the samples into pre- and post- 1970, the researchers found a clear shift to the negative post- 1970.The range of interest of researchers examining the variables curiosity or dogmatism quoted above is indeed wide and varied. Results often reflect the variety, and in some cases contradict each other. It must be emphasised again that this particular study was not an experiment in the sense of an operation upon one or more variables within a highly controlled environment but an observation of vibrant and complex learning environments in which variables intermingle and interact and life is present in all its complexity. Whilst the complaint of Bronfenbrenner (55) that:

> **'much of developmental psychology is the science of the strange behaviour of children in strange situations with strange adults for the briefest possible time'**

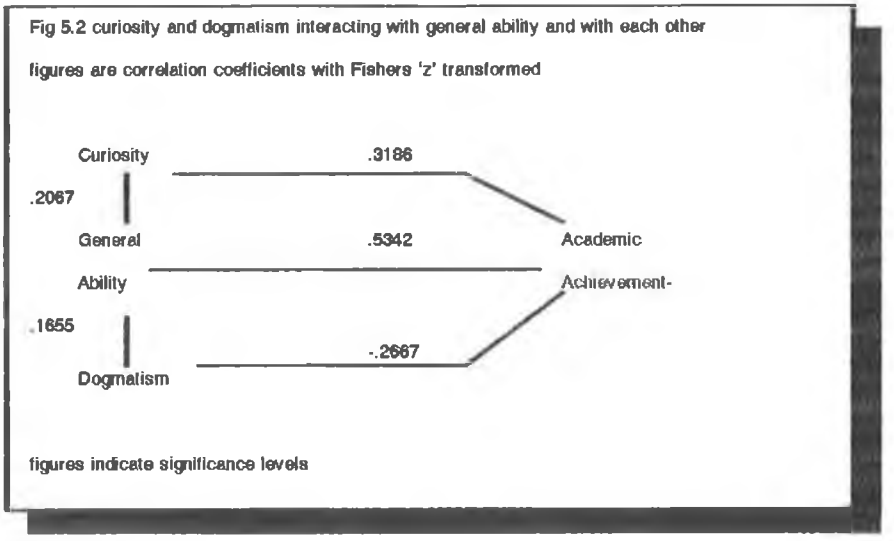
may be rather extreme, his observation that

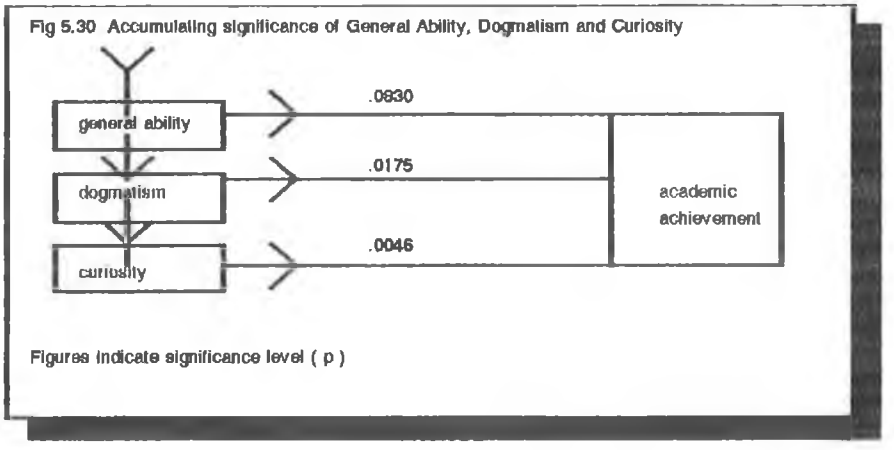
> **'much educational research is preoccupied merely with assessing outcomes and identifying which factors are statistically associated with these outcomes; underlying processes to the extent that they are considered at all, become matters for speculation based on the pattern of statistical associations. Moreover such patterns are almost always invariably susceptible to multiple and equivocal interpretations since, unlike laboratory experiments, the typical field research is not designed in such a way as to permit ruling out alternative explanation at the level of causal mechanisms,**

'is most certainly worthy of notice.A result obtained in a highly controlled brief time experiment may show different results to an 'ecologically valid' observation, but this does not mean that the results of one must be invalid. Both results may be invalid due to faulty design; both results may be valid but within different 'ecological' situations. And in such situations all generalisations are probabilisitic. (See Snow Ch. 2 above.) These observations are made simply as an introduction to a more detailed discussion of the findings of this study and again to reiterate the particular, peculiar and complex environment in which they were obtained.

It is important to note that the context is educational and that the terms Dogmatism and Curiosity relate to activities and attitudes of the participants within that activity. The identification of 'low dogmatism' is not simply the absence of 'high dogmatism'; it is descriptive of an attitude and an approach to learning which is distinct. The literature clearly demonstrates that low dogmatics within different settings have characteristics which contribute to their educational performance. It is equally clear that curiosity is a construct which is not inversely synonymous with dogmatism in this setting. Again there are distinct characteristics and activities associated with the high or low curiosity student. It is only by examining the nature of each concept within the setting that any relevant conclusion can be drawn about the interaction of the two variables which have been shown to be independently and co-operatively, significantly related to academic achievement. It is possible to be curious about a particular branch of knowledge to the extent that the student wishes to go beyond the material which is formally presented and to explore inferences which are suggested by such material especially, if, according to some research quoted above, curiosity can be linked to a higher order of thought which does not need the same external organisation and is a characteristic of the 'self-starter'. But to relate such a predilection to the specific requirements of the examination class in which time is often of the essence, the 'curious' operator might well be able to sublimate such preference to the higher and more immediate priority of examination success and submit to a method of instructional presentation which is not only preferred but deemed most economical and effective at any particular time. In other words - with reference to the specific ecological and 'momentary' conditions obtaining a student with a deep preference for one method of instruction might well utilise the temporary and different method as

circumstances dictate. In this way a predominantly dogmatic presentation of learning material and examination preparation might well be used by the high curiosity student in conjunction with other more 'curious' characteristics either within the school or in private study. Thus the 'curious' student functions in the 'dogmatic' instructional environment. The positive correlation of high curiosity with academic achievement also indicates that whilst the pedagogy of the final





examination year is predominantly dogmatic -assuming as we have seen the urgent necessity to present the 'right' answers in the sense that alternatives are few and far between - the reality of the examination criteria might be somewhat different. We are straying somewhat beyond the parameters of this study here -but this possiblity does reinforce the suggestion that those students who have 'curious' characteristics are not disadvantaged in a 'non-curious' environment, but may,in fact, thrive. If the curious can accommodate themselves in the non-curious atmosphere of unidirectional presentation of 'right' answers to be reproduced in a clearly defined manner, then the non-dogmatics can apparently equally accommodate themselves in a dogmatic environment.

The literature tends towards the general view that preference for dogmatic interpersonal interaction

deteriorates with age and that low dogmatism is a function of increase in formal education. Certainly, as we have seen in previous chapters, the general stated intent of much written educational policy is in this direction. But there is no doubt that at certain stages within a student's school career there is recourse in one form or another to the dogmatic or authoritarian presentation of instruction for whatever reason. The reason may well be important. The epistemological method of authoritarianism has according to Montague (56) at least three criteria by which the source of information is validated. These are prestige, number and age. Within the educational setting the teacher vis a vis the student can, if it so desired lay claim, within the definitions of the educational process, to each of these criteria as justification for his/her source of knowledge. But in addition to the basis for claims to knowledge, which would be covered by the term low-curiosity, there is also implied in the term 'high-dogmatism' within the educational context a methodology which supports the non-curious epistemology. Within this context a dogmatic preference refers to a method of instruction, a curious preference refers to a method of knowledge acquisition.By this differentiation it is possible to construct a dual variable explanation of the results obtained. The low dogmatic prefers a teaching methodology which according to the literature is less directed or 'custodial' and of 'low structure'. If however dogmatism decreases with age and increased formal education then the appreciation of flexibility in adolescents might well lead them, paradoxically, to the conclusion that in order to achieve a goal, again most economically and efficiently, submission to dogmatic instructional methods might be appropriate. It would seem that the lesson of 'ecologically valid' interaction research is that exclusivity of variables is rather less achievable than might be desired or apparent.

A Theoretical Extension.

It could be argued that the term 'Theory of Education' is meaningless. The influential theories applied widely to educational practice seem invariably to have their origins in other disciplines. Theories such as the developmental stage theory of Piaget and its variants derive from biology; psychology provides a wealth of derivatives from the Stimulus Response Theory of Skinner to the humanistic facilitation of Rogers. Latterly the psychological basis of educational practice has been supplemented by contributions from Sociology and Anthropology in the critiques of deficit concepts, and the proposition of difference concepts and the applications of equality of opportunity. Philosophy also has a long history of contribution to educational debate and practice.

A second factor in the consideration of the term 'Educational Theory' is the nature of the aims and purposes of such a theory. Is the theory to be a grand unifying theory which once and for all dispels all argument and explains 'education' constructing an ideal to which all pedagogy inevitably aspires; or does a theory of education seek, in the words of Bigge (57) to develop:

> **'a systematic integrated outlook in regard to the nature of the process whereby people relate to their environment in such a way as to enhance their ability to use both themselves and their environments more effectively.'**

However Bigge's definition is not one of 'educational theory' but of 'learning theory'. Like most attempted definitions within the sphere of education which seek to present all embracing explanations, this definition drifts inevitably towards one, more at home within the discipline of psychology or sociology. If 'learning' and 'education' are taken to be synonymous then attempts to describe educational theory will inevitably fail to satisfy. It can hardly be denied that there are strong connections and that theories which are initially taken from disciplines such as psychology and sociology become adapted and changed to such an extent that education theory might be considered a more appropriate description. However the academic field of 'education' is invariably divided into subdisciplines of Educational Psychology, Educational Sociology etc. etc. and experts

in such subdisciplines usually are grounded in the major discipline of psychology, or sociology. Even within such disciplines, as we have seen in the literature review section, these disciplines become separated and almost detached (experimental or correlational psychology for example - see Cronbach etc. ch.2).High expertise is acquired in major discrete fields, then applied to education. Such major discrete fields have as necessary qualities distinctive terminology, methodology and emphases. For example much debate in education revolves around educational sociologists or psychologists arguing the inadequacy or irrelevance of each others findings or theories.

