

SOME PROBLEMS
IN THE SELECTION
AND
PRELIMINARY TRAINING
OF
NON-EUROPEAN MEDICAL STUDENTS

A Thesis Submitted in Partial Fulfilment
of the Requirements for the
Degree of Doctor of Philosophy
in the
Department of Educational Psychology
of the
University of Natal

by

William Richard Grenville Branford, M.A.(Cantab.), B.Ed.
Senior Lecturer in English
Recorder, Board of the Faculty of Medicine
University of Natal

1 9 6 1

SOME PROBLEMS
IN THE SELECTION AND PRELIMINARY TRAINING
OF
NON-EUROPEAN MEDICAL STUDENTS

A REPORT
ON SELECTION AND PRELIMINARY TRAINING
IN
THE FACULTY OF MEDICINE OF THE UNIVERSITY OF NATAL
1951 - 1961

Table of Contents
List of Tables
List of Appendices

Part I : Theory and Background

- I. Scope and Objectives of the Thesis
- II. Selection: Theories and Methods
- III. The Schools: Setting of the Faculty's Problem
- IV. The Faculty: Curricula; Development of the Admissions Programme

Part II : Selection and Attainment

- V. Criteria and the Selection Pyramid
- VI. Applicants for Admission to Pre-Medical Courses
- VII. Try-out Reliability and Standardisation of Predictor Measures
- VIII. Prediction of Pre-medical Results
- IX. The Pre-medical Course: a critical review
- X. Summary of Findings

Appendices

Chapters I to VI are bound in Volume I,
Chapters VII to X and the Appendices in Volume II.
The complete table of contents appears in each Volume.

C O N T E N T S

	<u>Page.</u>
<u>CHAPTER I</u>	
<u>SCOPE AND OBJECTIVES OF THE THESIS</u>	1
<u>CHAPTER II</u>	
<u>SELECTION: THEORIES AND METHODS</u>	4
2.1 Introductory	4
2.2 Experiment and Observation..	4
<u>The Experimental Group (2.3 - 2.6)</u>	
2.3 Definition of the Group	6
2.4 Numbers... ..	6
2.5 Levels and Dispersion of Abilities	8
2.6 Development and Change	9
<u>Criteria (2.7 - 2.15)</u>	
2.7 Ultimate and Intermediate Criteria	9
2.8 Criteria of Professional Competence	10
2.9 Restriction of Criteria for the present study.	15
2.10 Academic Attainment: the orectic components..	17
2.11 The choice of measures	17
2.12 Administrative Classifications	18
2.13 Examination Marks	19
2.14 Instructors' Assessments	23
2.15 Conclusions as to Criteria of Academic Attainment... ..	24
<u>The Interpretation of Results (2.16 - 2.18)</u>	
2.16 Correlational and Actuarial Statistics..	25
2.17 Types of Prognosis	27
2.18 Percentages Graduating	28
<u>Predictors (2.19 - 2.43)</u>	
2.19 Classification of Predictors	29
<u>Biographical Data (2.20 - 2.26)</u>	
2.20 Treatment of Biographical Data	29
2.21 Age.	30
2.22 Sex.	33
2.23 Marital Status..	34
2.24 Socio-economic status.	34
2.25 Home Language... ..	36
2.26 Race	36

<u>Notes on Policy, 1951-1960 (3.10 - 3.16)</u>						<u>Page</u>
3.10	Principles of Bantu Education	...	...	...	...	77
3.11	The Bantu Education Acts	...	...	...	...	78
3.12	Finance and Enrolment	...	...	...	...	79
3.13	Syllabuses	...	...	...	...	81
3.14	The Mother-tongue Principle	...	...	...	...	81
3.15	University Legislation	...	...	...	...	84
3.16	Unrest	...	...	...	...	86

Summary (3.17)

3.17	Summary of Chapter III	86
------	------------------------	-----	-----	-----	-----	----

CHAPTER IV

THE FACULTY

General Outline (4.1 - 4.3)

4.1	Establishment of the Faculty	...	...	...	...	88
4.2	The M.B., Ch.B. Course at the University of Natal	...	...	...	...	89
4.3	The Hostel and the Faculty Building	...	...	...	...	90

From School to Medical Studies (4.4) 92

The Pre-Medical Curriculum (4.5 - 4.8)

4.5	The Pre-Medical Curriculum: Outline and Objectives	...	...	...	...	93
4.6	Choice of Pre-medical Courses	...	...	...	...	96
4.7	"Special" versus "Standard" Courses	...	...	...	...	97
4.8	Arrangement of Courses	...	...	...	...	98

Admissions (4.9 - 4.11)

4.9	Government Bursary-Loans	...	...	...	...	103
4.10	Admissions Policy	...	...	...	...	103
4.11	Development of the Admissions Programme	...	...	...	...	104

Tutorial Guidance and Mental Health (4.12) 109

Summary (4.13)

4.13	Summary of Chapter IV	110
------	-----------------------	-----	-----	-----	-----	-----

CHAPTER V

CRITERIA AND THE SELECTION PYRAMID

Progress through the Course (5.1 - 5.3)

5.1	The Administrative Framework: Entrance Qualifications, Promotions and Exclusion	111
-----	---	-----	-----	-----	-----	-----

	<u>Page</u>
5.2 The Class of 1951	112
5.3 Successive Criteria... ..	115
<u>Relationships of Criteria (5.4 - 5.11)</u>	
5.4 Clinical Courses: Final M.B., Ch.B. Examinations	116
5.5 Pre-Clinical Courses: Second and Third Year Examinations..	116
5.6 Relation of Pre-Clinical to Pre-Medical Results. (All Races grouped together: see also 5.11 and 5.15)	118
5.7 Classification of Pre-Medical Records... ..	122
5.8 Pre-Medical Courses: Preliminary and First Year Examinations	125
5.9 Entrance Qualifications and Pre-Medical Result. (All races grouped together)	126
5.10 The Credit Index	128
5.11 Prediction of Pre-Clinical Result from Criteria of Pre-Medical Attainment	131
(a) Statistical Groupings	131
(b) Staff Assessments... ..	136
<u>Comparisons with other Faculties (5.12)</u>	
5.12 Statistics from other Faculties... ..	137
<u>Africans and Indians (5.13 - 5.15)</u>	
5.13 Preliminary African-Indian Comparisons..	139
5.14 Matriculant Groups and Promotions to the Second Year	142
(a) Africans.	142
(b) Indians..	143
(c) African-Indian Comparison..	143
5.15 Relation of Pre-Medical to Pre-Clinical Result	144
(a) Africans.	
(b) Indians.	
<u>Pre-Medical Data (5.16 - 5.17)</u>	
5.16 Pre-Medical Criterion Scores	145
5.17 The Class of 1960: Failures and Intercorrelations..	145
<u>Conclusions (5.18)</u>	
5.18 Conclusions from Chapter V..	148
 <u>CHAPTER VI</u> <u>APPLICANTS FOR ADMISSION TO PRE-MEDICAL COURSES</u>	
6.1 The Supply of Candidates	151
6.2 Points of Entry.	151

<u>Potential Students (6.3 - 6.7)</u>		<u>Page</u>
6.3	Problems of Estimation	151
6.4	Matriculation Exemptions... ..	153
	(a) African pupils: Department of Bantu Education.	
	(b) Indian pupils : Natal Senior Certificate.	
6.5	African Matriculants Qualified for Admission:	154
	(a) Numbers qualified.	154
	(b) Limiting Factors: English and Mathematics	155
	(c) Contrast of 1958 and 1959 results.	157
	(d) Contrast of examining bodies	158
	(e) English Higher..	159
	(f) State-aided and 'independent' schools... ..	159
6.6	Indian Matriculants Qualified for Admission:	160
	(a) Numbers qualified	161
	(b) English and Mathematics	161
	(c) Contrasts from year to year.	162
	(d) Examining bodies	162
6.7	Examining Body, Race, and Matriculation Results	162

Applications for Admission to Pre-Medical Courses (6.8 - 6.15)

6.8	Records of Applications	165
6.9	African, Coloured and Indian Applications and Selection Ratios... ..	166
6.10	Selection Ratio and Attainment... ..	170
6.11	Qualifications of Applicants	172
6.12	Ages and Total Matriculation Marks	175
6.13	African Failures in English Higher	178
6.14	Examining Bodies: African Applicants..	178
6.15	African Applicants' Schools	179

Summary (6.16)

6.16	Summary of Chapter VI	180
------	------------------------------	-----

CHAPTER VII

TRYOUT, RELIABILITY AND STANDARDISATION OF PREDICTOR MEASURES

Pilot Validation Studies, 1956-1957 (7.1 - 7.9)

7.1	List of Predictors Used	182
7.2	Testing and Marking Procedure	184
7.3	Abbreviations..	185
7.4	Preliminary Validations, 1956	185
7.5	Group ON 1955..	186
7.6	Group OJ 1956..	189
7.7	Group ON 1955-6	191
7.8	Matriculation Marks and Pre-Medical Criterion Gradings... ..	194
7.9	Trial Administration.	195
7.10	Decisions after Pilot Validation Studies	195

<u>Standardisation and Reliability of Objectively-Marked Tests (7.11 - 7.13)</u>							<u>Page</u>
7.11	Reliability Coefficients...	...	...	...	...	...	197
7.12	Standardisation of Objectively-Marked Tests:						
	African-Indian Comparisons...	...	...	...	...	...	199
7.13	The Scientific Information Test..	...	...	...	...	...	203
 <u>Standardisation of Matriculation Marks (7.14 - 7.20)</u>							
7.14	Estimate of Reliability. (Matriculation Total)	...	...	...	...	...	205
7.15	Matriculation Marks: Problems of Standardisation..	...	...	...	...	...	205
7.16	Provisional Standardisations, 1958 and 1959..	...	...	...	...	...	207
7.17	Study of Distributions	...	...	...	...	...	209
7.18	Matriculation Total Marks..	...	...	...	...	...	210
7.19	Matriculation English Marks	...	...	...	...	...	212
7.20	Matriculation Mathematics Marks..	...	...	...	...	...	214
 <u>Collection of Biographical Data (7.21)...</u>							215
 <u>Personal Assessments (7.22 - 7.24)</u>							
7.22	School Principals' Reports.	...	...	...	...	...	215
7.23	Interviewers' Ratings	...	...	...	...	...	218
7.24	Group Assessments	...	...	...	...	...	221
 <u>Summary (7.25)</u>							
7.25	Summary of Chapter VII	...	...	...	...	...	223

CHAPTER VIII

INTERIM VALIDATIONS

Introductory (8.1 - 8.2)

8.1	Status of Validation Data..	...	...	...	...	...	226
8.2	Grouping of Cases	...	...	...	...	...	226

Age and Sex (8.3 - 8.6)

8.3	Age: Africans	...	...	...	...	...	229
8.4	African Men and Women	...	...	...	...	...	232
8.5	Age: Indians..	...	...	...	...	...	232
8.6	Indian Men and Women.	...	...	...	...	...	235

Matriculation Marks (8.7 - 8.10)

8.7	Matriculation Total Mark:						
	(a) Africans and Indians separately	...	...	...	...	...	236
8.8	Matriculation Total Mark:						
	(b) Africans and Indians pooled...	...	...	...	...	...	244
8.9	Indians : predictions from matriculation marks	...	...	...	...	...	246
8.10	Africans: predictions from matriculation marks	...	...	...	...	...	249

<u>Standardised Tests (8.11 - 8.13)</u>						Page
8.11	Predictions from Tests: Africans	...	...	...	...	253
8.12	Predictions from Tests: Indians	...	...	...	...	258
8.13	Over- and Under-Achievers	...	...	...	...	260

<u>Impressionistic Judgments (8.14 - 8.16)</u>						Page
8.14	Interviewers' Ratings	...	...	...	...	263
8.15	Group Assessments..	...	...	...	...	269
8.16	School Principals' Reports	...	...	...	...	270

<u>Special Selection Procedures (8.17)</u>						Page
8.17	Results of Special Selection Procedures	...	...	...	...	271

<u>Summary (8.18)</u>						Page
8.18	Summary of Chapter VIII..	...	...	...	...	272

CHAPTER IX

<u>THE PRE-MEDICAL COURSE : A CRITICAL REVIEW</u>	275
---	-----

CHAPTER XSUMMARY OF FINDINGS

10.1	Background...	...	...	...	...	280
10.2	Applicants for Admission to the Faculty	...	...	...	...	280
10.3	Examinations.	...	...	...	...	281
10.4	Admission Policy...	...	...	...	...	282
10.5	Student Attainment.	...	...	...	...	282
10.6	Prediction of Pre-clinical from Pre-medical Results	...	...	...	...	283
10.7	African-Indian Differences	...	...	...	...	283
10.8	Prediction of Pre-Medical Results	...	...	...	...	284

APPENDICES

A.	Biographical Studies	...	...	...	...	286
B.	Biographical Questionnaires	...	...	...	...	301
C.	Occupations of Fathers...	...	...	...	...	306
D.	Request for Staff Rankings	...	...	...	...	308
E.	School Principals' Rating Form.	...	...	...	...	310
F.	Interviewers' Rating Forms	...	...	...	...	316
G.	Cumulative Record Card...	...	...	...	...	318
H.	Variance Analyses of Matriculation Marks...	...	...	...	...	319
I.	Preliminary Year Subjects and Predictor Measures (1960)	...	...	...	...	339