Some approaches have come very close to earning the title 'educational theory'. An example is that of the B.P.E. formula of Hunt and associates (58) who adapted Lewin's equation (B=F(L) quoted earlier in the thesis and applied it to various influential psychological theories of learning, B.P.E. being the initialisation of Between Psychology and Education. They emphasise that:

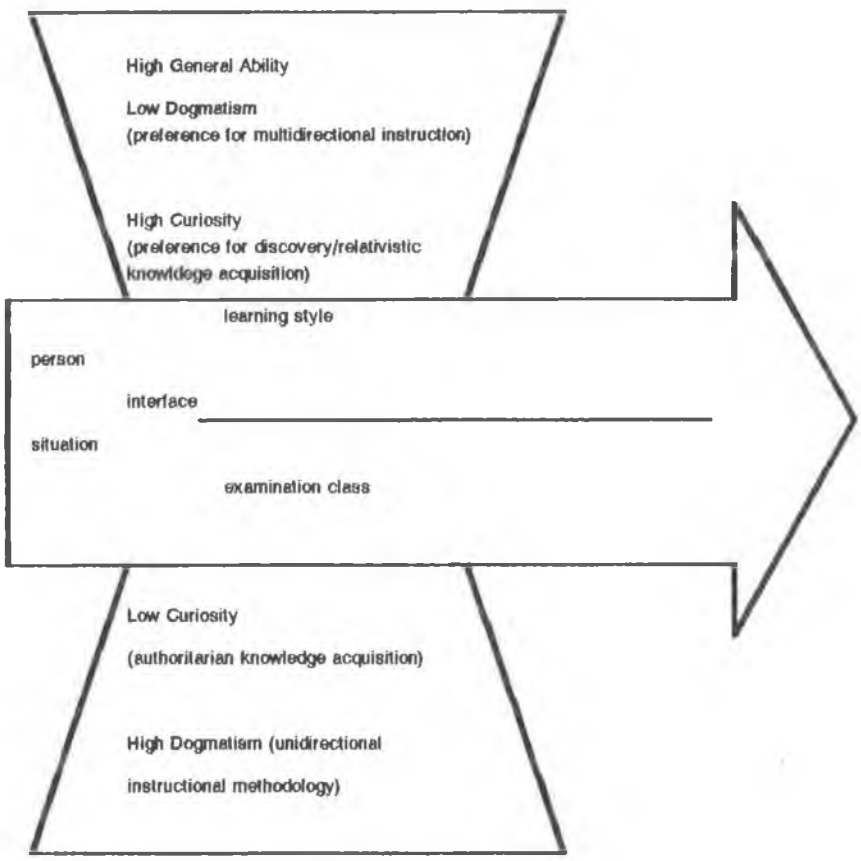
> **'interdisciplinary activity, like interpersonal relations, requires a mutually agreeable communication system compatible with the language, frame of reference, concepts and ideas of each party.'**

However in defining the parameters of their interest, whilst finding concepts of psychology reasonably accessible, concepts of 'education' are rather more elusive, and discussion of such concepts tends to focus on the educational environment and to lean, in the main towards sociological or social psychological referents. This is, of course, not to say that there should be a completely discrete area of knowledge termed 'education' Hunt feels at the conclusion of the exposition of the marriage of disciplines to refer to 'teachers' and theory application -an 'how to do it' chapter as it is termed, and I believe this is an inevitable path down which any 'educational theory' must tread; it is one of the necessary conditions for a theory to be 'educational' rather than 'psychological' or 'sociological', and the dictum of Lewin that there is nothing so practical as a good theory describes precisely this necessary quality of educational theory. The extensive discussion of Aptitude Interaction Treatment illustrates exactly the type of research which has developed encompassing several theoretical positions to produce 'ecologically valid' findings and models of educational practice which are both explanatory and suggestive of ways and means of modification if necessary.

The results obtained in this study are tentative and I believe no more than a indication of possible interactions of variables within the later years of schooling by those facing external examinations. Yet I believe it is a valid procedure to suggest some possible implications resulting from such findings. Variable interaction is complex and opaque. But such interaction as may be indicated here may still imply a generalisable form of operating - the framework to provide a greater investigation and assessment of effects, to apply treatments whilst accounting for aptitudes. I have tried to describe what constitutes educational theory - what it aims to do and how it goes about its business. A theory which develops within an educational framework (especially that which describes classroom and school interaction) is usually part of a patchwork quilt with many parts and in its modest implication this study may add another small patch.

If the academic achievement of a student in the final secondary school certification process is generally held to be 'up to the student' then the variable which would most nearly be associated with such a supposition is General Ability (as presented here) or even more commonly 'intelligence'. Bearing in mind that the nature of the examination process itself which students undergo reflects in some measure those skills and abilities measured by such tests, the relationship which seems to exist between the two measures is understandable. Furthermore the variable of General Ability seems quite clearly to be the best available predictor of achievement in formal end of school testing. If, then, the educator is able to make predictions based on formal tests of general ability, and if the nature of the curricular activities is such that the most efficient method of preparation is thought to be instruction, then there inevitably follows an element of determinism

Fig. 5.3. The interaction variables of the final year examination class (after Snow)



which pervades the educators presentation and permeates the student's preparation. It is possible that prediction of academic outcomes made by means of single instruments such as tests of general ability could be enhanced by the use of other instruments measuring the strength and the presence of other variables.

The influence of general ability and its prediction of final academic outcome echoes generally held ideas and reflects present practice. But at least two other variables amongst many, seem to influence outcome which then increases in combination with general ability.

Figure 5.3 is an attempt to relate the findings of the study with the theoretical position of interaction research. It is tentative and incomplete. But it hopefully marks the beginning of further and deeper studies in this neglected area. It is possible that the mediation of other variables in more subtle ways than have been have discovered here affect the outcome significantly. An obvious step forward would be to discover what exactly mediates the counter effects of apparently contrasting learning style and environmental unsuitability. Studies elsewhere have shown the effect

of anxiety and Future Time perspectives. Another intriguing problem is the effect which may or may not occur if the environment itself is mediated and a compatible learning/teaching structure is established which complements the preferred learning style. There seems to be a contrast between preferred style and actual strategy in the subjects within this study. It seems reasonable to suggest that education is a complex process which if it is to begun to be understood adequately requires analysis which takes into account all aspects of personnel, material and aims and this applies equally to that education which is perceived as instructional, just as much as to that which is perceived as student centred with what are often described as more 'idealistic' aims. Different educational outcomes often require different educational means, but it appears that certain elements in the individualisation of education and the interaction of components apply equally to several educational arenas.

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APPENDIX A

1 Results of the 1988 survey

No	S	AB	NA	D	TP	SA	C	SE	AE	PTS
01	f	112	6	109	67	21	22	14	23	24
02	f	110	6	110	61	26	16	13	14	15
03	f	110	7	097	53	32	13	12	17	16
04	m	115	7	097	47	36	23	11	27	27
05	m	115	7	097	61	27	26	11	20	17
06	f	113	8	093	67	24	15	10	21	17
07	m	107	8	092	62	35	22	09	21	22
08	f	108	5	107	61	30	16	09	17	24
09	m	111	8	100	55	27	18	09	21	28
10	f	109	9	101	61	34	16	08	26	09
11	f	132	8	102	66	29	15	08	20	21
12	f	106	7	104	69	34	18	07	24	32
13	f	120	5	095	63	25	08	07	26	29
14	f	124	8	107	66	26	18	05	19	23
15	m	107	6	109	70	29	18	04	19	14
16	m	117	6	107	59	25	14	04	19	04
17	m	106	7	118	49	22	15	04	08	02
18	f	109	1	108	53	27	13	02	14	10
19	f	105	7	111	66	25	18	02	24	13
20	m	120	2	116	59	28	16	01	19	15
21	f	104	4	112	48	40	10	06	24	09
22	m	104	6	104	56	26	13	05	26	19
23	m	103	7	096	73	40	16	08	25	07
24	m	102	8	106	49	28	08	09	19	09
25	m	102	5	098	65	28	22	09	15	18
26	m	102	8	102	66	28	18	03	18	14
27	f	102	5	109	46	27	10	08	23	15
28	f	101	4	107	72	25	15	01	10	06
29	f	101	5	091	60	34	14	08	25	13
30	m	101	8	104	47	29	11	11	13	08
31	m	099	4	066	61	31	14	02	19	22
32	m	099	7	100	46	17	15	05	18	07
33	m	098	6	096	53	20	10	08	14	16
34	f	097	6	115	45	36	12	08	22	15
35	f	097	8	080	51	40	20	14	28	23
36	m	097	5	106	51	30	09	11	24	23
37	f	096	5	105	56	29	19	07	24	09
38	f	095	5	098	62	26	15	11	23	19
39	f	095	2	106	49	35	13	07	16	19

40	m	093	5	101	60	22	09	08	23	02
41	m	093	6	101	57	23	16	02	13	06
42	m	093	5	089	58	30	12	10	22	12
43	m	093	4	106	58	31	13	14	29	06
44	f	093	7	091	50	34	15	11	22	09
45	f	092	6	098	67	34	15	12	24	06
46	f	091	2	120	57	41	15	10	22	15
47	f	092	6	091	46	33	13	04	24	02
48	f	090	6	096	51	26	12	13	18	21
49	f	090	5	108	67	34	09	08	24	08
50	f	090	6	092	58	26	14	03	19	24
51	m	090	6	121	48	22	12	04	15	02
52	f	090	4	113	55	30	18	12	23	07
53	f	088	6	110	43	15	13	00	21	01
54	f	088	6	088	48	31	15	05	20	18
55	f	088	5	099	65	33	16	05	23	10
56	f	088	7	101	51	31	11	11	19	10
57	f	087	7	098	53	34	15	11	20	21
58	m	085	7	122	50	26	13	08	20	06
59	f	085	7	118	47	29	18	11	21	06
60	m	083	2	120	44	24	12	11	21	04
61	m	093	2	109	50	28	15	09	22	15
62	m	083	8	104	63	33	12	15	28	16
63	f	082	5	107	62	29	17	10	23	02
64	f	077	4	101	57	28	13	04	22	04

Total Cases = 64. Males = 27. Females = 37.

2 BASIC STATISTICS (1987 -88)

	General Ability	Need Achievement	Dogmatism
Mean:	99.5000	5.78125	102.8906
Variance:	126.44444	3.189484	99.27356
Std. Dev:	11.24475	1.785913	9.963612
Std. Error:	1.405594	0.223239	1.245451
Skewnesss:	0.494761	-0.711895	-0.661675

	Teacher Preference	School Alienation	Curiosity
Mean:	56.8125	29.03125	14.79688
Variance:	61.45635	28.50694	13.6565
Std. Dev:	7.83941	5.33919	3.59647
Std. Error:	0.979926	0.667398	0.461933
Skewnesss:	0.105009	0.011523	0.552170

	Self Esteem	Attitude to Education	Academic Achievement
Mean:	7.84375	20.6778	13.53125
Variance:	13.81647	18.44618	60.82441
Std. Dev:	3.717051	4.294902	7.799
Std. Error:	0.464631	0.536862	0.974875
Skewnesss:	-0.216112	-0.620918	0.275649

3 STATISTICS FOR SIGNIFICANT CORRELATIONS (1987 -1988)

● In each case - simple linear regression and Pearson's Product Moment Correlation

Academic Achievement Points (y) v. General Ability (x)

Equation for straight line: y = .316344 x + -17.54902

Standard error of the slope: 0.078387

d.f. = 62 95%

C.I. for population value of slope = 0.159650 to 0.473039

Correlation Coefficient (r) = 0.456117

r^2 = 0.2080379 95%

C.I. for r (Fisher's z transformed) = 0.236858 to 0.631168 t (with 62 d.f.) = 4.035662

p < .000152 (two tailed)

Correlation is significantly different from zero.

Academic Achievement Points (x) v. Dogmatism (y)

Equation for straight line: y = -.464329 x + 109.1736

Standard error of the slope: 0.151153

d.f. = 62 95%

C.I. for population value of slope =-0.766481 to -.162178

Correlation Coefficient (r) = -0.3634531

r2 = 0.1320981 95%

C.I. for r (Fisher's z transformed) = -0.55929 to -0.129185 t (with 62 d.f.) = -3.071913

p < .0003157 (two tailed)

Correlation is significantly different from zero.

Academic Achievement Points (x) v. Curiosity

Equation for straight line: y = 0.1315017 x + 13.01749

Standard error of the slope: 0.057814

d.f. = 62 95%

C.I. for population value of slope = 0.015934 to 0.247070

Correlation Coefficient (r) = 0.274575 r2 = 0.077019

95% C.I. for r (Fisher's z transformed) = 0.043037 to 0.489913 t (with 62 d.f.) = 2.274575

p < .0264027 (two tailed)

Correlation is significantly different from zero.

School Alienation (y) v. Attitude to Education (x)

Equation for straight line: y = .5784540 x + 17.70626

Standard error of the slope: 0.141722

d.f. = 62 95%

C.I. for population value of slope = 0.264547 to 0.831144

Correlation Coefficient (r) = 0.44069 r2 = 0.1942101

95% C.I. for r (Fisher's z transformed) = 0.218559 to 0.619404 t (with 62 d.f.) = 3.865635

p < .000268 (two tailed)

Correlation is significantly different from zero.

Self Esteem (y) v Attitude to Education (x)

Equation for straight line: y = .309539 x + 1.444988

Standard error of the slope: 0.102643

d.f. = 62 95%

C.I. for population value of slope = 0.104360 to 0.514719

Correlation Coefficient (r) = 0.35766 r2 = 0.1279209

95% C.I. for r (Fisher's z transformed) = 0.122632 to 0.554702 t (with 62 d.f.) = 3.015704

p < .003713 (two tailed)

Correlation is significantly different from zero.

Curiosity (y) v. Teacher Preference (x)

Equation for straight line: y = .1527894 x + 6.116525

Standard error of the slope: 0.056636

d.f. = 62 95%

C.I. for population value of slope = 0.039577 to 0.266002

Correlation Coefficient (r) = 0.324120 r2 = 0.1050545 95%

C.I. for r (Fisher's z transformed) = 0.085091 to 0.527874 t (with 62 d.f.) = 2.697768

p < .008980 (two tailed)

Correlation is significantly different from zero.

General Ability (y) v. Teacher Preference (x)

Equation for straight line: y = .4891845 x + 71.70821

Standard error of the slope: 0.171246

d.f. = 62 95%

C.I. for population value of slope = 0.146868 to 0.831501

Correlation Coefficient (r) = 0.341047

r2 = 0.1163087 95%

C.I. for r (Fisher's z transformed) = 0.103945 to 0.541459 t (with 62 d.f.) = 2.856615

p < .005820 (two tailed)

Correlation is significantly different from zero.

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4. Results of 1989 Survey

NO	GA	NA	D	TP	SA	C	SE	EA	PP	AP
G1	117	6	91	65	39	17	18	44	19.06728	9
G2	103	9	88	83	21	21	15	72	14.63846	10
G3	91	9	111	65	44	17	19	36	10.84232	3
G4	99	6	116	49	27	15	17	55	13.37308	14
G5	100	8	102	61	32	16	15	50	13.68942	9
G6	98	6	105	64	37	12	14	52	13.05673	7
G7	116	6	95	60	38	13	14	46	18.75093	10
G8	95	8	101	54	27	14	10	63	12.1077	12
G9	93	5	97	53	30	19	11	49	11.47501	5
G10	100	5	95	50	31	14	10	53	13.68942	8
G11	110	6	103	54	32	11	15	64	16.28587	22
G12	106	6	105	34	30	10	14	47	15.58749	12
G13	80	8	110	56	26	2	9	62	7.36254	3
G14	105	8	109	63	33	16	21	42	15.27114	10
G15	123	6	96	54	42	17	15	39	20.96535	29
G16	101	4	97	65	28	17	8	59	14.00577	10
G17	114	9	110	65	26	17	15	40	18.11824	24
G18	124	7	93	79	43	21	19	49	21.28169	27
G19	119	9	94	76	41	22	14	27	19.69997	27
G20	121	6	117	55	35	21	7	42	20.33266	21
G21	98	9	107	60	35	14	12	55	13.05673	13
G22	115	7	97	65	41	17	19	26	18.43459	27
G23	111	8	90	50	37	21	14	72	17.16921	27
G24	92	7	116	64	40	15	12	63	11.15867	2
G25	94	7	113	29	31	15	21	47	11.79136	10

NO	GA	NA	D	TP	SA	C	SE	EA	PP	AP
G26	105	7	104	58	31	18	15	46	15.27114	9
G27	106	8	101	68	42	16	21	28	15.58749	15
G28	111	5	109	46	32	15	9	50	17.16921	6
G29	100	7	112	55	33	15	12	57	13.68942	6
G30	118	5	98	52	10	19	3	75	19.38362	20
G31	101	7	100	47	30	14	12	68	14.00577	17
G32	100	4	101	55	30	12	16	53	13.68942	13
G33	184	5	105	76	34	13	20	51	8.62791	7
G34	104	6	111	56	30	15	18	42	14.9548	16
G35	104	6	106	56	30	17	15	55	14.9548	10
G36	87	5	107	56	25	12	7	71	9.57694	11
G37	96	6	102	41	34	17	11	53	12.42404	14
G38	97	3	112	39	28	18	17	73	12.74039	4
G39	110	3	96	39	27	19	17	48	16.85287	15
G40	109	7	100	52	28	16	18	47	16.53652	18
G41	93	6	104	48	33	18	19	40	11.47501	8
G42	94	6	99	48	25	16	11	45	11.79132	16
G43	133	5	96	72	22	9	10	82	24.12879	21
G44	116	5	102	44	28	11	3	81	18.75093	16
B1	90	5	113	48	28	18	14	52	10.52598	20
B2	98	3	108	46	26	12	11	56	13.05673	8
B3	97	7	114	73	23	19	11	72	12.74039	5
B4	89	6	100	61	30	13	14	63	10.20963	9
B5	103	7	95	49	32	13	16	58	14.63846	7
B6	107	6	116	54	27	16	8	49	15.90383	7
B7	108	7	112	55	31	15	13	55	16.22018	11
B8	100	8	112	53	26	19	11	70	13.68942	4
B9	100	9	116	46	27	23	11	77	13.68942	10
B10	110	8	121	39	30	16	16	65	16.85287	15
B11	101	4	121	51	32	16	4	59	14.00577	7
B12	96	5	107	46	18	8	10	81	12.42404	7
B13	87	8	104	58	27	10	18	57	9.57694	6
B14	119	7	90	62	36	17	20	64	19.69997	23
B15	102	5	102	54	36	14	17	78	14.32211	11
B16	105	7	109	51	21	13	7	47	15.27114	10
B17	97	5	117	49	27	10	7	51	12.74039	5
B18	112	6	115	54	30	18	16	41	17.48556	19
B19	103	4	104	40	30	8	12	64	14.63846	5

NO	GA	NA	D	TP	SA	C	SE	EA	PP	AP
B20	102	7	125	41	28	14	12	57	14.32211	8
B21	120	7	109	46	34	6	19	53	20.01631	5
B22	101	7	113	53	31	10	17	51	14.00577	9
B23	92	3	119	51	31	15	19	49	11.15867	5
B24	103	5	105	56	25	12	19	52	14.63846	5
B25	95	6	96	51	25	17	18	67	12.1077	4
B26	115	7	99	60	35	18	19	48	18.43459	8
B27	110	8	98	65	44	19	20	39	16.85287	26
B28	91	5	107	53	31	3	20	74	10.84232	7
B29	120	7	90	69	36	14	17	48	20.01631	16
B30	110	5	100	52	29	15	15	50	16.85287	15
B31	96	5	105	45	22	13	12	73	12.42404	4
B32	95	6	104	56	27	19	10	67	12.1077	10
B33	103	4	103	43	29	16	20	46	14.63846	13
B34	102	4	116	43	22	20	16	59	14.32211	8
B35	102	8	120	53	17	15	6	62	14.32211	11
B36	98	4	127	37	17	15	3	48	13.05673	11
B37	83	4	114	48	36	14	17	43	8.31156	12
B38	99	6	116	54	32	14	7	46	13.37308	5
B39	103	6	108	41	36	18	14	41	14.63846	16
B40	107	9	99	50	37	21	20	45	15.90383	15
B41	101	5	102	51	24	18	16	51	14.00577	7
B42	106	6	89	68	33	23	17	47	15.58749	17
B43	107	6	119	53	28	9	9	55	15.90383	9
B44	94	8	104	56	24	13	9	44	11.79136	9
B45	104	7	105	49	31	20	16	52	14.9548	4
B46	117	6	105	47	31	15	16	50	19.06728	19
B47	103	6	110	52	23	8	10	61	14.63846	7
B48	116	8	105	45	34	13	12	49	18.75093	12
B49	99	4	102	57	34	17	12	63	13.37308	8
B50	111	7	81	62	28	18	15	58	17.16921	8
B51	107	7	100	58	39	16	13	52	15.90383	14
B52	112	6	97	61	34	16	19	58	17.48556	15
B53	91	4	118	50	29	18	16	54	10.84232	13
B54	107	5	91	43	36	12	18	60	15.90383	4
B55	108	9	99	37	29	13	18	57	16.22018	6
B56	111	6	118	16	21	14	12	44	17.16921	18
B57	100	9	108	56	24	15	19	67	13.68942	7

B58	103	5	122	46	24	15	12	58	14.63846	10
B59	121	5	107	54	35	23	15	49	20.33266	14
B60	105	9	109	57	37	20	13	70	15.27114	11
B61	104	8	113	56	33	19	18	44	14.9448	17
B62	111	6	115	61	31	16	12	57	17.16921	18
B63	81	7	114	46	26	18	21	42	7.67888	20
B64	105	4	104	60	34	12	13	61	15.27114	18
B65	101	9	89	54	34	11	14	65	14.00577	16
B66	115	7	102	74	35	19	22	57	18.43459	23
B67	132	9	99	59	39	22	20	40	23.81244	37
B68	113	7	97	54	30	20	20	59	17.8019	20
B69	121	7	73	76	25	20	11	67	20.33266	9
B70	105	6	107	49	26	10	10	63	15.27114	13

Total Cases = 115. Male = 70. Female = 45.