<u>REFERENCES</u>	341
-------------------	-----

LIST OF TABLES

		<u>Page</u>
<u>Tables in Chapter II</u>		
2.A	Intercorrelations of First-Year Examination Marks, Pre-Medical and Pre-Veterinary Sciences, University of Pretoria. (Gouws, 1957)	21
2.B	Intercorrelations of Examination Marks: Faculty of Medicine of a Scottish University. (Scottish Council for Research in Education).	22
2.C	Matriculation Marks and Achievement in Pre-Medical and Pre-Veterinary Sciences, University of Pretoria, 1953-4. (Gouws, 1957)..	41
2.D	University of Cape Town: Graduates of 1949-1952. Matriculation Aggregate and the Number of Years Before Graduation. (Data from the Office of the Dean, Faculty of Medicine, University of Cape Town)..	42
2.E	University of Natal (European Students). Matriculation Predictors and First-Year Success. (Office of the Student Adviser)..	43
2.F	Test AH5: Total Scores. British Medical Students and Graduates. (Harris, 1950).	48
2.G	Over- and Under-Achievers: University of Pretoria (Gouws)..	56
<u>Tables in Chapter III</u>		
3.A	Pupils by Standard, 1950-1954 (<u>Union Statistics for Fifty Years</u>)... ..	71
<u>Tables in Chapter IV</u>		
4.A	Pre-Medical Curricula, 1951-1961.	102
4.B	Information before the Screening Committee, 1951-1960	108
<u>Tables in Chapter V</u>		
5.A	Preliminary Year Class of 1951 (Summary)	113
5.B	Preliminary Year Class of 1961... ..	114-115
5.C	Passes and Failures in Pre-Clinical Subjects, 1951-9	118
5.D	Overall Passes and Failures: Pre-Clinical Result versus Previous University Record. All Races, 1953-1959.	119
5.E	Pre-Clinical and Pre-Medical Records: All Races. 1953-1956 Classes Only	119
5.F	Pre-Clinical Results: "U.N. Pre-Medicals" only. All Races, 1953-1959.	120

	<u>Page</u>
5.G Pre-Medical and Pre-Clinical Result: 1953-9	124
5.H Passes and Failures in Individual Pre-Medical Subjects, 1951-9	126
5.I Overall Pre-Medical Result: Matriculants only. All Races, 1951-9	127
5.J Preliminary Year Students entering with previous University Credits: All Races, 1951-9	128
5.K Credit Index and Overall Pre-Clinical Result	130
5.L Prediction of Overall Pre-Clinical Result from Pre- Medical Data	134
5.M Promotions: Faculty of Science, Fort Hare, and Faculties of Science, Agriculture and Medicine, Natal, 1951-1957	138
5.N Failures in Science Subjects, 1951-1957 (Percentages): Faculties of Medicine, Science and Agriculture.. ...	139
5.O Overall Pre-Clinical Result: 1951-1959. Africans, Indians and Coloureds... ..	140
5.P Overall Pre-Medical Result, 1958-1959 only. African, Indian and Coloured Students first enrolled in the Preliminary Year..	141
5.Q Overall Pre-Medical Result, 1951-1959. South African Matriculants only: African-Indian Comparison... ..	143
5.R Africans and Indians: Pre-Clinical Result and Pre-Medical Record	144
5.S Preliminary Year Class of 1960: Qualified Candidates, Enrolments and Promotions	146
5.T Preliminary Year Examinations, 1960.	146
(a) English, History and Science	147
(b) Science in detail... ..	147
5.U Intercorrelations (<u>r</u>) of Preliminary Year Marks, 1960.	147

Tables in Chapter VI

6.A Matriculation Exemptions, 1953-1960. (a) African candidates in State and State-aided schools. (b) Indian Natal Senior Certificate candidates. ...	155
6.B Matriculation Statistics: Bantu Education Department, 1958, 1959 and 1960	156
6.C Summary of African Matriculation Results, 1958-1959...	157
6.D Examining Bodies: African Candidates, 1958	158
6.E African Candidates: Joint Matriculation Board Percentages of Passes, 1958-1960	159

Tables in Chapter VI
(Continued).

	<u>Page</u>
6.F African Matriculants, 1958-1960.	
(a) State and State-aided Schools	
(b) Other Schools	160
6.G Indian Candidates, Natal Senior Certificate Examination: 1958, 1959 and 1960... ..	161
6.H African and Indian Matriculants and Examining Bodies, 1958	164
6.I African Candidates for Admission to Pre-Medical Courses...	167
6.J Indian Candidates for Admission to Pre-Medical Courses ...	167
6.K Coloured and Chinese Candidates for Admission to Pre-Medical Courses... ..	168
6.L Percentages of Applicants Qualifying for Admission ...	168
6.M(i) Selection Ratio and Attainment.	170
6.M(ii) Indian Pre-medical Students: 1951-4 and 1955-9... ..	171
6.N Qualifications of Applicants for Admission to Pre-medical Courses, 1951-1961	174
6.O Qualified Candidates, 1951-61, 1955 and 1961..	175
6.P Applicants' Ages	176
6.Q Applicants' Total Matriculation Marks... ..	176
6.R Ages and Total Matriculation Marks: Means and Variances..	177
6.S Examining Bodies: African 'Direct' Applicants	179

Tables in Chapter VII

7.A. Group ON 1955 (N = 22). Preliminary Year Subjects and Predictor Measures: Phi-Coefficients and Exact Probability Tests	187
7.B Preliminary Year November Criterion: Group ON 1955. Correlations (ρ) with marks and tests.	189
7.C Preliminary Year June Criterion: Group OJ 1956. Correlations (ρ) with marks and tests.	190
7.D Preliminary Year November Criterion: Group ON 1955-6. Correlations with marks and tests.	192
7.E Intercorrelations of Selected Predictor Variables... ..	193
7.F Reliability Coefficients: Objectively marked Tests. ...	198

Tables in Chapter VII
(Continued)

	<u>Page</u>
7.G Objectively-Marked Tests: African and Indian Pre-medical freshmen.	
(i) Means and Variances	
(ii) Variance-Ratio and T-tests... ..	201
7.H Objectively-Marked Tests: Applicants of 1956 and 1959.	
(i) Means and Variances.	
(ii) Variance-Ratio and T-tests... ..	202
7.I Validity Coefficients: Scientific Information Test ...	204
7.J Means and Standard Deviations of Matriculation Marks. Reference Groups	208
7.K Preliminary Year Criterion Scores correlated with School Principals' Ratings and Matriculation Marks..	217
7.L Means and Variances of Interviewers' Ratings: "General Impression".	219
7.M Correlations between Interviewers' Ratings... ..	220
7.N Recommendations by 1961 Assessment Teams	222

Tables in Chapter VIII

8.A Entrance Age and Pre-Medical Result: Africans (1951-9)..	230
8.B Entrance Age and Pre-Medical Result: Indians (1951-9)..	233
8.C Entrance Age and Pre-Medical Result: Indians (1957-9)..	234
8.D Expectancies: Total Matriculation Mark and Pre-Medical Result... ..	237
8.E Correlations: Total Matriculation Mark and Pre-Medical Result... ..	239
8.F Total Matriculation Mark: Estimation of Correlation with Pre-Medical Result for Qualified Applicants..	242
8.G Total Matriculation Mark and Pre-Medical Result: Africans and Indians separately and together	244
8.H Indian Matriculation Marks and Pre-Medical Result: Biserial Correlations	246
8.I Combinations of Indian Matriculation Marks and Pre-Medical Result... ..	248
8.J African Matriculation Marks and Pre-Medical Result: Product-Moment Correlations	249
8.K African Matriculation Marks and Preliminary Year Criteria	251
8.L Africans: Bantu Language Higher, English Higher, and Pre-Medical Result... ..	252

Tables in Chapter VIII
(Continued)

	<u>Page</u>
8.M Africans: Test Scores, Matriculation Total and Pre-medical Result	254
8.N Africans: Prediction from Combinations of Standard Scores	256
8.O Indians: Test Scores and Pre-Medical Result	258
8.P Over- and Under-Achievers	262
8.Q Follow-up Data: Interviewers' Ratings, 1956. Candidates interviewed in selection procedure... ..	264
8.R Validations of Interviewers' Ratings: Candidates of 1959	267
8.S Screening Committee's Ranking, Matriculation Total and Pre-Medical Result	270
8.T Results of Ordinary and Special Selection Procedures, 1951-9	271

CHAPTER VII

TRYOUT, RELIABILITY AND STANDARDISATION
OF PREDICTOR MEASURES

Pilot Validation Studies, 1956-1957 (7.1 - 7.9)

7.1 List of predictor measures used

A summary list of predictor measures used in the investigation may be helpful at this point.

(a) Matriculation Marks.

Three matriculation marks were available for all candidates:

- (1) Total as percentage of the possible maximum.
- (2) English (Higher Grade) percentage.
- (3) Mathematics percentage.

For smaller groups, correlations were also run for:

Latin, Biology, History and Geography percentages, available for fairly large numbers of Indians, and

'Adjusted Total', 'Mean Science', Bantu Language and 'Other Subjects' percentages, available for some Africans.

'Adjusted Total', 'Mean Science', and 'Other Subjects' for African candidates are defined as:

'Adjusted Total': Total as a percentage of the possible maximum, omitting Bantu Language marks from the count.

'Mean Science': A student's mean percentage for those of the following subjects that appear in his record: "Science", Botany, Chemistry, Physics, Zoology, Biology, Physiology, and Hygiene, Physical Science.

'Other Subjects': A student's mean percentage for subjects other than Bantu Languages, English, Mathematics, and the sciences listed above.

(b) Tests.

Seven tests of the Differential Abilities battery of the National Bureau of Educational and Social Research were written by freshmen and others in 1956. On the basis of pilot studies (described in Sections 7.4 to 7.9) of these and certain other tests, the following eight tests were selected as the basic battery for the rest of the investigation. In each case the underlined title is the one which will denote this particular test throughout the remaining chapters and Appendices.

- (1) Vocabulary (Differential Abilities, N.B.69) 50 items. 10 minutes.

(2) Verbal Reasoning (Differential Abilities, N.B.109). 60 items of four types: Analogies, Classification, Same-Opposite and Logical Choice. The four sections of the test are not separately timed. 20 minutes.

(3) Non-Verbal Reasoning (Differential Abilities, N.B.100). Three sub-tests, separately timed: Figure Series (10 items, 8 minutes); Number Groups (18 items, 8 minutes); Pattern Completion (30 items, 12 minutes). Total 58 items, 28 minutes).

(4) Mechanical Comprehension (Differential Abilities, N.B.112). 24 items. 18 minutes. A paper-and-pencil test.

(5) A2 (National Institute for Personnel Research). "A test of general mental ability." (Manual). 60 items; 30 minutes. Verbal, number, and diagram problems.

(6) GL ("General Level" : Test GL.2C/46 of the National Foundation for Educational Research in England and Wales). 28 letter-series problems, usually untimed, yielding four scores for items at four levels of difficulty, and an overall score, all computed by taking the number right as a percentage of the number attempted. One hour was allowed for this test.

(7) Mathematics. General Achievement Test III of Educational Testing Service, Princeton. Two subtests:

I. Terms and Concepts, 36 items. 15 minutes.

II. Comprehension and Interpretation, 25 items. 25 minutes.

(8) Scientific Information. A test of general knowledge of science specially constructed for this study (See Section 7.13). 44 items, 30 minutes.

While the factorial content of these tests for non-Europeans is unknown, it will be seen that the battery includes two tests based mainly on verbal material (Vocabulary and Verbal Reasoning), two non-verbal tests (Non-Verbal Reasoning and Test GL), one test (mathematics) in the field of 'n', one general intelligence test including verbal, non-verbal and number problems (A2), and one test of knowledge (Scientific Information).

Besides the tests listed above, a number of others were tried out. These are listed below: underlining again indicates the short title which will denote this test throughout.

(i) Matrices (1938). (Raven's Progressive Matrices in the 1938 version. Non-verbal Intelligence; 60 items. One hour allowed).

(ii) Arithmetic (Differential Abilities). 50 items. 30 minutes.

(iii) Space Perception (Differential Abilities). 74 items, 26 minutes.

(iv) Memory (Differential Abilities): 44 items, 21 minutes.

(v) Vocabulary (Mill Hill) the Mill Hill Vocabulary Scale : 68 items, untimed.

(vi) Reading Comprehension (Differential Abilities) Test N.B.56. 20 items, 18 minutes.

(vii) Reading Comprehension (Princeton); Cooperative English Test C2 of Educational Testing Services, Princeton:

Part I Vocabulary: 60 items, 15 minutes.

Part II Reading Comprehension: 90 items, 35 minutes.

(viii) English Usage (Differential Abilities, Test N.B.69). 87 items, 30 minutes.

(ix) Mathematics Pre-Test. Co-operative Mathematics Pre-test for College Students (Educational Testing Services, Princeton): 40 items, 40 minutes.

(x) The Speed Tests of D.F. Morrisby's experimental battery.

(xi) Test GLS/14E.36 ("Speed": W.D. Furneaux: National Foundation for Educational Research, London).

Each student's test results were pooled for the computation of an Index of Accuracy: the number of correct responses as a percentage of the total number of items attempted. This is more convenient than Himmelweit's computation of the Index of Accuracy on the basis of the number of wrong responses as a percentage of the total number of items attempted. (Himmelweit, 1951: see Section 2.33).

Owing to changes from time to time in the experimental battery, the Index of Accuracy could not be computed for the same set of tests for every student. Within any experimental group, however, for which correlations are presented in this chapter and the next, the basis for the computation of the Index of Accuracy is always the same. Thus the Index for Group ON. 1955 has been computed from the tests taken by all members of that group, and the tests taken by all members of Group ON 1960 are the basis of the Index computed for them. Similar precautions were followed in the validations reported in Chapter VIII. It follows, however, that the Indices of Accuracy for different groups could not be pooled for the computation of Standard Scores.

7.2 Testing and marking procedure.

In the administration of objectively-marked tests, rapport was generally felt to be good. All tests taken during registration were administered by the writer; in the selection procedures of 1956, 1960 and 1961, and at the Durban centre in 1959, the tests were administered either by the writer or by qualified members of the departments of Psychology or Educational Psychology. In centres other than Durban in 1959, the Faculty appointed an agent to administer the tests: in Johannesburg the National Institute for Personnel Research, in Cape Town a member of the University Department of Psychology: in other centres usually clergymen or teachers. The tests chosen for 1959 are all simple to administer; and very detailed written instructions were issued for a standard procedure in all centres.

All tests, it will be seen, had to be administered by Europeans, though Biesheuvel (1943) recommends that, whenever possible, non-Europeans should be tested by a member of their own race. As nearly every member of the teaching staff of the Faculty is white, non-European testers in the present study, had they been available, might only have served to mark it off from the students' ordinary experience and stimulated suspicion instead of allaying it.

A circular briefly explaining testing procedure and the use of separate answer sheets was sent whenever possible to candidates, or distributed to freshmen or school pupils taking experimental tests before the date of testing. Out of a total of several thousand papers, not more than a dozen had to be discarded because instructions had been misunderstood.

In the special selection procedure of 1960 and 1961 all tests were administered in Durban, and the 1961 timetable permitted testing to be spread over two days. This made it possible to reduce the dangers of fatigue by making testing sessions shorter, and to guard against some of the effects of unfamiliarity with the testing situation by administering three of the most important tests - Vocabulary, Mathematics and Non-Verbal Reasoning - in two versions, one on each day. African candidates in particular tended to improve their performance considerably in the tests of the second day. At the time of writing, however, there are no validation data for the tests administered in this manner.

Nearly all test papers were marked independently by two scorers. A few papers in 1957 and 1958 had to be both marked and checked by the writer; for these papers an interval of at least one day was left between marking and checking.

Score and other data were entered on a cumulative record card. (Appendix G).

7.3 Abbreviations.

Validation and other studies have been carried out for a number of different pre-medical groups, e.g. students who wrote the Preliminary Year examinations of 1955 or the First Year examinations of 1957. For brevity in citation, each group has a code number, made up as follows:

- 'O' denotes a Preliminary Year examination and 'I' a First year examination.
- 'J' denotes a June test.
- 'N' denotes a November examination.

Thus Group OJ.1956 consists of students who wrote Preliminary Year June tests in 1956, and for this group the criteria are Preliminary Year June test results. Group IN.1957 consists of students who wrote the First Year examinations in 1957, and so on.

7.4 Preliminary Validations, 1956.

Pilot validation studies were undertaken during 1956. In view of the very small numbers of cases and the paucity of criterion data then available, these studies could only be exploratory, but it was important to decide in good time before the registration of freshmen in 1957 whether changes would be necessary in the group of experimental tests that had been written by the freshmen of 1956 and by volunteers from the class of 1955.

In August 1956 preliminary correlations were run for two small student groups:

- Group ON.1955 (Section 7.5) Twenty-two pre-medical students who had written:
 - (i) The Preliminary Year examinations in November 1955.
 - (ii) A group of ten tests of intelligence and special abilities in March-April 1956.

Group OJ.1956 Thirty pre-medical students who had written:
(Section 7.6)

- (i) The same group of tests as Group ON.1955, in March-April 1956.
- (ii) The mid-year tests in Preliminary Year M.B. Ch.B. subjects in June-August 1956.

Matriculation marks were available for both groups, and it had, of course, been largely upon the basis of their matriculation results that these students had been selected for admission to the Faculty. Test scores, on the other hand, (except in the case of Progressive Matrices and A2 scores for the 1956 group) had not been taken into account in the selection of either group. This would tend to increase the correlations of tests, and lower those of matriculation, with measures of performance later.

It will be seen that in the case of the 1955 group, the tests had been administered after the criterion performance and not before it.

Age, race and sex differences were not taken into account in this particular study. The importance of Indian-African differences at the university level was not clear at the time (1956) and it has been shown in Chapter V (Section 5.12, Table 5.M) that in the early years of the Faculty's existence these differences were in any case not reflected in statistics of pre-medical attainment.

At the end of 1956, however, a third pilot analysis was carried out, and in this study (reported in Section 7.7 under the heading Group ON.1955-1956) African and Indian records were analysed separately for the first time. The predictive value of matriculation marks was also studied for slightly larger African and Indian groups for whom two years of criterion data were available (Section 7.8).

7.5 Group ON.1955.

Two exploratory analyses were performed upon the data for this group.

(a) Individual subjects: Each distribution of marks or scores was dichotomised at the median or as near the median as possible in the case of ties. Phi-coefficients (Kendall, 1955, formula 3.16) were then computed for the correlation of each criterion variable with the predictors. Later, Fisher's Exact Probability Test (Siegel, 1956, Table I) was applied as a significance test to the data of the two-by-two tables from which the phi-coefficients had been computed. Results follow in Table 7.A.

Table 7.A

Group ON.1955 (N = 22)
 Preliminary Year Subjects and Predictor Measures.
Phi-Coefficients and Exact Probability Tests.

Predictors	Preliminary Year Results				
	English	History	Botany	Chemistry	Physics
<u>Matriculation:</u>					
(1) Total	-.09	.09	<u>.45</u>	.29	<u>.47</u>
(2) English	<u>.45</u>	<u>.45</u>	.09	.27	.27
(3) Mathematics	.27	<u>.45</u>	-.08	.27	.09
<u>Tests:</u>					
Vocabulary	.27	.27	.09	<u>.45</u>	<u>.45</u>
Reading Comprehension	.09	<u>.45</u>	-.03	.09	.27
Verbal Reasoning	.27	<u>.45</u>	.27	.00	<u>.45</u>
Arithmetic	-.09	.28	.27	.09	<u>.45</u>
Mechanical Comprehension	.09	-.09	.27	.18	.27
A2	.09	.10	.09	.09	.37
Matrices (1938)	.32	-.09	-.09	-.27	.09
Non-Verbal Reasoning	.09	<u>.45</u>	.10	.01	.37
Space Perception	.09	.09	.09	.09	.27
Memory	-.37	-.27	.00	.27	.27
Index of Accuracy	.27	.27	-.27	-.11	-.11
<p><u>Note:</u> Underlined coefficients are those for which the data of the original two-by-two tables yield a result significant of the 0.05 level by Fisher's Exact Probability Test (Siegel, 1956, Table I).</p>					

The coefficients are generally low but positive. For the highest values, the data of the original two-by-two tables are just significant at the 0.05 level by Fisher's Exact Probability Test. For the 70 two-by-two tables yielding the phi-coefficients of Table 7.A, there are 12 such values, all positive, i.e. considerably more than would be expected to arise by chance. Eight of these twelve significant values are yielded by four of the fourteen predictors - Matriculation Total, Matriculation English and the Vocabulary and Verbal Reasoning tests, and nine of the twelve are in the History and Physics criterion columns. Thus two trends appear from the table:

(1) The verbal predictors seem in general more effective than the non-verbal, even for Physics and Chemistry.

(2) Some results - in this case History and Physics - appear more predictable than others. Botany, on the other hand, yields four negative coefficients, one of zero, and seven of .09 or .10.

For an analysis on similar lines of a later group, see Appendix I.

(b) Sum of Standard Scores: A second analysis was performed in 1957, using a global criterion constructed as follows from the marks of the five Preliminary Year examinations:

- (1) Each distribution of marks was tested for normality (Garrett, 1953, formulae 64 and 65). No significant deviation from the normal curve was found.
- (2) Standard scores in all subjects were calculated for each student.
- (3) The sum of each student's standard scores was taken as an overall criterion measure.

Rankings of the group on this criterion were then correlated by means of Spearman's rho (Kendall, 1955, formula 1.9) with rankings on each of the predictors as before. Table 7.B lists the resultant correlations in descending order. (This table follows on the next page).

From Table 7.B it will be seen that six of the fourteen predictor measures yield a correlation with the criterion which lies above the 0.05 significance level; one correlation lies beyond the 0.01 significance level. Chance correlation would be likely to yield only one or two significant values out of fourteen. Four of the six significant relationships with the global criterion are yielded by predictors already noted as correlating significantly the results of Preliminary Year examinations taken singly. These four predictors are Matriculation Total, Matriculation English, and the Vocabulary and Verbal Reasoning tests. Again none of the non-verbal measures correlates significantly with the criterion.

This analysis was not performed until 1957, and the data, of course, are insufficient for firm conclusions. Verbal measures again yield higher correlations than non-verbal and the relationship between the tests and the global criterion appears stronger than was the relationship between the tests and individual examinations. (The reliability of the global criterion is likely to be higher than those of the individual examinations).

Table 7.B

Preliminary Year November Criterion: Group ON 1955

Correlations (ρ) with marks and tests.

Predictors	Rank-Order Correlation								
1. Matriculation Total marks	0.56								
2. Matriculation English marks.	0.49								
3. Arithmetic Test.	0.44								
4. Vocabulary Test.	0.44								
5. Verbal Reasoning Test.	0.40								
6. Test A2	0.36								
7. Non-Verbal Reasoning Test.	0.33								
8. Mechanical Comprehension Test.	0.31								
9. Matriculation Mathematics Marks.	0.27								
10. Reading Comprehension (Differential Abilities).	0.25								
11. Index of Accuracy.	0.17								
12. Matrices (1938)	0.16								
13. Space Perception Test.	0.05								
14. Memory Test.	-0.02								
<p>N = 22. For this, the critical values of ρ for a one-tailed test are:</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="padding-right: 20px;">Significance level :</td> <td style="padding-right: 20px;">0.05</td> <td style="padding-right: 20px;">ρ =</td> <td>0.359</td> </tr> <tr> <td></td> <td>0.01</td> <td>ρ =</td> <td>0.508</td> </tr> </table> <p>(Siegel, 1956, Table P).</p>		Significance level :	0.05	ρ =	0.359		0.01	ρ =	0.508
Significance level :	0.05	ρ =	0.359						
	0.01	ρ =	0.508						

7.6 Group OJ 1956.

A similar overall criterion measure was computed by the same method as before for the June Test marks of the Preliminary Year class of 1956, and rankings on this criterion were correlated with rankings on the same fourteen measures. Two further tests, Vocabulary (Mill Hill) and the English Usage Test of the Differential Abilities battery were included for this group of students. The results are presented in Table 7.C.

Table 7.C

Preliminary Year June Criterion: Group OJ 1956
Correlations (ρ) with marks and tests

Predictor	Rank-Order Correlation
1. Total Matriculation Marks.	0.52
2. Vocabulary Test (N.B.69)	0.52
3. Vocabulary (Mill Hill)	0.49
4. English Usage Test.	0.43
5. Matriculation English Marks.	0.41
6. Mechanical Comprehension.	0.36
7. Verbal Reasoning Test.	0.32
<hr/>	
8. Reading Comprehension Test.	0.17
9. Index of Accuracy.	0.16
10. Matriculation Mathematics Marks.	0.14
11. Arithmetic Test.	-0.005
12. Test A2	-0.03
13. Matrices (1938).	-0.05
14. Memory Test.	-0.08
15. Space Perception Test.	-0.14
16. Non-Verbal Reasoning Test.	-0.28
<hr/>	
<p>N = 30. For this, the critical value of ρ for a one-tailed test are:</p> <p style="padding-left: 40px;">Significance level : 0.05 $\rho = 0.306$: 0.01 $\rho = 0.432$</p> <p style="padding-left: 40px;">(Siegel, 1956, Table P.)</p>	

Seven of the sixteen correlations are significant at the 0.05 confidence level, and four at the 0.01 confidence level. Four of the seven significant relationships are yielded by the predictors that figured similarly in the previous analysis: Matriculation Total, Matriculation English, and the Vocabulary and Verbal Reasoning tests. Two other verbal measures not available for the 1955 group, Vocabulary (Mill Hill) and the English Usage test, correlate significantly with the criterion. The

ranking of measures in order of predictive accuracy matches fairly closely the corresponding ranking for the 1955 group, and Matriculation Total marks are at the top of both lists.

7.7 Group ON. 1955-1956

As soon as the 1956 Preliminary Year examination results became available, the distributions of marks were tested for normality and converted to Standard Scores as before. These standard scores were added to yield an overall criterion measure similar to that of the 1955 Preliminary Year Group (Group ON.1955). Preliminary Year criterion data were now available for over 50 students who had completed the battery of experimental tests.

The next set of computations was undertaken for African and Indian records separately, as well as for a racially mixed group. Coloured and Federation students were left out of the analysis, which was carried out for 21 Indians and 21 Africans who had written the Preliminary Year examinations of 1955 or 1956. These were the largest South African groups in the Faculty for which full test and criterion data were available.

A disadvantage of pooling 1955 and 1956 records was that the 1955 class had been tested four months after their Preliminary Year examinations and the 1956 class eight months before them, but there was at that time no alternative to pooling if separate African and Indian analyses were to be undertaken.

It must also be noted that the criterion data were based on records of racially mixed groups on the advice of the National Institute for Personnel Research.