5. BASIC STATISTICS (1988-89)

	General Ability	Need Achievement	Dogmatism
Mean:	104.0956	6.00343	104.1043
Variance:	102.9294	2.50389	184.4101
Std. Dev:	10.14541	1.582368	13.57977
Std. Error:	0.946064	0.147556	1.266321
Skewnesss:	0.250034	-0.033600	-3.693865

	Teacher Preference	School Alienation	Curiosity
Mean:	52.91304	30.45217	15.32174
Variance:	107.238	36.0569	15.904035
Std. Dev:	10.35558	6.00474	3.988026
Std. Error:	0.965663	0.559944	0.371885
Skewnesss:	-0.010248	-0.1939624	-0.593521

	Self Esteem	Attitude to Education	Points
Mean:	14.18261	54.08687	12.45476
Variance:	19.48131	131.5549	44.58474
Std. Dev:	4.414058	11.46994	6.677186
Std. Error:	0.411613	1.169577	0.622650
Skewnesss:	-0.456942	0.175147	0.987725

6. STATISTICS FOR EACH SIGNIFICANT CORRELATION:

● In each case - simple linear regression and Pearson's Product Moment Correlation

Academic Achievement Points (y) v. General Ability (x)

Equation for straight line: y = .372001 x + -26.57209

Standard error of the slope: 0.051023 d.f. = 113 95%

C.I. for population value of slope = 0.271714 to 0.473886

Correlation Coefficient (r) = 0.5664383 r^2 = 0.3208523 95%

C.I. for r (Fisher's z transformed) = 0.427688 to 0.697111 t (with 113 d.f.) = 7.306505

p < .000001 (two tailed)

Correlation is significantly different from zero.

Academic Achievement Points (y) v. Need Achievement (x)

Equation for straight line: y = .8130445 x + 7.087857

Standard error of the slope: 0.389521 d.f. = 113 95%

C.I. for population value of slope = 0.041332 to 1.584747

Correlation Coefficient (r) = 0.1926765 r^2 = 0.0371243 95%

C.I. for r (Fishers z transformed) = 0.009916 to 0.362981 t (with 113 d.f.) = 2.087291

p = 0.039110 (two tailed)

Correlation is significantly different from zero.

Academic Achievement points (y) v. Dogmatism (x)

Equation for straight line: y = -9.512635 x + 22.13785

Standard error of the slope: 0.045381 d.f. = 113 95%

C.I. for population value of slope = - 0.185035 to - 0.010734

Correlation Coefficient (r) = - 0.1934640 r^2 = 0.0374283 95%

C.I. for r (Fishers z transformed) = - 0.365691 to - 0.010734 t (with 113 d.f.) = - 2.096152

p = 0.038301 (two tailed)

Correlation is significantly different from zero

Academic Achievement points (y) v. Teacher Preference (x)

Equation for straight line: y = .1196182 x + 5.785803

Standard error of the slope: 0.059604 d.f. = 113 95%

C.I. for population value of slope = 0.001532 to 0.237704

Correlation Coefficient (r) = 0.1855147 r^2 = 0.0344157

95% C.I. for r (Fishers z transformed) = 0.002489 to 0.356515 t (with 113 d.f.) = 2.006885

p = 0.047149 (two tailed)

Correlation is significantly different from zero)

Academic Achievement points (y) v. Curiosity (x)

Equation for straight line: y = .6156465 x + 2.801273

Standard error of the slope: 0.146470 d.f. = 113

95% C.I. for population value of slope = 0.325512 to 0.905877

Correlation Coefficient (r) = 0.3677309 r^2 = 0.1352360

95% C.I. for r (Fishers z transformed) = 0.197949 to 0.516079 t (with 113 d.f.) = 4.203567

p = 0.000053 (two tailed)

Correlation is significantly different from zero.

Academic Achievement points (y) v. School Alienation (x)

Equation for straight line: y = .3242417 x + 2.360918

Standard error of the slope: 0.1000061 d.f. = 113

95% C.I. for population value of slope = 0.128003 to 0.522480

Correlation Coefficient (r) = 0.2915882 r^2 = 0.0850237

95% C.I. for r (Fishers z transformed) = 0.114596 to 0.450638 t (with 113 d.f.) = 3.240442

p = 0.001568 (two tailed)

Correlation is significantly different from zero.

Academic Achievement points (y) v. Attitudes to Education (x)

Equation for straight line: y = - .1659075 x 23.33661

Standard error of the slope: 0.052493 d.f. = 113

95% C.I. for population value of slope = -0.269905 to -0.061920

Correlation Coefficient (r) = -0.2849928 r^2 = 0.0812209

95% C.I. for r (Fishers z transformed) = -0.444887 to -0.107492 t (with 113 d.f.) = -3.160586

p = 0.002021 (two tailed)

Correlation is significantly different from zero

Academic Achievement points (y) v. Self Esteem (x)

Equation for straight line: y = .2863675 x + 8.173345

Standard error of the slope: 0.139730 d.f. = 113

95% C.I. for population value of slope = 0.009536 to 0.563199

Correlation Coefficient (r) = 0.1893079 r^2 = 0.0358375

95% C.I. for r (Fishers z transformed) = 0.006420 to 0.359941 t (with 113 d.f.) = 2.049428

p = 0.042736 (two tailed) Correlation is significantly different from zero

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Dogmatism (y) v. General Ability (x)

Equation for straight line: y = -.384197 x +144.0978

Standard error of the slope: 0.120618 d.f. = 113

95% C.I. for population value of slope = -0.623164 to -0.145231

Correlation Coefficient (r) = -0.28703270 r^2 = 0.0823878

95% C.I. for r (Fishers z transformed) = -0.446667 to -0.109687 t (with 113 d.f.) = -3.185231

p = 0.001870

Correlation is significantly different from zero.

Teaching Preference (y) v. General Ability (x)

Equation for straight line: y = .2047867 x +32.59564

Standard error of the slope: 0.094068 d.f. = 113

95% C.I. for population value of slope = 0.018420 to 0.391153

Correlation Coefficient (r) = 0.2006306 r^2 = 0.0402526

95% C.I. for r (Fishers z transformed) = 0.018188 to 0.370141 t (with 113 d.f.) = 2.176997

p = 0.031561

Correlation is significantly different from zero.

School Alienation (y) v. General Ability (x)

Equation for straight line: y = .138745 x +16.00943

Standard error of the slope: 0.054127 d.f. = 113

95% C.I. for population value of slope = 0.031510 to 0.245980

Correlation Coefficient (r) = 0.2344189 r^2 = 0.0549522

95% C.I. for r (Fishers z transformed) = 0.053610 to 0.400345 t (with 113 d.f.) = 2.563333

p = 0.011681 (two tailed)

Correlation is significantly different from zero.

Curiosity (y) v. General Ability (x)

Equation for straight line: y = .1076757 x + 4.113169

Standard error of the slope: 0.035564 d.f. = 113

95% C.I. for population value of slope = 0.037217 to 0.178135

Correlation Coefficient (r) = 0.2739235 r^2 = 0.0750341

95% C.I. for r (Fishers z transformed) = 0.095609 to 0.435205 t (with 113 d.f.) = 3.02765

p = 0.003054 (two tailed)

Correlation is significantly different from zero.

Teacher Preference (y) v. Need Achievement (x)

Equation for straight line: y = 1.945409 x + 41.59776

Standard error for the slope: 0.587811 d.f. = 113

95% C.I. for population value of slope = 0.780850 to 3.109968

Correlation Coefficient (r) = 0.2972653 r^2 = 0.0883667

95% C.I. for r (Fishers z transformed) = 0.120726 to 0.455578 t (with 113 d.f.) = 3.309584

p = 0.001254 (two tailed)

Correlation is significantly different from zero.

Self Esteem (y) v. Need Achievement (x)

Equation for straight line: y = .5572412 x + 10.65503 d.f. = 113

Standard error of the slope: 0.257127

95% C.I. for population value of slope = 0.047825 to 1.066657

Correlation Coefficient (r) = 0.1997620 r^2 = 0.0399049

95% C.I. for r (Fishers z transformed) = 0.017284 to 0.369562 t (with 113 d.f.) = 2.16718

p = 0.032320

Correlation is significantly different from zero

Teacher Preference (y) v. Dogmatism (x)

Equation for straight line: y = - .2158593 x +76.38394

Standard error of the slope: 0.068803 d.f. = 113

95% C.I. for population value of slope = -0.352170 to -0.079548

Correlation Coefficient (r) = -0.2830667 r^2 = 0.0801268

95% C.I. for r (Fishers z transformed) = -0.443205 to -0.105420 t (with d.f. 113) = -3.137358

p = 0.002174 (two tailed)

Correlation is significantly different from zero

Self Esteem (y) v. Dogmatism (x)

Equation for straight line: y = -6.160904 x +20.59638

Standard error of the slope: 0.030024 d.f. = 113

95% C.I. for population value of slope = -0.121091 to -0.002127

Correlation Coefficient (r) = -0.1895391 r^2 = 0.0359251

95% C.I. for r (Fishers z transformed) = -0.360150 to -0.006660 t (with 113 d.f.) = -2.052025

p = 0.042478 (two tailed)

Correlation is significantly different from zero

School Alienation (y) v. Teacher Preference (x)

Equation for straight line: y = .1820364 x +20.58466

Standard error of the slope: 0.051760 d.f. = 113

95% C.I. for population value of slope = 0.080481 to 0.285572

Correlation Coefficient (r) = 0.3156413 r^2 = 0.0996295

95% C.I. for r (Fishers z transformed) = 0.140661 to 0.471500 t (with 113 d.f.) = 3.536083

p = 0.000590 (two tailed)

Correlation is significantly different from zero

Curiosity (y) v. Teacher Preference (x)

Equation for straight line: y = 8.598823 x +10.68585

Standard error of the slope: 0.035313 d.f. = 113

95% C.I. for population value of slope = 0.016026 to 0.155950

Correlation Coefficient (r) = 0.2232829 r^2 = 0.0499552

95% C.I. for r (Fishers z transformed) = 0.041885 to 0.390430 t (with 113 d.f.) = 2.435004

p = 0.016456 (two tailed)