Means and Standard Deviations were calculated for Africans and Indians separately on all predictor variables, but as these are discussed in some detail, and in a context of larger samples, in the next division of this chapter (Section 7.12), they will not be presented here. Product-moment correlations with the Preliminary Year criterion follow in Table 7.D. (This table 7.D follows on the next page).

From Table 7.D it will be seen that again only very tentative inferences can be drawn from such small numbers. It is interesting, however, to compare the five best predictors for each group. These are:

Africans.

- (1) Vocabulary Test.
- (2) Matriculation Total.
- (3) Matriculation English.
- (4) Verbal Reasoning Test.
- (5) Matriculation Mathematics.

Indians.

- (1) Arithmetic Test.
- (2) Test A2.
- (3) Mechanical Comprehension Test.
- (4) Index of Accuracy.
- (5) Matriculation Total.

Mixed Group.

- (1) Matriculation Total.
Vocabulary Test.
- (2) Verbal Reasoning Test.
- (3) Index of Accuracy.
Mechanical Comprehension Test.

As might be expected, the list for the mixed group includes three of the four predictors noted as effective in both the previous analyses - Matriculation Total and the Vocabulary and Verbal Reasoning Tests. (The fourth, Matriculation English, also correlates at the .01 significance level with the criterion for this group).

The African and Indian results, however, are suggestively different. Four of the five best 'African' predictors are prima facie measures of V.ed (verbal and educational attainment). For the Indian Group, numerical and non-verbal material appears more important. Inspection of the criterion data indicates that the Africans were 'spread' mainly on their performances in the probably more 'verbal' subjects (English and History) and the Indians on performance in the physical sciences. This suggests further, that with Africans on the one hand and Indians on the other, we may in effect be predicting different kinds of criterion performance.

Table 7.D
Preliminary Year November Criterion: Group ON 1955-6
Correlations with marks and tests.

	Africans N = 21	Indians N = 21	Mixed Group N = 42
	r =	r =	r =
Matriculation: Total	.61	.44	.53
English	.62	.18	.43
Mathematics	.53	.34	.44
Tests: Vocabulary	.69	.38	.53
Verbal Reasoning	.60	.33	.48
Reading Comprehension	.49	.38	.44
A2	.33	.54	.45
Arithmetic	.08	.58	.34
Mechanical Comprehension	.46	.47	.47
Matrices (1938)	.16	.30	.25
Non-Verbal Reasoning	.04	.28	.18
Space Perception	.34	.12	.25
Memory	.32	-.18	.11
Index of Accuracy	.49	.46	.47
For N = 21, the .05 confidence level for r = 0.433, and the .01 confidence level for r = 0.549.			
For N = 42, the .05 confidence level for r is 0.304, and the .01 confidence level for r is 0.393.			

It is of interest to compare the Standard Scores of the top African student and top Indian student in the 1956 class. These are:

	<u>African</u>	<u>Indian</u>
English	+ 2.26	- 0.08
History	+ 2.53	+ 0.70
Botany	+ 1.91	+ 0.92
Chemistry	+ 1.51	+ 1.73
Physics	+ 0.61	+ 2.68

Both are clearly outstanding students, but the Indian's Physics and Chemistry scores sum to 4.41 as against the African's 2.12. Two years later, in the Anatomy and Physiology examinations, these students' results were:

	<u>African</u>	<u>Indian</u>
Anatomy	66% Class II	77% Class I, class medal.
Physiology	72% Class II	72% Class II.

Some product-moment intercorrelations were computed and follow in Table 7.E.

Table 7.E
Intercorrelations of Selected Predictor Variables

	Africans N = 21	Indians N = 21	Mixed Group N = 42
	r =	r =	r =
<u>Matriculation:</u>			
Total with English.	.77	.65	.70
Total with Mathematics.	.55	.70	.64
Mathematics with English.	.34	.28	.31
<u>Tests:</u>			
Vocabulary with Reading Comprehension. *	.33	.62	.44
Vocabulary with Mechanical Comprehension.	.10	.12	.12
Vocabulary with Non-Verbal Reasoning.	-.22	-.29	-.20
Vocabulary with A2.	.24	.15	.22
Vocabulary with Index of Accuracy.	.11	.38	.24
Non-Verbal Reasoning with Matrices (1938).	.60	.69	.66
* For a larger mixed group (Non-European Arts and Medical Students, African, Indian and Coloured, N = 84) Vocabulary (N.B.69) and Vocabulary (Mill Hill) intercorrelated 0.73.			

<u>Africans:</u>	Beta Coefficients:	Vocabulary	:	0.68
		Mechanical Comprehension:		0.39
	Multiple R :			0.79
<u>Indians:</u>	Beta Coefficients:	Vocabulary	:	0.31
		A2	:	0.49
	Multiple R :			0.61.

While these computations suggested that certain combinations of tests might have considerable predictive value, no significance could be attached to the particular figures obtained in view of the small number of cases and limited criterion data upon which they were based. Even at much later stages of the work, as has already been explained, there were still insufficient data to warrant the use of multiple regression techniques except for purely exploratory purposes.

7.8 Matriculation Marks and Pre-Medical Criterion Gradings

For the small group whose results are reported in Table 7.D, African matriculation marks appear relatively effective predictors and Indian matriculation marks relatively poor ones. The criteria, however, are only Preliminary Year results, and other pilot computations had already indicated that for the results of the two-year pre-medical course as a whole, matriculation marks were better predictors for Indians than for Africans.

Gradings of performance over the two years of the pre-medical course had been established for a group of 60 students. (The system of grading, as it was complicated and has been discarded in favour of other criterion measures, need not be described here). Gradings correlated as follows with matriculation marks:

	<u>Africans</u> (N = 28)	<u>Indians</u> (N = 32)
Matriculation Total:	0.27	.67
Matriculation English:	0.28	.44
Matriculation Mathematics:	0.37	.52

These correlations, being for a two-year follow-up, were felt to be more informative than correlations with Preliminary Year attainment only. While Indian matriculation marks are significantly related to the two-year criterion, only one of the correlations yielded by African matriculation marks with the criterion is significant (Mathematics: $r = 0.37$) and then barely at the 0.05 level.

This, it was felt, indicated the need to include some standardised tests of attainment in future experimental batteries with a view to improving the prediction of African results. While some of the Differential Abilities tests had yielded fairly promising results for Africans in the Faculty (Table 7.D), these were against Preliminary Year criteria only. Further, the Differential Abilities tests could not be expected to play the same part in a predictor battery as did matriculation marks or attainment tests.

For the Indians, it seemed, matriculation marks could be regarded as fairly satisfactory measures of academic achievement, but for the Africans

such a measure had not as yet been identified. Four measures of attainment in English, Mathematics and Science were accordingly selected for use in testing the freshmen of 1957. These were (See Section 7.1):

- (1) Reading Comprehension (Princeton).
- (2) Mathematics. (General Achievement Test III of Educational Testing Service, Princeton).
- (3) Mathematics Pre-Test.
- (4) Scientific Information Test - a measure specially developed for this investigation. Its construction is described in Section 7.13 below.

7.9 Trial Administration.

Two of the attainment tests brought into use in 1957 had been administered by way of trial in non-European matriculation forms or university classes. These were Reading Comprehension (Princeton) and Mathematics (General Achievement Test III). The Mathematics Pre-Test was not given a trial administration.

Other tests given trial administrations in schools or university classes in 1956 or 1957 were Furneaux's tests GL.2C/46 (Level) and GIS/14E.36 (Speed), and the Speed Tests of Morrisby's experimental battery (Morrisby 1955). From these trial administrations it appeared:

- (1) That the Reading Comprehension and Mathematics Tests, although American, and Test G.L. presented no difficulty in administration.
- (2) That for Non-European groups the time-limit of the second part of the Reading Comprehension Test should be extended from 25 to 35 minutes. (No comparisons with United States norms were planned).
- (3) That the complicated instructions and timing of both Furneaux's and Morrisby's Speed Tests made it difficult to administer these tests satisfactorily.

7.10 Decisions after pilot validation studies.

To make room for four attainment tests in the battery to be used for testing the freshmen of 1957 it would be necessary to discard some of the original tests. This was generally done on evidence of low validity, high correlation with other predictors, or difficulty in administration.

A test of low or even negative validity may, of course, function in a battery as a suppressor variable whose function "is to partial out the non-valid variance from an otherwise valid test" (Thorndike, 1949). But the use of suppressor variables presupposes multiple regression techniques which are inappropriate to the small numbers available for the present study. (Section 2.4). It was felt that most of the tests retained should be positively and significantly related to the criteria, though certain others could be used for their exploratory value without reference to their potential as predictors.

Such an exploratory test is Furneaux's Test G.L. (General Level) which yields indices of performance at different levels of difficulty, and which is scored in such a way as not to penalise the slow but accurate worker. It was thought that this test might yield valuable research information even if it did not correlate highly with any criterion measure, and it was accordingly included in test batteries from 1957 onwards.

The five tests discarded from the original battery were:

(1) Reading Comprehension (Differential Abilities). Although the validities of this test were of the order of 0.4, it correlated 0.3 to 0.6 with Vocabulary (Table 7.E) and is short (only 20 items). It was felt that the longer Reading Comprehension (Princeton) Test, (90 items, and, as administered in this investigation, fifty minutes) would be preferable.

(2) Arithmetic (Differential Abilities). This test was dropped on the grounds of the validity of 0.08 in the African group (Table 7.D). For Indians it showed high validity, and as Indian scores clustered near the maximum, it was thought that the obtained validities could not be trusted, and that it would be better to rely upon the Mathematics achievement tests. Kelly's findings upon Thurstone's Number Ability Test (Section 2.32 above) were not known to the writer at the time, but in their light the decision to drop the Arithmetic Test now appears to have been a mistake.

(3) Matrices 1938. This test had shown generally low or negative validity (Tables 7.A to 7.D) and correlated 0.6 to 0.7 with Non-Verbal Reasoning, which was retained in preference to Matrices (1938) because its three sub-tests (Figure Series, Number Groups and Pattern Completion) afford a wider range of non-verbal material than does the Matrices test. Moreover Edholm and Gibson (1944) and Gibson (1948) had found Matrices of very little value for the prediction of Second M.B. examination results.

(4) Space Perception (Differential Abilities). This test had shown rather poor validities ranging from +0.27 to -0.14 for mixed groups (Tables 7.A to 7.C), and although for Africans separately it yielded a more promising result (0.34, Table 7.D) it is a particularly difficult test to administer, and was therefore dropped.

(5) Memory (Differential Abilities). This had shown generally negative or low validity.

After further checks during 1957 and 1958 two of the four attainment tests introduced in the 1957 battery were also discarded: the Mathematics Pre-test and Reading Comprehension (Princeton). These tests required 90 minutes of working time and were discarded mainly to shorten the experimental battery and limit the number of variables for analysis. The Mathematics Pre-Test correlated -0.03 (rho) with a staff ranking of 17 Africans on two years' pre-medical work with which Scientific Information correlated 0.54 (rho) and though Reading Comprehension (Princeton) correlated positively with staff assessments it was felt to overlap Matriculation English and the Vocabulary and Verbal Reasoning Tests to such an extent as not to warrant its continuation. This reduced the experimental battery to the eight tests listed in Section 7.1(b):

- (1) Vocabulary;
- (2) Verbal Reasoning;
- (3) Non-Verbal Reasoning;
- (4) Mechanical Comprehension;
- (5) A2;
- (6) GL;
- (7) Mathematics (General Achievement);
- (8) Scientific Information.

Of these tests four (numbers 1, 5, 7 and 8, chosen partly for face validity and simplicity in administration and timing) were used in the special selection procedure of 1959, together with an English Composition test which was marked on impression. For the 1959 procedure, as explained in Section 7.2, tests were administered by teachers and clergymen in outlying centres, and though very detailed written instructions were issued to them, it was felt that tests requiring experienced administrators could not be used.

The four tests not taken by the 1959 group during selection were administered as part of registration procedure.

In the selection procedures of 1960 and 1961 all testing took place in Durban, and the full battery was administered with the exception of Mechanical Comprehension. Although this test had shown promising validities, it was felt that under selection conditions candidates might have difficulty in following the instructions and react unfavourably to the test.

7.11 Reliability Coefficients.

Except in the case of the Scientific Information Test, the reliabilities of the objectively-marked tests chosen as the final experimental battery had been established for European groups for whom the tests had originally been standardised. But since "reliability depends upon the population measured as well as upon the measuring instrument" (Guilford, 1950) a check upon test reliabilities in the special circumstances of the Faculty seemed desirable.

For this it was felt that the split-half method of estimation would be sufficient. Scores for odds and evens were counted and correlated for each test, taking African and Indian papers separately, and the self-correlation of the whole test was then estimated by the Spearman-Brown formula (Garrett, 1953, formula 80). For the Scientific Information test a second estimate was obtained by the Kuder-Richardson formula. (Garrett, 1953, formula 77; See 7.13 below).

The re-test method would in most cases have been preferable owing to the speed factor in certain tests. (Thorndike, 1949). But none of the published tests chosen was divided into equivalent and separately timed halves. (Although the Mathematics and Non-Verbal Reasoning tests, as shown in Section 7.1, are in separately timed sections, these sections are not equivalent). Re-testing with alternative forms would have doubled the testing time required and possibly antagonised both students and staff. Nor were alternative forms available for Test GL, Mechanical Comprehension, and Scientific Information. And since the validity of most of the tests had already been established, an estimate of reliability was a matter of secondary importance.