Correlation is significantly different from zero

Curiosity (y) v. School Alienation (x)

Equation for straight line: y = .1302205 x +11.35624

Standard error of the slope: 0.061265 d.f. = 113

95% C.I. for population value of slope = 0.008844 to 0.251579

Correlation Coefficient (r) = 0.1960720 r^2 = 0.0384442

95% C.I. for r (Fishers z transformed) = 0.013444 to 0.366041 t (with 113 d.f.) = 2.125531

p = 0.035720 (two tailed)

Correlation is significantly different from zero

Self Esteem (y) v. School Alienation (x)

Equation for straight line: y = .3504462 x +3.510761

Standard error of the slope: 0.060788 d.f. = 113

95% C.I. for population value of slope = 0.230015 to 0.470878

Correlation Coefficient (r) = 0.4767355 r^2 = 0.2272768

95% C.I. for r (Fishers z transformed) = 0.321709 to 0.606869 t (with 113 d.f.) = 5.765072

p = 0.000001 (two tailed)

Correlation is significantly different from zero

Attitude to Education (y) v. School Alienation (x)

Equation for straight line: y = -.8667502 x + 81.25529

Standard error of the slope: 0.160127 d.f. = 113

95% C.I. for population value of slope = -1.183991 to -0.549509

Correlation Coefficient (r) = -0.4537610 r^2 = 0.2058991

95% C.I. for r (Fishers z transformed) =-0.588014 to -0.295176 t (with 113 d.f.) = -5.412882

p = 0.000001 (two tailed)

Correlation is significantly different from zero

Attitude to Education (y) v. Curiosity (x)

Equation for straight line: y = -.7003779 x + 65.59187

Standard error of the slope: 0.262415 d.f. = 113

95% C.I. for population value of slope = -1.220270 to -0.180486

Correlation Coefficient (r) = -0.2435171 r^2 = 0.0593006

95% C.I. for r (Fishers z transformed) =-0.408416 to -0.063226 t (with 113 d.f.) = -2.668967

p = 0.008729 (two tailed)

Correlation is significantly different from zero

Attitude to Education (y) v. Self Esteem (x)

Equation for straight line: y = -.8865069 x + 67.43385

Standard error of the slope: 0.229781 d.f. = 113 95%

C.I. for population value of slope = -1.341744 to -0.431269

Correlation Coefficient (r) = -0.3411608 r^2 = 0.1163907

95% C.I. for r (Fishers z transformed) =-0.493446 to -0.168582 t (with 113 d.f.) = -3.858053

p = 0.000191 (two tailed)

Correlation is significantly different from zero

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7. RESULTS OF THE 1990 SURVEY

NO	S	GA	NA	D	TP	SA	C	SE	EA	AP
01	F	111	7	102	54	24	18	08	23	22
02	F	115	6	099	59	27	22	10	17	20
03	M	113	7	101	54	30	19	12	20	21
04	M	123	9	108	67	27	18	06	20	25
05	F	110	6	108	66	25	18	14	21	23
06	F	106	7	103	69	30	15	10	23	24
07	F	130	8	109	62	29	17	09	23	25
08	M	115	8	101	63	24	22	07	20	24
09	F	105	6	109	66	27	20	06	25	18
10	M	116	6	107	59	26	14	05	18	19
11	M	109	4	100	53	26	13	05	15	13
12	M	120	4	115	58	28	13	05	19	19
13	F	120	4	097	54	30	15	07	20	26
14	M	110	7	100	52	32	10	12	23	18
15	F	108	7	101	59	31	16	12	10	22
16	F	107	8	094	50	35	20	08	20	20
17	M	115	7	098	46	36	23	15	21	25
18	M	107	6	103	68	30	20	05	21	14
19	M	106	8	115	50	20	19	07	10	05
20	F	110	5	112	59	33	21	12	16	14
21	M	109	8	108	60	30	20	09	23	11
22	F	107	7	098	45	34	22	10	20	18
23	M	119	5	112	54	29	10	07	20	21
24	M	120	8	111	65	24	17	06	22	24
25	M	106	7	119	50	21	16	04	09	09
26	F	103	5	110	48	40	21	10	27	12
27	M	105	7	100	60	27	15	10	18	19
28	M	104	5	109	58	21	17	12	21	08
29	F	104	7	107	55	19	17	15	19	12
30	F	104	5	103	56	20	15	07	11	14
31	M	104	6	105	50	38	12	07	24	18
32	M	103	7	100	65	41	16	12	22	12
33	M	103	6	099	67	35	16	04	16	06
35	M	102	6	101	62	38	16	10	11	09
36	F	102	7	108	42	30	10	07	23	18
37	F	101	6	101	40	29	14	10	20	16

38	F	101	4	099	35	30	21	15	18	17
39	M	101	8	104	60	38	18	13	20	14
40	F	099	6	112	44	37	14	10	22	17
41	F	099	6	114	40	34	16	08	15	14
42	M	099	4	089	58	28	14	07	16	19
43	M	098	6	100	44	15	15	07	20	08
44	M	098	5	099	42	18	12	08	18	07
45	F	097	6	110	44	30	15	13	20	16
46	F	097	7	107	28	40	16	11	13	14
47	F	096	5	104	50	25	20	09	20	11
48	M	096	5	099	45	26	21	15	18	14
49	M	095	4	101	51	29	18	12	22	09
50	F	094	3	102	47	36	13	10	14	18
51	M	093	5	101	55	19	11	09	21	06
52	M	093	5	102	51	24	11	13	19	09
53	F	094	6	101	48	27	18	11	19	13
54	M	094	4	099	47	23	10	12	22	05
55	F	092	8	095	47	30	16	14	22	11
56	F	092	7	099	42	19	20	15	19	12
57	M	092	6	102	37	25	12	12	18	10
58	M	091	4	104	56	30	14	14	27	09
59	M	091	6	118	48	20	11	06	15	04
60	F	091	5	115	56	40	18	12	20	12
61	M	090	4	111	49	33	20	12	23	08
62	F	090	6	113	49	29	20	07	22	11
63	F	089	4	105	40	18	15	10	21	06
64	F	089	3	106	42	21	12	12	19	09
65	M	089	3	111	53	25	12	09	21	07
66	M	088	5	106	42	26	13	10	19	05
67	F	088	7	099	48	33	12	11	20	12
68	F	087	4	111	50	35	16	12	18	17
69	F	087	3	099	48	28	18	11	17	19
70	M	085	7	104	59	33	14	15	25	13
71	M	085	3	108	41	30	16	12	21	10
72	F	083	4	101	50	22	13	07	19	05
73	F	081	3	105	43	21	14	09	23	04

TOTAL CASES = 73 MALES = 38 FEMALES = 35

8. BASIC STATISTICS

	General Ability	Need Achievement	Dogmatism
Mean:	101.0556	5.736111	104.5556
Variance:	113.7997	2.337832	35.6025
Std. Dev:	10.66769	1.528997	5.966784
Std. Error:	1.2572	0.180194	0.703192
Skewness:	0.36930	-0.120112	0.276993

	Teacher Preference	School Alienation	Curiosity
Mean:	51.86111	28.375	16.05556
Variance:	76.43114	37.6743	11.74335
Std. Dev:	8.742491	6.137939	3.425867
Std. Error:	1.030312	0.723363	0.403859
Skewness:	-0.046582	-0.075563	-0.058162

	Self Esteem	Attitude to Education	Academic Achievement
Mean:	9.833333	19.40278	14.19444
Variance:	9.014085	13.96225	36.07433
Std. Dev:	3.002347	3.736609	6.006191
Std. Error:	0.353829	0.440363	0.707836
Skewness:	-0.033366	-0.805127	0.189403

9. STATISTICS OF SIGNIFICANT CORRELATIONS

● **In each case - simple linear regression and Pearson's Product Moment Correlation**

Academic Achievement Points (y) v. General Ability (x)

Equation for straight line: y = .1.29561 x + 83.17603

Standard error of the slope: 0.149664 d.f. = 70

95% C.I. for population value of slope = 0.961110 to 1.558110

Correlation Coefficient (r) = 0.7091959 r^2 = 0.5029558

95% C.I. for r (Fisher's z transformed) = 0.571409 to 0.808096 t (with 70 d.f.) = 8.416259

p < .000001 (two tailed)

Correlation is significantly different from zero.

Academic Achievement Points (y) v. Need Achievement (x)

Equation for straight line: y = 0.093974 x + 4.402197

Standard error of the slope: 0.028278 d.f. = 70

95% C.I. for population value of slope = 0.037576 to 0.150373

Correlation Coefficient (r) = 0.3691491 r^2 = 0.1362711

95% C.I. for r (Fisher's z transformed) = 0.150337 to 0.553484 t (with 70 d.f.) = 8.416259

p < .001418 (two tailed)

Correlation is significantly different from zero.

Academic Achievement (y) v. Teacher Preference (x)

Equation for straight line: y = 0.496995 x + 44.806537

Standard error of the slope: 0.163520 d.f. = 70

95% C.I. for population value of slope = 0.170866 to 0.823125

Correlation Coefficient (r) = 0.3414418 r^2 = 0.1165825

95% C.I. for r (Fisher's z transformed) = 0.119202 to 0.531100 t (with 70 d.f.) = 3.039364

p < .003332 (two tailed)

Correlation is significantly different from zero.

Academic Achievement (y) v. Curiosity (x)

Equation for straight line: y = 0.156649 x + 12.83201

Standard error of the slope: 0.065574 d.f. = 70

95% C.I. for population value of slope = 0.025867 to 0.287432

Correlation Coefficient (r) = 0.2745563 r2 = 0.0753812

95% C.I. for r (Fisher's z transformed) = 0.045801 to 0.475952 t (with 70 d.f.) = 2.388956

p < .019598 (two tailed)

Correlation is significantly different from zero.

General Ability (y) v. Self Esteem (x)

Equation for straight line: y = -1.23020 x + 113.1526

Standard error of the slope: 0.398412 d.f. = 70

95% C.I. for population value of slope = -2.02482 to -0.43560

Correlation Coefficient (r) = -0.34623 r2 = 0.1198775

95% C.I. for r (Fisher's z transformed) = -0.53499 to-0.124556 t (with 70 d.f.) = -3.08778

p < .002890 (two tailed)

Correlation is significantly different from zero.

Teacher Preference (y) v. Self Esteem (x)

Equation for straight line: y = -.7744792 x + 59.4744

Standard error of the slope: 0.335501 d.f. = 70

95% C.I. for population value of slope = -1.44361 to -0.10534

Correlation Coefficient (r) = -0.2659717 r2 = 0.0707409

95% C.I. for r (Fisher's z transformed) = -0.46875 to-0.036556 t (with 70 d.f.) = -2.308426

p < .023934 (two tailed)

Correlation is significantly different from zero.

Teacher Preference (y) v. General Ability (x)

Equation for straight line: y = .42025362 x + 9.39295

Standard error of the slope: 0.084093 d.f. = 70

95% C.I. for population value of slope = 0.252535 to 0.587972

Correlation Coefficient (r) = 0.51279857 r2 = 0.2926623

95% C.I. for r (Fisher's z transformed) = 0.319031 to 0.665416 t (with 70 d.f.) = 7.997479

p < .000002 (two tailed)

Correlation is significantly different from zero.

Need Achievement (y) v Curiosity (x)

Equation for straight line: y = .1283982 x + 3.674607

Standard error of the slope: 0.051073 d.f. = 70

95% C.I. for population value of slope = 0.026536 to 0.230260

Correlation Coefficient (r) = 0.28777187 r^2 = 0.0828128 95%

C.I. for r (Fisher's z transformed) = 0.060111 to 0.486975 t (with 70 d.f.) = 2.514017

p < .014239 (two tailed)

Correlation is significantly different from zero.

General Ability (y) v Curiosity (x)

Equation for straight line: y = .810501 x + 88.04251

Standard error of the slope: 0.359238 d.f. = 70

95% C.I. for population value of slope = 0.009402 to 1.526979

Correlation Coefficient (r) = 0.2603629 r^2 = 0.0677888

95% C.I. for r (Fisher's z transformed) = 0.030526 to 0.464041 t (with 70 d.f.) = 2.256165

p < .027186 (two tailed)

Correlation is significantly different from zero.

Teacher Preference (y) v. Need Achievement (x)

Equation for straight line: y = 1.73726 x + 41.89599

Standard error of the slope: 0.651099 d.f. = 70

95% C.I. for population value of slope = 0.438685 to 3.035836

Correlation Coefficient (r) = 0.3038341 r^2 = 0.0923151

95% C.I. for r (Fisher's z transformed) = 0.077630 to 0.500288 t (with 70 d.f.) = 2.668197

p < .009459 (two tailed)

Correlation is significantly different from zero.

Need Achievement (y) v. General Ability (x)

Equation for straight line: y = .071172 x + -1.43623

Standard error of the slope: 0.014870 d.f. = 70

95% C.I. for population value of slope = 0.041515 to 0.100829

Correlation Coefficient (r) = 0.4965628 r^2 = 0.2465747

95% C.I. for r (Fisher's z transformed) = 0.299328 to 0.653100 t (with 70 d.f.) = 4.786335

p < .000009 (two tailed)

Correlation is significantly different from zero.

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10. RESULTS OF TEACHER SURVEY

SEX	NO	DOGMATISM	TEACHER ROLE	TEACHER FLEXIBILITY
F	01	166	66	26
M	02	139	59	34
F	03	130	55	20
F	04	178	60	25
F	05	168	58	29
F	06	184	76	48
F	07	178	66	37
M	08	156	67	32
F	09	174	67	34
M	10	156	62	32
M	11	131	78	29
M	12	169	66	32
F	13	161	67	29
M	14	144	60	32
F	15	181	70	37
F	16	159	65	29

M	17	147	62	35
M	18	170	58	36
M	19	141	49	36
F	20	155	70	29
F	21	181	68	40
F	22	173	63	28
M	23	159	58	31

TOTAL CASES = 23 MALES = 10 FEMALES = 13

11. STATISTICS FOR CORRELATIONS

Teacher Rôle/Teacher Flexibility

Equation for the straight line: y = 0.2641284 x +15.29266

Standard error of the slope = 0.179760 d.f. = 21

95% C.I. for population value of slope = -0.109702 to 0.637959

Correlation Coefficient (.r) = 0.3053256 r^2 = 0.0932237

95% C.I. for r (Fisher's Z transformed) = 0.027818 to 0.718408 t (with 21 d.f.) = 1.469342

p = 0.156563 (two tailed)

This correlation coefficient is not significantly different from zero.

Teacher Rôle/Teacher Dogmatism

Equation for the straight line: y = 0.1271541 x +43.45782

Standard error of the slope = 0.084038 d.f. = 21

95% C.I. for population value of slope = -0.047613 to 0.301921

Correlation Coefficient (.r) = 0.3135274 r^2 = 0.0982994

95% C.I. for r (Fisher's Z transformed) = -0.113320 to 0.642673 t (with 21 d.f.) = 1.513052

p = 0.145171 (two tailed)

This correlation coefficient is not significantly different from zero.

Teacher Flexibility/Teacher Dogmatism

Equation for the straight line: y = 0.1526256 x +7.621096

Standard error of the slope = 0.068935 d.f. = 21

95% C.I. for population value of slope = 0.009267 to 0.295984

Correlation Coefficient (.r) = 0.4350315 r^2 = 0.1892524

95% C.I. for r (Fisher's Z transformed) = 0.027818 to 0.718408 t (with 21 d.f.) = 2.214051

p = 0.038023 (two tailed)

This correlation coefficient is significantly different from zero.

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12. Statistics for selected multiple regressions

(1) General Ability / Need Achievement / Dogmatism / Teacher Preference / Curiosity / School Alienation / Self Esteem and Attitude to Education with Academic Achievement Points.

Variable	Coefficient	St.Error	t-value	p(2 tail)
Intercept	-7.922800	6.4487900	-1.228572	0.2204
Gen.Abil.	0.2912765	0.0355877	8.1847523	0.0000
Need Ach.	0.1087863	0.2281094	0.4769041	0.6339
Dogmatis.	-.1358895	0.0416086	-3.265897	0.0012
Teach.Pr.	-.0147624	0.0402277	-.3669700	0.7140
Sc.Alien.	0.1604343	0.0656587	2.4442019	0.7140
Curiosit.	0.2709532	0.0962333	2.8155861	0.0053
Self Est.	-.0651553	0.0663807	-.9528319	0.3416
Att. Edu.	-.0696096	0.0192137	-3.622908	0.0004

$r^2 = 0.4009$ Adjusted $r^2 = 0.3785$

Analysis of Variance to test regression relation.

Source	Sum of Sqs.	df.	Mean Sq.	f	p-value
Regression	4739.5509	8	592.44386	20.158819	0.0001
Error	7082.7051	241	29.38881		
Total	11822.256	249			

(2) Need Achievement / Dogmatism / Self Esteem with Academic Achievement Points.

Variable	Coefficient	St.Error	t-value	p(2tail)
Intercept	31.854869	5.4567920	5.8376550	0.0000
Need Ach.	0.7014584	0.2538357	2.7205633	0.0070
Dogmatis.	-.2106999	0.0476250	-4.424148	0.0000
Self Est.	-.0791924	0.0644393	-1.228946	0.2203

$r^2 = 0.1138$ Adjusted $r^2 = 0.0994$

Analysis of Variance to test regression relation.

Source	Sum of Sqs.	df.	Mean Sq.	f	p-value
Regression	1345.0227	3	448.34091	10.526812	0.00372
Error	7082.7051	241	29.38881		
Total	11822.256	249			

(3) Teacher Preference / School alienation / Curiosity / Attitude to Education with Academic Achievement Points.

Variable	Coefficient	St.Error	t-value	p(2 tail)
Intercept	-3.485013	3.0394717	-1.146585	0.2527
Teach.Pre.	0.1034107	0.0414954	2.4921010	0.0134
Sc.Alien.	0.1937047	0.0633834	3.0560807	0.0250
Curiosit.	0.4791639	0.0750693	4.4570543	0.0000
Att.Educ.	-.0557235	0.0206926	-2.692925	0.0076

r^2 = 0.1851 Adjusted r^2 = 0.1685

Analysis of Variance to test regression relation.

Source	Sum of Sqs.	df.	Mean Sq.	f	p-value
Regression	2188.5207	4	547.13018	13.914322	0.0095
Error	9633.7353	245	39.32136		
Total	11822.256	249			

(4) Need Achievement / Dogmatism / Teacher Preference / School alienation / Curiosity / Self Esteem/ Attitude to Education with Academic Achievement Points.

Variable	Coefficient	St.Error	t-value	p(2 tail)
Intercept	14.816305	6.5633475	2.2567435	0.0249
Need.Ach.	0.4514628	0.2529663	1.7846757	0.0756
Dogmatis.	-.1542691	0.0468717	-3.291305	0.0011
Teach.Pre.	0.0368224	0.0448218	0.8215280	0.4122
Sc.Alien.	0.2038872	0.0738067	2.7624504	0.0062
Curiosit.	0.4302316	0.1063211	4.0465293	0.0001
Self.Est.	-.0975093	0.0770136	-1.266130	0.2067
Att.Educ.	-.0489719	0.0214882	-2.279010	0.0235

r^2 = 0.2344 Adjusted r^2 = 0.2091

Analysis of Variance to test regression relation.

Source	Sum of Sqs.	df.	Mean Sq.	f	p-value
Regression	2770.7889	7	395.82699	10.582829	0.0014
Error	9051.4671	242	37.40275		
Total	11822.256	249			

APPENDIX B.

● **Histograms for the six matched student and teacher variables**

Teacher Dogmatism:

130.0	*	1
135.4	*	1
138.1		0
140.8	*	1
143.5	*	1
146.2	*	1
148.9	*	1
151.6		0
154.3		0
157.0	***	3
159.7	**	2
162.4	*	1
165.1		0
167.8	*	1
170.5	***	3
173.2	*	1
175.9	*	1
178.6	**	2
181.3	**	2
184.0	*	1

Skewness = -.4132669

Student Dogmatism:

66.0	*	1
72.1		0
75.2	*	1
78.2		0
81.3	*	1
84.3		0
87.4		0
90.4	**********	10
93.5	*********	9
96.5	**********	14
99.6	**********	32
102.6	**********	42
105.7	**********	32
108.7	**********	31
111.8	**********	25
114.8	**********	18
117.9	**********	15
120.9	**********	11
124.0	*****	5
127.0	**	2

Skewness = -.3960764

Teacher Flexibility

20.0	*	1
22.8		0
24.2		0
25.6	*	1
27.0	*	1
28.4	*	1
29.8	*****	5
31.2	*	1
32.6	****	4
34.0	**	2
35.4	*	1
36.8	**	2
38.2	**	2
39.6		0
41.0	*	1
42.4		0
43.8		0
45.2		0
46.6		0
48.0	*	1

Skewness = .5513613

Student Curiosity

02.0	*	1
04.4	*	1
05.6		0
06.8	*	1
08.0	*****	5
09.2	******	6
10.4	**********	12
11.6	********	8
12.8	**********	19
14.0	**********	44
15.2	**********	33
16.4	**********	29
17.6	**********	16
18.8	**********	27
20.0	**********	26
21.2	*********	9
22.4	*******	7
23.6	*****	5
24.8		0
26.0	*	1

Skewness = -.2041338

Teacher Role

49.0	*	1
51.9		0
53.4		0
54.8		0
56.3	*	1
57.7		0
59.2	****	4
60.6	**	2
62.1	**	2
63.5	*	1
65.0		0
66.4	****	4
67.9	***	3
69.3	*	1
70.8	**	2
72.2		0
73.7		0
75.1		0
76.6	*	1
78.0	*	1

Skewness = .0491858

Student Teacher Preference

16.0	*	1
22.7		0
26.1		0
29.4	**	2
32.8		0
36.1	**	2
39.5	******	6
42.8	**********	13
46.2	**************************	26
49.5	******************************	30
52.9	******************************	30
56.2	**	49
59.6	**********************	22
73.0	***	3
76.3	****	4
79.7	*	1
83.0	*	1

Skewness = - .0379577

APPENDIX C. DATA INSTRUMENTS

1. CURIOSITY MEASURE

1. _____Look before you leap.