For tests which were only administered to freshmen on registration, and which were not used in actual selection procedures, reliabilities could be estimated for groups of freshmen only. But for those tests which had been taken by sufficiently large numbers of applicants for admission to the Faculty in the course of actual selection procedures, reliabilities were estimated for applicant groups. Results are summarised in Table 7.F, which also shows the reliabilities reported by the publishers of the tests for the original European standardisation groups.

Table 7.F
Reliability Coefficients: Objectively Marked Tests

Test	Africans		Indians		Europeans
	N	r ₁₁	N	r ₁₁	r ₁₁
(The group - freshmen or applicants - for which the estimate is made, is shown in brackets).					
Vocabulary (Freshmen)	56	.94	45	.88	.89
Verbal Reasoning (Freshmen)	68	.88	59	.78	.90
Mechanical Comprehension (Freshmen)	51	.70	53	.71	.70
Mathematics (Applicants)	50	.82	61	.81	.92
A2 (Applicants)	49	.86	52	.85	-
Non-Verbal Reasoning (Freshmen)	69	.91	60	.54	.84
GL (Freshmen)	50	.86	50	.77	-
Scientific Information (Applicants)	50	.69	50	.68	-

Considering that these reliabilities are for groups at the matriculant level or above it, most of them appear reasonably high. Guilford (1950) points out that "the requirement of reliabilities of .90 and above is very unrealistic and that if a selection test proves to be valid we can tolerate its low reliability." It will be seen that in most cases the reliabilities obtained for Africans and Indians are of the same order of magnitude, or slightly higher, than those reported for Europeans by the publishers of the tests. The European groups, however, for which reliabilities were computed by the constructors of the tests, are not, of course, the same for all seven tests. Further, the constructors of the South African Differential Ability tests used an approximative reliability formula (Garrett, 1953, formula 78: Manual of the Differential Abilities Battery, p. 5) which does not involve any kind of item analysis. Thus the comparison of reliabilities obtained in the present study with those obtained for the same tests with European populations has little significance.

It is of interest, however, that for all the tests except Mechanical Comprehension, the African group shows a higher reliability than the Indian. This is to be expected from the generally greater dispersion of African scores shown in Section 7.12.

For the Scientific Information Test, as explained in Section 7.13, a rather low internal-consistency reliability is to be expected owing to the heterogeneity of the items. The test yields reasonably high validities for African groups (see Section 7.13).

The very low reliability obtained for Non-Verbal Reasoning in the Indian group was checked by intercorrelating the three parts of the test. This yielded coefficients of the order of 0.3 (r) indicating very low internal consistency. Fortunately GL provides an alternative non-verbal measure.

7.12 The Standardisation of Objectively-Marked Tests African-Indian Comparisons

To facilitate the comparison and addition of candidates' scores, the raw marks for every test were converted to a standard scale. Such scales, for the available numbers and in a rapidly changing situation, can be only approximate, and the tables will, of course, require revision from time to time.

For every test, African and Indian marks were standardised separately, the reference group in every case being the African or Indian freshmen of the Faculty who had taken the test in question as part either of registration or of selection procedure. This of course limited the size of the reference groups. These, for instance, for the first tentative standardisation of four tests for Africans for the selection procedure of January 1959, were:

Test A2	:	64
Vocabulary	:	64
Mathematics	:	45
Scientific Information	:	47

Small as these groups are, it seemed preferable to include only pre-medical students in all reference groups, though the totals could have been inflated by including the scores of applicants, Arts students and school pupils in matriculation forms who had taken the tests. In most cases these differ significantly from pre-medical students' scores. For the Mathematics test, however, sixteen African high school students' scores were included, the median score for these being the same as that of the undergraduates.

The means and standard deviations for these small groups differ only slightly from those of classes enrolled later. Re-standardisation, accordingly, has not yet been undertaken. For other tests, standardised at the end of 1960, somewhat larger reference groups have been available. Cumulative records are kept for each of the eight tests, so that any substantial variation of the performance of a freshman class from the Faculty's norms will be detected immediately.

Before standardisation, each distribution of raw marks was tested for skewness and kurtosis. (Garrett, 1953, formulae 20, 64, 21 and 65). A table was then prepared, using Garrett's formula 74, for conversion to

a scale with a theoretical mean of 10 points and a standard deviation of 2.5. This has the advantage of expressing average or higher scores in two digits, and scores below average in one. Scores generally range from five to fifteen, but exceptionally high or low marks will lie beyond these limits. As the zero point is four standard deviations below the mean, it is unlikely that any score will have to be standardised with a minus sign, which might confuse the Admissions Committee.

Only one African distribution was found to differ significantly from the normal curve: this, the distribution of marks for the Mechanical Comprehension Test, is platykurtic. As the test for kurtosis yielded a value of $Ku/S.E.Ku$ significant only between the 0.05 and 0.02 levels, (2.03 for $N = 81$), no adjustment was attempted.

The distributions of Indian scores showed significant negative skew for four tests: A2, Vocabulary, Mathematics and Verbal Reasoning. For Indian freshmen, the ceiling of these tests is evidently too low. As it had been decided by January 1959, when the first tests for normality were undertaken, that very little use would be made of test scores in the assessment of Indian applicants, the construction of standard scales for these four tests was no longer a matter of importance. The Indian Verbal Reasoning distribution, however, was normalised by the procedures outlined by Garrett (1953: Chapter 12, Section 2).

Means and variances for the reference groups are presented in Table 7.G(i). Variance-ratio and t -tests were set up for comparing Indian and African distributions: the results of these are summarised in Table 7.G(ii). T -tests were not applied in the case of two pairs of distributions yielding a significant variance-ratio. Bessel's correction was applied in the computation of variances. (Tables follow on page 201).

The Indian mean is higher in all cases, and significantly higher in five of the six comparisons that satisfy the t -test's assumption of equivalent variances. From the broad differences between Indian and African opportunities and performances already discussed in Chapters III and VI, this is only to be expected.

If we leave out of account the possibly special cases of GL (unspedded) and Mechanical Comprehension (perhaps equally unfamiliar to both groups) it will be seen from the obtained values of t that the more highly significant Indian-African differences are on tests A2 and Mathematics - tests involving problems or operations - while Vocabulary and Scientific Information - tests of knowledge - show less significant differences. This might suggest that African and Indian freshmen differ less in performances calling chiefly for the recall of previously learned information, than in solving problems of a novel kind.

The African variance is larger for six of the eight tests, and significantly larger for two (Verbal and Non-Verbal Reasoning). For others, however (e.g. Scientific Information and Mechanical Comprehension) the difference of variances is inconsiderable. It will be shown later that among freshmen groups the variances of Indian and African Matriculation marks do not differ significantly, though this was not the case for Matriculation Total marks among qualified applicants (Section 6.12).

Indian-African differences on the variances of test scores possibly throw some light on the forces operating in the selection of candidates for admission to the Faculty, if we take 'selection' in its widest possible sense to include the general influences of family and environment (Furneauux, 1961) as well as the formal procedures of education.

Table 7.G

Objectively-Marked Tests
African and Indian Pre-Medical Freshmen

(i) Means and Variances

	Africans			Indians		
	N	Mean	Variance	N	Mean	Variance
Vocabulary	64	39.00	24.98	73	41.40	20.88
Verbal Reasoning	101	41.86	69.48	83	47.03	36.79
A2	64	48.30	25.13	72	52.01	21.51
Mathematics	45	33.82	38.80	46	38.72	45.50
Non-Verbal Reasoning	103	34.15	61.91	84	38.95	28.96
GL	98	163.07	4130	76	192	4451
Mechanical Comprehension	81	8.41	12.46	71	9.04	11.36
Scientific Information	47	20.45	30.22	53	22.89	30.10

(ii) Variance-Ratio and t-tests
(Africans versus Indians.)

Tests	Variance-Ratio	t	Significance
Non-Verbal Reasoning	2.138	-	$p < 0.01$ (F)
Verbal Reasoning	1.889	-	$p < 0.01$ (F)
A2	1.168	4.448	$p < 0.01$ (t)
Mathematics	1.170	3.563	$p < 0.01$ (t)
Vocabulary	1.196	2.916	$p < 0.01$ (t)
GL	1.078	2.877	$p < 0.01$ (t)
Scientific Information	1.004	2.194	$p < 0.01$ (t)
Mechanical Comprehension	1.097	1.113	-

An attractive hypothesis, not however at present fully supported by the data, is that in the case of the Africans the tendency is for candidates to be selected for their capacity to memorise information, while the Indians are selected for intelligence as well. This would explain a tendency for African scores to be more highly dispersed on tests involving 'operations' and less dispersed on tests of 'knowledge' such as Scientific Information and Vocabulary. Such a difference might, however, not be due to selection, and unfortunately for the hypothesis, the African and Indian freshman variances are almost identical for tests A2 and GL. One might, however, attribute the similarity of African and Indian variances on these two tests to the bunching of Indian scores near the ceiling of A2, and the elimination of the speed factor by the scoring procedure for GL.

With these results may be compared those obtained in the testing of applicants. It will be recalled that in 1956 virtually all applicants for admission to the Faculty wrote Test A2 and Matrices (1938), and that again in 1959 virtually all applicants took five tests: English Composition (unstandardised and impressionistically marked), A2, Vocabulary, Mathematics, and Scientific Information. Results follow in Table 7.H.

Table 7.H

Objectively-Marked Tests
Applicants of 1956 and 1959

(i) Means and Standard Deviations

	Africans (1956)			Indians (1956)		
	N	Mean	Variance	N	Mean	Variance
A2.	52	44.67	34.65	42	49.00	34.10
Matrices, 1938.	42	47.19	74.43	42	51.19	23.73
	Africans (1959)			Indians (1959)		
	N	Mean	Variance	N	Mean	Variance
A2.	56	46.64	53.69	86	49.24	22.26
Mathematics.	51	30.10	34.84	88	33.3	58.28
Vocabulary.	56	35.63	41.44	86	37.63	43.53
Scientific Information.	51	17.73	23.12	88	20.07	26.23

(ii) Variance-Ratio and t-tests.
(Africans versus Indians).

Test	Variance-Ratio	t	Significance
Matrices (1938).	3.137	-	$p < 0.01$ (F)
A2 (1956 candidates).	1.016	3.52	$p < 0.01$ (t)
A2 (1959 candidates).	2.412	-	$p < 0.01$ (F)
Mathematics.	1.673	-	$p < 0.05$ (F)
Vocabulary.	1.050	1.77	Not significant
Scientific Information.	1.135	2.34	$p < 0.05$ (t)

Applicants' scores appear to follow patterns generally similar to those of freshmen's scores. For Test A2 the African variance is significantly greater in 1959 (but not in 1956) and for Matrices (as for Non-Verbal Reasoning in the freshman groups) the African variance is also significantly greater than the Indian. Thus the 'intelligence' tests show a greater dispersion of African scores; for Mathematics the Indian variance is this time significantly greater, while on the two tests of 'knowledge', Vocabulary and Scientific Information, African and Indian variances are again almost identical.

Indian means are again higher than African, and in two cases significantly higher. Within each racial group the mean for applicants is invariably lower than the mean for freshmen, and the variance for applicant scores is generally greater except in the cases of Scientific Information for both groups, and of Mathematics for Africans.

It is not suggested that these data suffice to sustain the hypothesis of African dispersion on measures of intelligence and Indian dispersion on measures of attainment, with its corollary that African schools do not select for intelligence. This hypothesis is only incidental to the present research, and should be explored in the light of much more than the present rather scanty evidence.

Unfortunately, owing to changes in the testing programme, only relatively small numbers of freshmen have as yet taken all eight of the experimental tests finally chosen for this study, but multivariate analysis may be helpful when enough cases for it have accumulated.

7.13 The Scientific Information Test

For this test, constructed in 1956, 140 alternative-response items were written, using (for some) material kindly made available by the National Institute for Personnel Research. From these items, 44 were selected for the final experimental version. Owing to the pressure of time and lack of resources, the item analysis on which this selection was based had to be on a small scale.

Two high schools, one African and one Indian, made their Standard IX and Standard X classes available for experimental administrations of this test and the General Mathematics Achievement Test of Educational Testing Services, Princeton.

As the testing time was limited, the 140 Scientific Information items were divided into one set of 60 items (regarded as the most promising) and two of 40 each. From these, two 100-item forms of the test were put together, each containing the set of 60 items followed by one of the two sets of 40. Each form of the test was taken by half the group tested; thus the 60-item set was tested for the entire group, and each of the 40-item sets for half of it.

Each form contained 28 questions drawn from the fields of Physiology, Hygiene and elementary medical knowledge, 28 in the field of Biology, 28 in Physics and Chemistry and 16 of a general scientific nature. This, of course, is only a rough classification. Thanks are due to members of the departments of Surgery, Zoology and Physics who read the entire test at this stage and whose criticisms are incorporated in the final forms of items.

The test in these forms was administered untimed to 110 high school pupils (62 Indians and 48 Africans) in Standards IX and X. This provided 55 sets of answers for each form. Phi-coefficients were then computed for the correlation of each item with total score for each form. It will be seen that this provided two checks on the validity of the 60 items in the first set and one on the validity of the 80 items making up the other two sets. The 40 items correlating best with total score were selected, plus four other items, to form the final version. Of the 44 items in this, 14 may be classified as matters of general scientific knowledge and reasoning, 13 are from the fields of physics and chemistry, 10 involve physiology, hygiene or elementary medical knowledge and 7 elementary biology. This is again only a rough classification. A later analysis has shown that the four new items added to the final version are of value in discriminating between high and low scorers.

The method of selecting items probably eliminated most items that are common knowledge to non-European Natal Senior Certificate classes. Thus the test may be regarded as a measure of interest as well as of knowledge.