_____Who stands still in the mud sticks in it.

2. _____It's better to be safe than sorry

_____Nothing venture, nothing have.

3. _____Where there's a will, there's a way.

_____What can't be cured must be endured.

4. _____The grass is always greener on the other side of the fence.

_____Every bird likes its own nest best.

5. _____He who hesitates is lost.

_____All in good time.

6. _____Never start a thing you can't finish.

_____Nothing like trying.

7. _____Let sleeping dogs lie.

_____When at first you don't succeed, try ,try again.

8. _____It's hard to teach an old dog new tricks.

_____Never too old to learn.

9. _____Don't bite off more than you can chew.

_____Anything's possible.

10. _____A new broom sweeps clean.

_____An old broom is better than a new.

11. _____By hook or by crook, we'll win.

_____Let well enough alone.

12. _____It's never too late to change.

_____Keep your nose to the grindstone.

13. _____Never put off till tomorrow what can be done to-day.

_____Time cures all things.

14. _____A bird in the hand is worth two in the bush.

_____Never do things by halves.

15. _____Better late than never.

_____Time and tide wait for no man.

16. _____Big noses get into trouble.

_____Nothing venture nothing have.

17. _____Practice makes perfect.

_____Take the line of least resistance.

18. _____Never say die.

_____Better go back than lose yourself.

19. _____If you want a thing done well, do it yourself.

_____The Jack of all Trades is the master of none.

20. _____The best view is from the mountain top.

_____Keep the common road and be safe.

21. _____It will all come right in time.

_____Have you something to do tomorrow? Do it today.

22. _____It's better to be safe than sorry.

_____He does most who dares to do something.

23. _____Curiosity killed the cat.

_____Seek knowledge so you may act wisely.

24. _____Fortune favours the brave.

_____Stay on the safe side of the boat.

25. _____Dare to follow the truth.

_____Don't rock the boat.

2. THE EDUCATION SCALE

1. A person can learn more by working four years than they can by going to secondary school.

1 2 3 4 5

2. The more education a person has, the more they are able to enjoy life.

1 2 3 4 5

3. Education helps a person to use their leisure time to better advantage.

1 2 3 4 5

4. A good education is a great comfort to a person out of work.

1 2 3 4 5

5. Only subjects like reading, writing and arithmetic should be taught at public expense.

1 2 3 4 5

6. Education is of no help in getting a job today.

1 2 3 4 5

7. Most young people are getting too much education.

1 2 3 4 5

8. A secondary education is worth all the time and effort it requires.

1 2 3 4 5

9. Our schools encourage individuals to think for themselves.

1 2 3 4 5

10. There is too much useless activity in modern education.

1 2 3 4 5

11. Education only makes a person discontented.

1 2 3 4 5

12. School training is of little use in meeting the problems of real life.

1 2 3 4 5

13. Education tends to make a person less conceited.

1 2 3 4 5

14. Solution of the world's problems will come through education.

1 2 3 4 5

15. Secondary school courses are too impractical.

1 2 3 4 5

16. A person is foolish to stay at school if they can get a job.

1 2 3 4 5

17. Savings spent on education are wisely invested.

1 2 3 4 5

18. An educated person can advance more rapidly in business and industry.

1 2 3 4 5

19. Parents should not be compelled to send their children to school.

1 2 3 4 5

20. Education is more valuable than most people think.

1 2 3 4 5

21. A secondary school education makes a person a better citizen.

1 2 3 4 5

22. Public money spent on education over the last few years could have been more wisely spent for other purposes.

1 2 3 4 5

3 THE FIGART VERSION OF THE ROKEACH DOGMATISM SCALE

1. Some people are always for what is true. All the rest are always against what is true.

1 2 3

2. We must believe what important people say. If we do not we will not know what is going on in the world.

\+ 0 -

3. Sometimes I start talking before someone else has finished because I must tell what I have to say.

\+ 0

4. I just cannot stop when I talk to people who do not see things the way I do.

\- 0

5. Most people just do not care about others.

\+ 0

6. It is not good to read books about things that get your thoughts mixed up.

\+ 0

7. It is wrong to give in to those who think different people should run our country.

\+ 0

8. Some ways of thinking are really the dame even though people try to tell you they are different.

\- 0

9. There is no point in listening to someone who will just try to change your mind.

\+ 0

10. People know more about things they believe in than things they are against.

\+ 0

11. In times like these people are selfish if they think first about their own happiness.

\- 0

12. I must make myself do a lot of things that I need to do.

\- 0

13. By saying things over and over you can be sure that people will know what you mean.

\- 0

14. Many things in books are not worth being there.

\- 0

15. People who think about themselves first are terrible.

\- 0

16.Most people seem clever enough. Even so. groups do stupid things at times.

\+ 0

17. Most people just do not know what is good for them.

\- 0

18. There is so much to do and so little time to do it.

\+ 0

19. People must take there chances if they really want to do big things.

\+ 0 -

20. It seems that many people I talk to do not really know about the good and bad things that are going on in the world.

\+ 0 -

21. It does not matter too much if you are not happy now. It is what will happen in the years to come that counts.

\+ 0 -

22. Most people seem to have odd ideas about a lot of things.

\+ 0 -

23. When people are angry, they often bring up things that have nothing to do with what they are angry about.

\+ 0 -

24. It's bad to make people do things. But this is often the only way to help the world.

\+ 0 -

25. I am sure people talk about me.

\+ 0 -

26. Sometimes we must make people do things that we know are good for them.

\+ 0 -

27. People who will never say they are wrong make me angry.

\+ 0 -

28. It's better to be a dead hero than a live coward.

\+ 0 -

29. Country people and town people think about things in different ways.

\+ 0 -

30. Thinking about what might happen makes people afraid.

\+ 0 -

31. Many times I do not listen to what people are saying because I am thinking about what I will say next.

\+ 0 -

32. People who do not believe in something important do not have much of a life.

\+ 0 -

33. People get most out of life when they try hard to do what they think is best.

\+ 0 -

34. I would like it if someone were able to tell me how to take care of my problems.

\+ 0 -

35. People do not say much about it but they are thinking about they might become great.

\+ 0 -

36. We have a good way of running our country. Even so it would be better if we only let the clever people do it.

\+ 0 -

37. Most people find something wrong with the way others think.

\+ 0 -

38. If people knew what I really thought they might not like me.

\+ 0 -

39. It is best to find out what clever people say about something before you say something yourself.

\+ 0 -

40. People seem to think that most of the things they do are bad.

\+ 0 -

41. If people had a chance they would do something great to help the world.

\+ 0 -

42. Things are really bad when a person talks against someone who thinks the same way as they do.

\+ 0 -

43. We are going against our own side if we listen to what the other side says.

\+ 0 -

44. Life is terrible if people do not have help.

\+ 0 -

45. People should not try to work together if they believe in different things.

\+ 0 -

46. It would be better if we could go back to the way things were in the good old days.

\+ 0 -

47. It seems like people that I do not even know well are always looking for the bad things in me.

\+ 0 -

48. At times I think I am no good at all.

\+ 0 -

49. There are many ways to think about things in this world. Even so there is only one right way.

\+ 0 -

50. I cannot stand some people because of the way they think about things.

\+ 0 -

4 SELF-ESTEEM INVENTORY

LIKE ME UNLIKE ME

1. I often wish I was someone else
2. I find it very hard to talk in front of the class.
3. There are a lot of things about myself I would change if I could.
4. I can make up my mind without too much trouble.
5. I get upset easily at home.
6. I am a lot of fun to be with.
7. It takes me a long time to get used to anything new.
8. I'm popular with people of my own age.
9. My parents usually consider my feelings.
10. I give in very easily.
11. My parents expect too much of me.
12. It's pretty tough to be me.
13. People usually follow my ideas.
14. I have a low opinion of myself.
15. I often feel upset in school.
16. I'm not as nice looking as most people.
17. If I have something to say I usually say it.
18. My parents understand me.
19. Most people are better liked than I am.
20. I usually feel as if my parents are pushing me.
21. I often get discouraged in school.
22. Things usually don't bother me.
23. I can't be depended on

5 A QUICK MEASURE OF ACHIEVEMENT MOTIVATION

1. I don't think I' m a good trier. TRUE FALSE
2. I would sooner admire a winner than win myself. TRUE FALSE
3. Incentives do more harm than good. TRUE FALSE
4. In an unknown situation it doesn't pay to be pessimistic TRUE FALSE
5. It' s never best to set one's own challenges TRUE FALSE
6. I don't care what others do, I go my own way. TRUE FALSE

7. Even a good poker player can't do much with a poor hand. TRUE FALSE

8. Modern life isn't too competitive. TRUE FALSE

9. You can try too hard sometimes. It's best to let the world drift by. TRUE FALSE

10. Most people want success because it brings respect. TRUE FALSE

6 THE PUPIL/TEACHER ACTIVE/PASSIVE INVENTORY

1. I prefer teachers who make attendance at their classes compulsory.

1 2 3 4 5

2. If students were allowed to plan what they wished to study, they'd probably waste a great deal of time deciding what to do.

1 2 3 4 5

3. Class discussion usually helps me to understand the concepts used by the teacher.

1 2 3 4 5

4. Individual projects are alright in national school, but senior students are here to learn what the teacher knows.

1 2 3 4 5

5. I would not enjoy a course in which the teacher allowed the students to plan most of what was to be studied.

1 2 3 4 5

6. Some areas such as one's religion or politics are not suitable for class discussion.

1 2 3 4 5

7. I prefer a teacher who lets the students know from the outset that he/she is the boss.

1 2 3 4 5

8. I don't enjoy class in which most of the time is spent in group discussion.

1 2 3 4 5

9. I learn more by doing than by just listening.

1 2 3 4 5

10. Student opinion should not be sought about examinations and the testing of course work.

1 2 3 4 5

11. Expecting students to present work for discussion is often the practice of teachers who are not prepared to teach the group.

1 2 3 4 5

12. The responsibility of the teacher is to give the students work, not to ask them what they wish to do.

1 2 3 4 5

13. I generally dislike having to do individual projects in my main coursework.

1 2 3 4 5

14. I feel that the teacher must carefully avoid losing any of their authority over their students.

1 2 3 4 5

15. I feel that a lot of class discussion is just a waste of time.

1 2 3 4 5

16. The teacher should teach the class the way he/she wants and not be swayed by what the students want.

1 2 3 4 5

17. Students learn valuable skills when they are directly involved in planning their studies and the way in which they are to be examined.

1 2 3 4 5

7 THE SCHOOL OPINION QUESTIONNAIRE

1. I can't make much of what happens at this school.

1 2 3 4 5

2. I feel I am really part of this school.

1 2 3 4 5

3. More and more I feel helpless in the face of what is happening in this school.

1 2 3 4 5

4. The size and complexity of this school make it very difficult for a pupil to know where to get help or advice.

1 2 3 4 5

5. A pupil has little chance of protecting thier personal interests when they conflict with those of the school.

1 2 3 4 5

6. I seldom feel 'lost' or 'alone' at this school.

1 2 3 4 5

7. Life at this school is so confusing at times that a person just doesn't know where to turn.

1 2 3 4 5

8. It's wishful thinking to believe that a person can influence what happens at this school.

1 2 3 4 5

9. This school is just too big to look after each individual pupil.

1 2 3 4 5

8 THE ROKEACH DOGMATISM SCALE

1. The principles I have come to believe in are quite different from those believed in by most people.

1 2 3 4 5 6

2. The highest form of government is a democracy and the highest form of democracy is a government run by those who are most intelligent.

1 2 3 4 5 6

3. Even though freedom of speech for all groups is a worthwhile goal, it is unfortunately necessary to restrict the freedom of some political groups.

1 2 3 4 5 6

4. It is only natural that one would have a better acquaintance with ideas one believes in than ideas one opposes.

1 2 3 4 5 6

5. People on their own are helpless and miserable creatures.

1 2 3 4 5 6

6. Fundamentally the world we live in is a pretty lonely place.

1 2 3 4 5 6

7. Most people just don't give a damn for others.

1 2 3 4 5 6

8. I'd like it if I could find someone to solve my personal problems.

1 2 3 4 5 6

9. It is only natural for a person to be fearful of the future.

1 2 3 4 5 6

10. There is so much to be done and so little time to do it.

1 2 3 4 5 6

11. When I get wound up in a heated discussion, I just can't stop.

1 2 3 4 5 6

12. In a discussion I often find it necessary to repeat myself several times to make sure I am being understood.

1 2 3 4 5 6

13. In a heated discussion I generally become so absorbed in what I am going to say that I sometimes forget to listen to what other people are saying.

1 2 3 4 5 6

14. It is better to be a dead hero than a live coward.

1 2 3 4 5 6

15. Whilst I don't like to admit it, even to myself, my secret ambition is to become a famous person like Einstein, Emily Bronte, Shakespeare or Florence Nightingale.

1 2 3 4 5 6

16. The main thing in life is for a person to want to do something important.

1 2 3 4 5 6

17. If given the chance, I would do something of great benefit to the world.

1 2 3 4 5 6

18. In the history of mankind, there has only been a handful of great thinkers.

1 2 3 4 5 6

19. There are a number of people I have come to hate because of the things they stand for.

1 2 3 4 5 6

20. A person who does not believe in some great cause has not really lived.

1 2 3 4 5 6

21. It is only when people devote themselves to a cause or an ideal that life becomes meaningful.

1 2 3 4 5 6

22. Of all the different philosophies that exist in the world today there is probably only one that is correct.

1 2 3 4 5 6

23. A person who gets enthusiastic about too many causes is probably a wishy washy type of person.

1 2 3 4 5 6

24. To compromise with our political opponents is dangerous because it may mean betraying our own side.

1 2 3 4 5 6

25. When it comes to a matter of differences of opinion in religion, we must be careful not to compromise with those who believe differently to the way we do.

1 2 3 4 5 6

26. In times like these, one must be very selfish if one considers primarily one's own happiness.

1 2 3 4 5 6

27. The worst crime a person could commit is to attack publicly those people who believe int he same things.

1 2 3 4 5 6

28. In times like these it is often necessary to be on guard more against ideas put out by people or groups in one's own camp than by those in opposing camps.

1 2 3 4 5 6

29. A group which tolerates too many differences of opinion amongst its own members cannot exist for long.

1 2 3 4 5 6

30. There are two kinds of people in the world, those who are for the truth and those who are against the truth.

1 2 3 4 5 6

31. My blood boils when people stubbornly refuse to admit that hey are wrong.

1 2 3 4 5 6

32. A person who thinks primarily about their own happiness is beneath contempt.

1 2 3 4 5 6

33. Most of the ideas that get printed nowadays are not worth the paper they are written on.

1 2 3 4 5 6

34. In this complicated world of ours, the only way we can know what is going on is to is to rely on leaders and experts who can be trusted.

1 2 3 4 5 6

35. It is often desirable to reserve judgement about what is going on until one has had the chance to listen to the opinions of those one respects.

1 2 3 4 5 6

36. In the long run, the best way to live is to pick friends and associates whose tastes and beliefs are the same as one's own.

1 2 3 4 5 6

37. The present is all too often full of unhappiness. It is only the future that counts.

1 2 3 4 5 6

38. If a person is to accomplish their mission in life, it is sometimes necessary to gamble all or nothing.

1 2 3 4 5 6

39. Unfortunately, a good many people with whom I have discussed important social and moral issues don't really understand what is going on.

1 2 3 4 5 6

40. Most people just don't know what is good for them.

1 2 3 4 5 6

9 TEACHER ROLE DEFINITION INSTRUMENT

1. Supervise the collection of money, raffle tickets etc.

1 2 3 4 5

2. Help children acquire good manners and correct speech.

1 2 3 4 5

3. Interpret right and wrong for students.

1 2 3 4 5

4. Treat every student alike in matters of reward and punishment.

1 2 3 4 5

5. Mention to a colleague an awareness of that colleague's discipline problems and offer to help.

1 2 3 4 5

6. Alternate interesting work with uninteresting work so that a student will appreciate the former yet benefit from the discipline of the latter.

1 2 3 4 5

7. Punish those students who need it.

1 2 3 4 5

8. Give talks to groups outside school about what the teacher is doing inside school.

1 2 3 4 5

9. Deal with his/her own discipline problems rather than refer them to a higher authority.

1 2 3 4 5

10. Carry out the instructions of the principal even if they are thought to be unsound.

1 2 3 4 5

11. Get right away from school for relaxation and entertainment.

1 2 3 4 5

12. Punish the aggressive child for attacks on other children.

1 2 3 4 5

13. Never allow students to know how a teacher is going to react to classroom situations.

1 2 3 4 5

14. Comply with parents requests to keep children in at break and excuse them from P.E. or games.

1 2 3 4 5

15. As a newly qualified teacher start as a strict disciplinarian and then gradually become approachable as the class respects the teacher's authority.

1 2 3 4 5

16. Put slow learners with other slow learners in all academic work.

1 2 3 4 5

17. Teach Religious Knowledge wherever possible

1 2 3 4 5

18. Encourage students to form class councils to make rules for their own classroom behaviour.

1 2 3 4 5

19. As a new teacher take a neutral stand on any issue on which the staff are divided.

1 2 3 4 5

20. Turn a blind eye to infringements of school rules at times.

1 2 3 4 5

21. No matter what the teacher's subject, teach in addition the three r's to those who need it.

1 2 3 4 5

22. Be competent in subjects outside the range of the school subject; for example: stock-taking, time-tabling, attendance etc .etc.

1 2 3 4 5

23.Take up a teaching position in a difficult school in a depressed area.

1 2 3 4 5

24. Change schools every two or three years to gain experience and promotion.

1 2 3 4 5

25. Help students acquire values and attitudes not fostered in their own homes.

1 2 3 4 5

26. Take part in cultural life of the community by supporting a music society, drama group, etc. etc.

1 2 3 4 5

27. Have access to a student's personal record folders and all the information in them.

1 2 3 4 5

28. Carry out the instructions of the principal even if they are thought to be unsound.

1 2 3 4 5

29. Allow students occasionally to act upon their decisions which the teachers feels might be wrong.

1 2 3 4 5

30. Guard against showing affection to students in class.

1 2 3 4 5

31. Use the comparison of one child's work with another as a method of motivation.

1 2 3 4 5

32. Allow students to confide in the teacher with personal problems that they may not wish to discuss with their parents.

1 2 3 4 5

33. Give basic sex information to students.

1 2 3 4 5

34. Instruct students to obey orders at once without question.

1 2 3 4 5

35. Give praise only sparingly in case it loses its effectiveness.

1 2 3 4 5

36. Visit the homes of problem children to discuss their difficulties with parents.

1 2 3 4 5

37. Group friends together and introduce more group activities in class.

1 2 3 4 5

38. Hold a responsible position in some youth oriented organisation outside school

1 2 3 4 5

10 MEASURE OF TEACHER FLEXIBILITY

1. If I could do as I please, I would change the kind of work I do every few months.

1 2 3 4 5

2. The trouble with most jobs is that you just get used to doing things one way and then they want you to do them differently.

1 2 3 4 5

3.One can never feel at ease in a job where the ways of doing things are always being changed.

1 2 3 4 5

4. I prefer to stay with a job I know I can handle rather than to change to one where most things would be new to me.

1 2 3 4 5

5. The trouble with most people is that when people find a job they do well, they don't stick with it.

1 2 3 4 5

6. I like a job in which I know I will be doing the same things from one week to the next.

1 2 3 4 5

7. When I get used to doing things one way, it is disturbing to change to a new method.

1 2 3 4 5

8. It would take a sizable increase in salary to get me to voluntarily transfer to another job.

1 2 3 4 5

BIBLIOGRAPHY

The following is a list of publications which have been either directly or indirectly influential in the construction of the foregoing pages. If there is an identifiable thread running through each it may well be the idea that to be involved in education is to be conscious of restraints on action without being paralysed by them and the realisation that change for the better is a function of evolution and in varying degrees always attainable.

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