As the test includes a wide range of material, its internal consistency, measured by reliability formulae, is low. For 50 African applicants for admission to the Faculty tested in January 1959, the Kuder-Richardson formula (Garrett, 1953, formula 77) yields a reliability coefficient of 0.62 and the Spearman-Brown formula based on the correlation of odds with evens, a reliability of 0.69. For 50 Indian applicants tested in the same year, the Spearman-Brown formula yielded a reliability of 0.68. Since there is only one form of the Scientific Information test, test-retest reliabilities cannot be computed.

The time-limit originally fixed for the test in its final 44-item form was 30 minutes, but all except the very slowest candidates are able to finish the test in 25 minutes.

From March 1957 onwards the test has been administered annually as part of registration or selection procedure: validity coefficients are listed in Table 7.I.

Table 7.I

Validity Coefficients

Scientific Information Test

Group	Criterion	Correlation
22 Africans and Indians (1956)	Sum of standardised Preliminary Year Marks.	0.58 (r)
17 Africans (1957)	Pooled staff rankings: 2 years' Pre-medical work.	0.52 (rho)
16 Africans (1957)	Pooled staff rankings: 1 year's Pre-medical work.	0.54 (rho)
11 Africans (1958)	Staff ranking on one year's Pre-medical work.	0.32 (rho)
14 Africans (1959)	Staff ranking on work of Preliminary Year.	0.46 (rho)
17 Africans (1960)	Dichotomy: promotion on schedule from Preliminary to First Year.	0.63 (phi)

The first two of the above groups overlap. Counting only the last five groups, which are all African and all independent, yields a median validity of 0.52, which for a single test of 25 minutes is satisfactorily high. Up to 1958, of course, the test was administered only experimentally, but the 1959 and 1960 validities were obtained in actual selection procedures.

7.14 - 7.20: Standardisation of Matriculation Marks

7.14 Estimates of Reliability

It was impossible to estimate the reliability of matriculation marks for individual subjects, though the intercorrelations of the marks for different papers in the same subject, or for different questions, would, if available, have afforded a basis for an estimate.

A rough estimate of the reliability of Matriculation Total Mark was, however, attempted by the method outlined by Parkyn (1959). The six subjects offered by each candidate were combined in two groups of three and the total mark for the first group ('Part I') was correlated with the total mark for the second ('Part II'). For Indian candidates Part I was made up of English, Geography and Mathematics, and Part II of Latin, History and Biology. (Large numbers of Natal Senior Certificate candidates offer this combination of subjects). For an African candidate, Part I consisted of English, a Bantu Language and Mathematics (offered by all candidates) and Part II of his other three subjects - often History and two Science subjects.

The samples for which correlations were run consisted of the marks of 50 Indians who had written the Natal Senior Certificate in 1960, and 50 Africans who had written the Joint Board Examination in 1958, 1959 or 1960. Only candidates who had offered six subjects were taken. The Indians consisted of the first 50 Natal Senior Certificate candidates on the Faculty's alphabetical list of candidates for admission in 1961 who met the requirements of the experiment. The Africans consisted of all Joint Board candidates for admission in 1960 and 1961, plus a few 1959 candidates to make the number up to 50.

For the African group, Part I correlated 0.75 with Part II. The reliability of the total mark, estimated from this by the Spearman-Brown formula, is 0.86. For the Indians, the two parts correlated 0.60, and the corresponding estimate of reliability is 0.75. (For his New Zealand sample, incidentally, Parkyn found a correlation of 0.71 for the two halves of the examination, which yielded a reliability of 0.83). The estimates for Africans and Indians compare quite favourably with those obtained for objectively-marked tests (Table 7.F, Section 7.11).

7.15 Matriculation Marks: Problems of Standardisation

Tables of Standard Scores were constructed for the matriculation marks of pre-medical freshmen as for their scores in objectively marked tests, using the scale and procedures already described in Section 7.12.

The definition of reference groups for these tables presented some difficulty. For a homogeneous population writing a single entrance examination, it would have been sufficient to decide, say, that pre-medical freshmen should constitute the principal reference group, and to standar-

dise upon their entrance examination results.

Gouws (1957) has shown how effective such a standardisation can be. His study, however, and most of the best-known British studies of selection procedures involving standardisation of marks (e.g. McClelland, 1942, or Yates and Pidgeon, 1957) are concerned with relatively large populations, all or nearly all of the same racial group, who have written the same set of entrance examinations or tests. The sources of certain other estimates, such as school marks or teachers' ratings, may vary for different groups of the main population, but can usually be scaled upon some test or examination written by the entire group.

For the Faculty, unfortunately, none of these conditions obtains: the applicant population is small and multi-racial, and its members have written six or seven different matriculation examinations. Further, as has been shown in Chapters III and VI, important changes have been taking place in the school systems from which our students are drawn, and in the pattern of Indian and African matriculation results over the years of the Faculty's existence. Complications may thus arise out of variations between racial groups, examining bodies, and changes over a period of time.

Upon variations of this kind there appears to be no satisfactory check, since there is no measure common to the entire population of applicants, upon which the marks of different groups could be scaled. The treatment of matriculation marks has therefore to strike a balance between the uncritical assumption that all marks are equivalent, and the unsatisfied requirements of a scaling procedure applicable to all groups.

Matriculation data have been collected for three levels of the population under study:

- (i) The general body of matriculants;
- (ii) Applicants for admission to the Faculty, and
- (iii) Pre-medical freshmen.

(i) Among the general body of matriculants, it will be recalled, significant differences were found between Indian and African results from 1956 onwards (Section 6.4) and, within the African group, between Joint Board and Cape Senior Certificate results (Section 6.5d).

(ii) Among applicants (counting only those scoring over 40%) the variance of Indian total matriculation marks has been shown to be significantly greater than that of African marks (Section 6.12, Table 6.R).

(iii) Among freshmen, as is shown below (Sections 7.17 - 7.20) the means but not the variances of Indian and African matriculation marks also differ significantly.

From a difference in variances among applicants and in means among freshmen it follows that Indian and African matriculation marks should be standardised separately. Also supporting this decision is the nearly significant difference between the correlations of Indian and African total matriculation marks with pre-medical criterion ratings (Section 7.8).

Within each racial group, however, when it comes to an actual selection procedure, the Admissions Committee has little option but to assume that the marks of different examining bodies are comparable, and that one year's marks are comparable with another's. Test scores, of course, when available, serve as a check on matriculation marks, but the selection tests are normally taken only by a pre-selected group of candidates brought to Durban for this purpose.

Nevertheless, even a tentative standardisation of matriculation marks has certain advantages. The frame of reference of raw matriculation marks is undefined, but for the standard scores the frame of reference is given by the performances of specific groups of African and Indian pre-medical students. The standard scores thus enable the Admissions Committee to compare a candidate's performance with those of already admitted students, as well as to add his marks for several subjects so as to yield a total comparable with that of other candidates.

Preliminary standardisation of matriculation marks, using pre-medical freshmen as the reference groups, was undertaken in 1958.

7.16 Provisional Standardisations: 1958 and 1959

The African group for the provisional standardisation of 1958 consisted of 72 students who had been under the age of 25 on enrolment and who had entered the Faculty without previous university credits. This excluded from the reference group a large number of cases from the Faculty's early years (1951-1955) in which there were high proportions of freshmen over 25, or with previous university records. But it was felt that most future applicants would be entering direct from school, and that the reference groups for standardisation should be constituted accordingly. It had also appeared by this time that it would be advisable to run most correlations for groups of freshmen under 25 on enrolment and without previous university credits, and that the groups for standardisation and for correlations ought clearly to be similarly constituted.

The Indian group was similarly limited to freshmen under the age of 25 on enrolment in the Preliminary Year. It included a few cases with previous credits, but none which would exempt the student from either year of the pre-medical course. In other words, every member of the Indian reference group had started the pre-medical course at the beginning. The Indian group numbered 92; it was thus more numerous than the African, partly because it included freshmen of 1958 as the African group did not, and partly because proportionately fewer Indian records had had to be discarded on grounds of incompleteness, age, or exemption from a year of the course.

It will be seen that the marks of several different Preliminary Year classes had to be pooled for these reference groups. In spite of this the numbers for standardisation were small, but they included every available case in the Faculty's records, and it seemed preferable to standardise upon the modal and clearly defined class of freshmen - the relatively young students beginning the course at the beginning - rather than to include the large numbers of "special cases" admitted during the Faculty's early years.

All cases of students admitted without matriculation mathematics were excluded from the reference groups. The marks taken for standardisation were in all cases, so far as could be ascertained, those obtained at the first attempt. They thus included a number of English marks under 40% and mathematics marks under 33%, in cases of students who had failed these subjects at the first attempt and later passed them in supplementary examinations. This, as will be seen, made for rather wide dispersions of marks, but this was felt to be preferable to using the marks of second attempts, or an arbitrary system of subtraction and adjustment.

The scale chosen and the conversion formulae were the same as those adopted for objectively-marked tests and described in Section 7.11. The approximation of each set of marks to the normal curve was closer than might be expected, probably as a result of the relative heterogeneity of the groups, whose members were drawn from several different Preliminary Year classes.

Modification of the African scales initially constructed has not been felt necessary. It was observed, however, that the marks of Indians admitted in or after 1955 tended to be significantly higher and at the same time more homogeneous than those of Indian freshmen in earlier years. For this reason Indian marks were re-standardised early in 1960 using the marks of 68 freshmen admitted in the years 1955-1959 as the reference group.

Means and standard deviations follow in Table 7.J. The measures standardised have been defined in Section 7.1.

Table 7.J
Means and Standard Deviations of Matriculation Marks
Reference Groups

(a) Africans, 1951-1957			
	Mean	Standard Deviation	N
Total.	51.73	5.47	72
Adjusted Total.	51.03	6.31	72
English.	48.79	7.66	72
Mathematics.	50.14	11.26	72
Science.	52.00	9.23	72
Other Subjects.	52.42	9.87	72
(b) Indians, 1951-1958			
	Mean	Standard Deviation	N
Total.	54.56	6.84	94
English.	51.38	7.21	94
Latin.	61.87	10.48	86
Biology.	53.85	10.01	87
Mathematics.	55.15	12.15	94
(c) Indians: Revised Scale: 1955-1959			
	Mean	Standard Deviation	N
Total.	56.88	5.99	68
English.	52.85	7.19	68
Latin.	62.08	8.52	61
Biology.	57.11	10.71	65
Mathematics.	58.96	11.98	68

Among the African group there were too few Latin marks for standardisation and so many different Science subjects that each candidate's science mark had to be treated as a composite (see Section 7.1). But most Indian candidates had taken both Latin and Biology, though some had not, which accounts for the variations in the numbers in the reference groups.

7.17 Matriculation Marks: Study of Distributions

Two questions are left unanswered by this provisional standardisation:

- (a) Does the pattern of marks vary significantly from year to year?
and
- (b) Can the marks of different examining bodies legitimately be pooled?

These were investigated in 1960-1961 for three variables - Matriculation Total, English and Mathematics marks - first among qualified applicants for admission to the Faculty, and secondly among pre-medical freshmen.

The first question - 'Does the pattern of marks vary significantly from year to year?' - is answered by analysis of variance.

In the absence of scaling data for the entire group under study, the second question - 'Can the marks of different authorities legitimately be pooled?' - cannot of course be answered. The variance-ratio test, however, does provide a check worth having. In comparing, say, Cape Senior Certificate with Joint Board marks, a difference in means would imply either a difference between the levels of abilities of the two groups of candidates, or between the examination standards. In the absence of further evidence it is impossible to decide which of these is the case. Significantly different variances, however, would indicate a difference of meaning between the two sets of raw marks, whether the difference were in reality a matter either of marking procedure or of variations in the actual abilities of candidates. A further check on the comparability of the marks of different authorities is provided (among freshmen but not among applicants) by scaling these marks against scores in objectively-marked tests.

There are unfortunately very few cases of candidates of different races having written the same matriculation examination in the same years, and most of these (Indian and African Joint Board candidates) are many years out of date. It will thus generally be impossible to state whether in a comparison involving Africans and Indians, a difference between distributions of marks is attributable to racial differences or to differences between examinations.

The marks of unqualified candidates are only of theoretical interest since the Faculty is precluded from admitting such candidates by the regulations both of the University and of the South African Medical and Dental Council.

The present study of applicants' marks was confined to the marks of candidates qualifying at the first attempt, i.e. to matriculants of the groups classified in Chapter VI as 'Direct' and 'Lapsed', and to candidates with previous university credits who matriculated at the first attempt. Limiting the sample of applicants' marks in this way eliminates

the difficulty of deciding, in the case of the very large number of candidates who have written supplementary examinations, which of two sets of marks is to be taken for analysis. This also facilitates comparison between different groups of candidates in the same year - a difficult matter when a candidate's examination record is spread over two years or more. It also ensures that every member of the sample, as far as his matriculation record is concerned, is a potential medical student. At the same time this restriction eliminates from analysis the large number of "special cases" (especially Africans) who form a high proportion of the total number of qualified applicants.

The applicant groups set up for analysis consisted of all the cases satisfying these requirements that could be extracted from the records. Their numbers were:

Africans :	Cape Senior Certificate	:	61
	Joint Board Matriculation	:	102
Indians :	Cape Senior Certificate	:	15
	Joint Board Matriculation	:	45
	Natal Senior Certificate	:	194
	National Senior Certificate	:	19
	Transvaal Senior Certificate	:	35

The 164 Africans in the sample amount to 69% of the total of 238 applications by qualified Africans in the relevant groups of Table 6.N ('Direct', 'Lapsed' and 'University'), and the 308 Indians to 71% of the corresponding Indian total of 432.

The results of the analyses undertaken for these groups were presented in a report of 50 pages and 25 tables (Admissions Research Report No. 5) which was filed in the office of the Dean in January 1961. Since this Report only confirms a standardisation procedure to which in any case there seems to have been no practicable alternative, it here seems best simply to summarise its conclusions and to present the computations upon which they rest as an Appendix, (Appendix H), containing Tables 7.AA to 7.QQ.

The analysis, it must be stressed, is designed to show the relations of variances and means, though in the absence of a common measure for scaling, no conclusions can be drawn from these as to the abilities of candidates. At the same time, the extent to which different marks are comparable on purely statistical grounds is a matter of obvious importance, and it was felt that the information yielded by t-tests and by analysis of variance would be well worth the labour of computation.

7.18 Matriculation Total Marks

Africans:

Among applicants qualified at the first attempt, Joint Board Total marks do not vary significantly from year to year. Neither do those of the Cape Senior Certificate. No significant differences emerge from the comparison of the marks of the two examining bodies (Appendix H, Table 7.AA).

Among pre-medical freshmen no significant differences between Joint Board and Cape Senior Certificate marks are revealed by variance ratio or t-tests. (Appendix H, Table 7.BB).

These findings support the decision to pool the total matriculation marks of pre-medical freshmen examined by both authorities for the purpose of computing standard scores. This decision might be questioned on the grounds of the significantly higher rate of failure (in the general population, not in the Faculty) for African Joint Board candidates, shown in Section 6.5. But a significantly higher rate of failure does not necessarily imply a difference of examining standards. It appears that at the upper levels of marks, which are of most concern to the Faculty, the distributions do not differ significantly, and the scaling experiment (Table 7.BB.ii), for what it is worth, points to similarity of examining standards, at any rate as reflected in the Total Matriculation marks of these groups.

In the reference groups of African pre-medical freshmen, no significant variation from year to year has been found (Table 7.CC.i), and the provisional standard scores do not at present require revision.

The means and variances of matriculation total marks were computed for all available Cape Senior Certificate and Joint Board African applicant records (N = 318) as well as for the groups whose marks are summarised in Tables 7.AA and 7.BB. Comparison of means and variances at different levels of the population (Tables 7.AA and 7.CC) illustrates an important phenomenon:

	<u>Mean</u>	<u>Variance</u>
All African Applicants:	45.78	51.96
Applicants qualified at the first attempt:	49.55	36.64
African pre-medical freshmen:	51.33	32.10

The usual assumption in selection procedures is that the scores of the selected candidates are higher and more homogeneous than those of the general population of applicants. This assumption is satisfied if we compare the marks of pre-medical freshmen with those of applicants in general, but the variances of freshmen's marks and of the marks of applicants qualified at the first attempt, hardly differ. Since these two groups overlap very considerably - the ratio of qualified African applicants to places awarded, as shown in Section 6.9, is only 1.55 to 1, this is not surprising.

Indians:

Among Indian candidates qualified at the first attempt, total matriculation marks show no significant variation from one examining body to another (Table 7.DD). But this finding must be treated with caution. Among Natal Senior Certificate candidates qualified at the first attempt, there is no significant variation from year to year.

The marks of Indian freshmen, however, are shown in Table 7.EE to vary significantly from year to year; the mean total mark rises from 52.56 (1951-4) to 56.88 (1955-9); variances are correspondingly smaller for the later years, and it seems advisable to standardise for the 1955-1959 groups. The higher marks of the later freshmen groups are, of course, to be expected from the changes described in Chapters III and VI.

Total Matriculation Marks - Indian-African Comparisons.

Amongst applicants, the variances of total matriculation marks for

the two largest groups qualified at the first attempt - 102 African Joint Board and 194 Indian Natal Senior Certificate candidates - yield a ratio significant at the 5% level. The Indian mean is higher by 2% than the African (Table 7.FF.iii).

However, among candidates who had written the same examination, Indian-African differences were surprisingly small. These comparisons are for Joint Board and Cape Senior Certificate marks (Table 7.FF. i and ii) and in these cases there are special circumstances that probably explain the similarity. Indian Joint Board marks date mostly from 1950-1953, i.e. before the expansion of Indian secondary schools in Natal and the onset of Bantu Education. Indian attainment then was probably nearer the African level than it is now. And the very small group of Indian candidates from the Cape, similarly, may not enjoy the same advantages of environment and training as do many of the pupils of Sastri College and other long-established Indian schools in Natal.

Among pre-medical freshmen, as might be expected, the Indian standardisation group, as compared with the African, has a slightly larger variance, and a significantly higher mean (Table 7.FF.iv).

7.19 Matriculation English Marks

Africans:

Among African applicants qualified at the first attempt, the Joint Board English marks vary significantly from year to year. Cape Senior Certificate English marks do not, (Table 7.GG. i and ii). In five of the eight years for which comparisons can be made, the Cape mean is higher, but Table 7.GG.iii shows that when all available English marks for each authority are pooled, neither the means nor the variances differ significantly.

It will be recalled that for the general body of African examinees, significant differences were found between Cape Senior Certificate and Joint Board English results in 1958 (Section 6.5, Table 6.D). But this is not inconsistent with a similarity in the pattern of marks for those candidates who do succeed in passing.

Among African pre-medical freshmen, however, a significant difference does appear between Cape and Joint Board English marks (Table 7.HH.i) in spite of the contrary finding among qualified applicants. This would appear to result from the effect on freshmen's marks of four or five exceptionally high Cape Senior Certificate marks: this effect would be greater in the smaller freshmen group (N = 35) than in the larger group of qualified applicants (N = 62).

It happens that four variance-ratios (for total, English, Mathematics and Science marks) were computed for these two groups of freshmen, and that the ratio for English marks is the only one of the four that was found to be significant. Since it is significant at the 5% level only, and since among four ratios there is a fair probability that one will fall significant by chance, it may be felt that for practical purposes the difference could probably fairly safely be ignored.

Scaling Cape and Joint Board English marks on Vocabulary Test scores, however, (Table 7.HH.ii) suggests again that the English marks of the two authorities are less closely comparable than the total marks, though the discrepancies are not so great as to suggest that separate scaling would yield any appreciable returns.

Among African pre-medical freshmen, matriculation English marks are shown in Table 7.II to vary significantly from year to year. There are three fairly marked divisions:

- (a) 1951-1954 (low)
- (b) 1955-1957 (high)
- (c) 1958-1960 (low)

The Standardisation group, however, is drawn from groups with high and groups with low Matriculation English marks, in roughly equal proportions. Its mean and variance approximate fairly closely to the mean and variance of Matriculation English marks for African freshmen for the ten years under survey. Re-standardisation, it is felt, would serve no very clear purpose. The annual fluctuations of Africans' English marks, however, call for caution in the interpretation of individual records, Standard Scores and validity coefficients.

From the pilot validation studies of 1956 it may be recalled that the evidence for the validity of Matriculation English marks is somewhat contradictory. For the Africans of group ON 1955-6, Matriculation English marks correlated 0.62 with the sum of standard scores based on Preliminary Year marks (Section 7.7, Table 7.D), yet for a different group Matriculation English correlated only 0.28 with pre-medical criterion ratings (Section 7.8). The latter correlation is likely to have been depressed by pooling the results of several years.

Indians:

Among Indian candidates qualified at the first attempt, Matriculation English marks show no significant variation from one examining body to another (Table 7.JJ.i), nor do Natal Senior Certificate marks vary significantly from year to year (Table 7.JJ.ii).

The Matriculation English marks of Indian freshmen, like matriculation total marks, vary significantly from year to year (Table 7.KK.i) and there is a strong contrast between the years 1951-54 and 1955-59. English, like Total marks, have been standardised for the 1955-1959 group.

Indian-African Comparisons:

Among applicants qualified at the first attempt, the mean matriculation English mark is significantly higher for the largest Indian group (Natal Senior Certificate candidates) than for the largest African group (Joint Board candidates). Variances for these two groups do not differ significantly (Table 7.LL.iii).

But among candidates who had written the same examinations, Indian-African differences in English marks are again small. This repeats the finding for total marks (Table 7.LL. i and ii).

Among pre-medical freshmen, there is a statistically significant difference between the means, (but not the variances) of the Indian and African standardisation groups (Table 7.LL.iv).

7.20 Matriculation Mathematics Marks

Africans:

Among candidates qualified at the first attempt, comparing Joint Board and Cape Senior Certificate groups, significant variation from year to year does not appear in the mathematics marks of either authority, nor do the overall mean and variance for Joint Board candidates differ significantly from the overall mean and variance for Cape Senior Certificate candidates (Appendix H, Table MM). In both cases the within-group variance is greater than the between-group variance: for the Joint Board this was not the case either with total or with English. Thus the pattern of mathematics marks appears, for Africans, to vary rather less between years and between examining bodies than is the case either for total or for English. It is unfortunate that this should be offset by the probability that in mathematics individual performance varies more from one occasion to another than it does in other subjects.

As is now to be expected, no significant difference appears between Joint Board and Cape Senior Certificate mathematics marks among pre-medical freshmen (Table 7.NN). For this reason, no scaling experiment was undertaken.

From Table 7.00 it will be seen that among freshmen's mathematics marks, the variations from year to year are not statistically significant, and that the means and variances of the marks of the original standardisation (1951-1957) and of the marks of the 1951-1960 freshmen, are closely similar. Re-standardisation at present appears unnecessary.

Indians:

Among the mathematics marks of Indian candidates qualified at the first attempt, the analysis of variance summarised in Table 7.PP.i indicates significant differences between the marks of the five examining bodies. However, the distributions of marks for the two examinations written in recent years by the largest numbers of Indian candidates - the Natal and the Transvaal Senior Certificate groups - fortunately appear sufficiently similar to warrant pooling of marks. Separate scaling, as has already been pointed out, would be impracticable. Among Natal Senior Certificate candidates qualified at the first attempt, there is no significant variation from year to year (Table 7.PP.ii).

For the Matriculation mathematics marks of Indian pre-medical freshmen:

- (a) Significant variations occur from year to year (Table 7.QQ.i). Means for the years 1955-1960 are, with one exception, higher than the means for 1951-1955.
- (b) For the 1955-1959 groups used for the revised standardisation, however, between-group and within-group variances do not differ significantly (Table 7.QQ.ii).

Indian-African Comparisons:

Among the standardisation groups of pre-medical freshmen, the Indian mean, as might be expected, is significantly greater than the African, but the variances are alike (Table 7.RR.iv). Among applicants qualified at the first attempt there is no significant difference for the small and possibly atypical Joint Board groups (Table 7.RR.i). For the Cape groups

the African variance is significantly greater. Means for the two largest groups, Joint Board Africans and Natal Senior Certificate Indians, differ significantly (Table 7.RR.iii).

7.21 Collection of Biographical Data

The first sources of biographical data are the students' application form and personal file. For candidates for admission in and after 1956 the Faculty's application form was re-designed with the needs of the present study in mind; it has since been modified several times.

Before interviews in 1959, 1960 and 1961, candidates completed a detailed biographical questionnaire requiring half an hour to an hour's working time (Appendix B). This material and that of the application forms has as yet been used only as an adjunct to the interview, but a detailed analysis will be undertaken when sufficient numbers and validation data have accumulated. A summary of responses to one key item (Occupation of Father) appears as Appendix C.

Appendix C lists, of course, only the fathers of candidates admitted to pre-medical courses in and after 1959 (N = 102). It illustrates, however, the extent to which the students of the Faculty are drawn from the more prosperous or the more educated classes, and an important African-Indian difference.

Classification can only be approximate, but well over half the fathers can be roughly described as members of 'white-collar' groups, in teaching, commerce or government service. (Compare Section 3.3). Of the 62 Indian fathers, the largest groups are in commerce (27), teaching (11), or skilled trades (9). Of the 52 Africans, the largest groups are: teachers and ministers of religion (20); "Uncertain or not stated" (10) and "Government Service or Clerks" (8). Only one African father in this group was engaged in commerce, and none in skilled trades.

The "uncertain or not stated" African group consists of five deceased fathers whose occupations were not recorded by the candidates, four fathers whose occupations were not known to candidates who had been brought up in institutions or by foster-parents, and one who appears to have had no occupation at all.

7.22 - 7.27 The Treatment of Personal Assessments

7.22 School Principals' Reports

In its first years of operation, the Faculty asked the principal of every candidate's school for a detailed confidential report under three headings - 'Scholastic Record', 'Academic/Scholastic Interests' and 'General'. While these reports were useful, they were not in any way quantifiable, and many candidates' principals did not report upon their pupils at all.

During 1955 a new rating form was drafted, with the assistance of the Professor of Education, and sent to the school principals of all candidates for admission in 1956. This form requested certain factual information, as well as ratings on five-point scales of 'Intelligence', 'Industry' and 'Character'. Forms were returned for 76 of the total of 126 applicants, but the 76 forms returned covered most, though not all, of the 75 applicants qualified for admission.

For the selection of candidates for admission in 1957, this form was revised and much enlarged, and, with the addition of one new item in 1958 ('Progress at School'), has been use without further change ever since. The present text appears as Appendix E. It is introduced by a letter signed by the Dean and a guide to rating drafted by the Professor of Educational Psychology. Principals are asked for several items of factual information: the number of times the applicant attempted the matriculation examination, his previous failures if any, his rank position in class for the year's work and for English and Mathematics, details of school activities, and intelligence test score, if any. Seven ratings are also requested. If the principal works through the form from beginning to end, he will have reviewed the candidate's record, and his own views of the candidate, in some detail before arriving at the final rating - 'Probable Quality of Candidate's Academic Work'. There is also a fair amount of space for comments in the principal's own terms.

There are noticeable differences between the patterns of ratings awarded by European and by non-European school principals. In the 1956 reports, for instance, intelligence appeared to be rated more favourably by European principals, and character more favourably by African and Indian principals. However, the detailed analysis of principals' reports lies beyond the scope of the present study, which must be limited to the simple question of validation of final ratings.

Reports since 1956 have been received from a total of 108 schools: 66 for African and 42 for Indian and Coloured applicants. Scaling on matriculation marks has been undertaken for two variables - Rank Position in Class, and Probable Quality of Candidate's Academic Work. For this, the procedure is as follows. Taking each school principal's reports in turn:

- (1) The Matriculation Total percentages for all candidates rated by the Principal are written down in rank order.
- (2) In a column parallel to the marks, the Principal's ratings are written in rank order, A's at the top of the list, B's next and so on.
- (3) The mean of the marks in the first column opposite the A's is assigned to all candidates rated A, and the same is done for the B's, C's, D's and E's.

In the extreme case of a principal who has rated one candidate only, the Total percentage is entered as the Principal's assessment.

To take a numerical example, the data for five candidates rated in 1956 and 1957 by a certain principal are:

<u>Candidate</u>	<u>Principal's Rating</u>	<u>Total Matriculation Mark</u>
P	C	34
Q	C-B	37
R	C	35
S	A	57
T	B	63

Ranking as explained above, we have:

<u>Rating</u>	<u>Scaled Value of Rating</u>
A	63
B	57
C-B	37
C	35)
C	34)

) = 34.5, say 35.

Candidate S now gets a Scaled Rating of 63, Candidate T one of 57, and so on. Scaled Ratings are in turn convertible to Standard Scores using the tables for Matriculation Total.

It must be stressed that no scaling procedure will work very well with small numbers, and that this one has at present to be applied to very fallible data. But its usefulness is suggested by the following correlations run in 1957 for a group of 25 Africans (the largest number for which criterion data and School Principals' Ratings were then available):

Table 7.K

Preliminary Year Criterion Scores correlated with School
Principal's Ratings and Matriculation Marks. (N = 25)

	<u>r</u>	<u>p <</u>
(1) Unscaled Principal's Ratings:	0.42	.05
(2) Adjusted Total Matriculation Mark:	0.57	.01
(3) Scaled Principal's Ratings:	0.64	.01
(4) Scaled Principal's Ratings plus matriculation English plus matriculation mathematics, all converted to standard scores:	0.70	.01

Correlations (3) and (4) above were probably inflated by the fact that school principals' ratings had been given much less weight than matriculation marks in the actual selection of candidates. Assessments not used in selection are likely to correlate more highly with results, other things being equal, than the assessments on which selection is based.

One special difficulty arose in 1958. Over the past three years the Faculty had collected a fair number of ratings from the principals of African mission schools; when several of these schools changed hands (Section 3.11) new signatures began to appear on the reports, and scaling had to be started afresh.

7.23 Interviewers' Ratings

Four groups of candidates for admission to pre-medical courses were interviewed: in 1956 all qualified and some unqualified applicants; and in 1959, 1960 and 1961 all short-listed candidates. The 1961 interviews, however, were for questioning and observation only: interviewers' ratings were made only for candidates of 1956, 1959 and 1960.

For the candidates of 1956, a detailed interview schedule was drafted (not by the writer, who prepared, however, the interviewers' rating form) and tried out during 1955 with student volunteers. The schedule covers the topics of the candidates' education, employment if any, approach to medicine, use of leisure, and relations with others. The rating form is reproduced in Appendix F. (It includes spaces for an agreed rating by both interviewers, which was not in fact attempted).

Of the two interviewers in 1956, P and Q, P studied the candidate's file before the interview and Q after it. Ratings were recorded after each interview: Q did not as a rule consult the file before recording his.

Eight or nine candidates per interviewer were normally dealt with each day between nine a.m. and five p.m.

Owing to commitments in Durban and to pressure of time in other centres, it was impossible for all candidates to be met by both interviewers sitting together as had originally been planned. At centres where there were less than ten candidates the interviewers normally sat together, but they conducted their interviews separately where there were larger numbers. For a few candidates in Johannesburg and Umtata, Q chose to sit with his wife.

There were thus five different kinds of rating, i.e. by

- (i) P sitting alone (18 Africans, 24 Indians);
- (ii) P sitting with Q (P's ratings - 20 Africans, 12 Indians);
- (iii) Q sitting with P (Q's ratings - 20 Africans, 12 Indians);
- (iv) Q sitting alone, and (20 Africans, 6 Indians).
- (v) Q sitting with his wife,

(There are too few cases of type (v) to warrant their being treated separately.)

Candidates sponsored by the Federation and Protectorate governments were admitted without passing through the Faculty's selection procedure (See also Section 4.11) and were interviewed in Durban by P after registration.

These variations of procedure, unavoidable in the circumstances of 1956, of course complicate any attempt at evaluation of the interview.

For the interviews of 1959 and 1960 a new rating form was designed. This (reproduced in Appendix F) includes ratings on Liking, Self-Expression and Rapport, which are intended to throw light on the processes of the interview itself. The analysis of this form, however, forms a project independent of the present study. Chapter VIII will present only validations of the ratings on General Impression and Academic Performance (Section 8.14).

Before meeting a candidate, the interviewers were able to study his test and matriculation marks, application papers, and completed biographical questionnaire. The questionnaire (See Section 7.21 and Appendix B) took the place of the factual questions on the 1956 interviewers' schedule. The interviewers' ratings were thus made on the basis of much more material than the interview alone.

Three interviewers, P, R and S, participated. R and S were medically qualified. P was not. P interviewed all short-listed candidates in both years; R and S about half the short-listed candidates each. Each interviewer sat alone, but there was in each year a preliminary conference on procedure and the use of the rating scale. Whenever possible, P saw the candidate first, but owing to pressure of time and the interviewers' other commitments, this could not always be arranged. Usually each interviewer kept his own rating form after completing it, but in a few cases rating forms were left in a circulating file so that the second interviewer, if he wanted to do so, could look at the ratings of the first interviewer before making his own. Thus all ratings were not recorded independently.

Means and variances of interviewers' ratings follow in Table 7.L and correlations between interviewers in Table 7.M.

Table 7.L.

Means and Variances of Interviewers' Ratings
"General Impression"

Year	Interview	Africans			Indians		
		N	Mean	Var.	N	Mean	Var.
1956	P sitting alone.	18	3.33	0.59	24	3.21	0.35
	P sitting with Q.	20	2.95	0.68	12	2.58	1.09
	Q sitting with P.	20	2.85	1.00	12	1.92	0.82
	Q's other interviews.	20	2.45	1.05	6	3.00	0.40
1959	P	28	6.14	2.93	37	6.97	3.36
	R	28	6.86	2.26	16	6.88	1.87
	S	28	6.53	2.85	24	6.21	2.17
1960	P	29	9.10	5.82	20	9.20	3.74
	R	29	9.07	5.93	20	10.05	5.00

Note: (1) Means and variances are not comparable from one year to another. The 1956 rating form differs from that of 1959 and 1960, and different conventions were followed each year in transforming interviewers' letter grades to numerical values.

(2) S interviewed too few Indians in 1960 for his ratings of the two groups to be compared.

Considering the small numbers of cases in each group, the means and variances of ratings in any one year seldom vary considerably. From year to year as explained above, means and variances are not comparable.

If ratings of Africans are compared with ratings of Indians, it is of interest that in seven cases out of nine the variance of the ratings of Africans is slightly higher. This is probably related to the greater variety of age and hence of personal history among African applicants (Table 6.R, Section 6.12). It is also possible that European interviewers tend to perceive individual differences more readily among Africans than among Indians, or at any rate to think that they perceive them.

Mean ratings tend to be higher for the Africans in 1956 and for the Indians in 1959 and 1960.

Correlations between predictor ratings follow in Table 7.M.

Table 7.M
Correlations between Interviewers' Ratings

(a) "General Impression"

Year	Interviewers	Africans			Indians		
		N	r	P <	N	r	P <
1956	P with Q	20	0.76	0.01	12	0.80	0.01
1959	P with R	28	0.35	-	16	0.82	0.01
	P with S	28	0.61	0.01	24	0.62	0.01
	R with S	28	0.79	0.01			
1960	P with R	29	0.14	-	20	0.17	-
	P with S	29	0.66	0.01			
	R with S	29	0.23	-			

(b) "Academic Performance"

Year	Interviewers	Africans			Indians		
		N	r	P <	N	r	P <
1959	P with R	28	0.30	-	16	0.44	0.05
	P with S	28	0.52	0.01	24	0.79	0.01
	R with S	28	0.61	0.01			

Note: Blank cells, e.g. for Indian interviews, R with S, 1959, denote too few cases for correlation.

From Table 7.M it will be seen that:

(i) In 1956 and 1959 the ratings of different interviewers correlate significantly except in one case involving P and R. In 1960, however, there is only one significant correlation, involving P and S, and none of R's ratings correlates significantly with those of his colleagues. All four non-significant relationships involve R whose judgments thus appear to be formed in a rather different way from those of P and S, particularly P's. P and Q incidentally, had some training in educational psychology and S, medically qualified, had read widely in modern psychological literature. R, the eldest interviewer, though a man of great experience of non-Europeans in medical and other fields, probably had less knowledge of this kind.

(ii) For seven comparisons run for three different groups of Africans, the median correlation of interviewers' ratings on General Impression is 0.61. This approximates to the median inter-judge correlation of 0.63 obtained by Kelley and Fiske (1951) for ratings on "Criterion Skills" of clinical psychologists in training. Thus, in these two instances, Europeans rating Africans appear to agree to about the same extent as do Europeans rating other Europeans.

(iii) In all cases of comparisons between interviewers, the correlations reveal a rather greater measure of agreement between ratings of Indians than between ratings of Africans. The tendency towards a higher variance for the ratings of Africans would not lead one to expect this. The finding is of interest because the ratings predicted African performance better than Indian. (Section 8.14). Among possible explanations are:

(a) Matriculation Total mark was known to be a better predictor for Indians than for Africans. This might lead to a convergence of interviewers' ratings of Indians upon Matriculation Total, and hence to higher inter-judge agreement.

(b) Indian candidates possibly present a more consistent front to different interviewers; with Africans, the facade, if any, may vary more, and each interview may tend to assume a pattern of its own.

(iv) On ratings of Academic Performance, four out of five pairs of interviewers agree less well than on General Impression. This is contrary to the finding of Kelly and Fiske for their population (Section 2.8).

(v) Inter-judge agreement is generally lower for the 1960 than for the 1959 group. By the time of the 1960 interviews the interviewers knew that the 1959 assessments (except P's) had failed to correlate significantly with staff ratings of the candidates' Preliminary Year work (see Section 8.14); this probably affected the medical members' confidence in the interview, and a similar finding for the 1960 ratings led to the abandonment of interviewers' ratings as predictors for the candidates of 1961.

7.24 Group Assessments

On a number of occasions the Screening Committee has put on record its ranking of short-listed candidates, and predictions based on these impressionistic rankings can be compared with predictions from marks or from psychometric data (Section 8.15).

For the first of the special selection procedures, that of 1956,

the Screening Committee consisted of a medically qualified member (the Dean), a member of the Department of Education with qualifications in psychology, and a member of one of the pre-medical teaching departments. This team roughly parallels the Chairman, Psychologist and Observer of Civil Service Selection Board assessment teams (Section 2.40 and Vernon, 1950b).

This precedent was followed in the constitution of Screening Committees for the later special selection procedures. Screening in 1959 was by a committee consisting of the Dean, two other medically qualified members, two members of the Department of Psychology and two members of departments teaching in the pre-medical school (English and Physics).

For screening in 1960, the committee was divided initially into two groups of three (doctor, psychologist and pre-medical lecturer). The same information - reports, marks and interviewers' ratings - was available to both groups, but the two groups worked independently up to the final meeting, and the members of one group interviewed candidates, while the members of the other did not. Each group ranked or rated the short-listed candidates independently, and the Committee met as a whole for its final decisions. Preliminary validations of the assessments recorded by the groups and by individual members are reported in Section 8.15.

For screening in 1961, the Committee was similarly divided into two groups of three, but validations cannot of course be reported as yet. An advantage of the division of the committee is that groups of three generally reach agreement more quickly than do groups of six or seven, while the candidate has the advantage of being discussed twice by different people.

Agreement between the two groups has been fairly close. In 1961, classifying 20 African and 38 Indian and Coloured short-listed candidates as 'Admission Recommended', '?' and 'Not Recommended', their assessments were as shown in Table 7.N.

Table 7.N

Recommendations by 1961 Assessment Teams

Recommendation	Both Groups	Group I only	Group II only
(a) Africans (20)			
'Admission Recommended'	7	0	3
'?'	0	3	0
'Not Recommended'	8	2	2
(b) Indians and Coloureds (38)			
'Admission Recommended'	21	3	3
'?'	0	7	0
'Not Recommended'	6	1	6

In 42 out of 58 cases, it will be seen, the recommendation of both groups is the same. There is also broad agreement between the groups as to the proportions of Africans on the one hand, and of Indians and Coloureds on the other, to be admitted.

Of the six assessors, two had ten previous years' experience of screening candidates for admission to the pre-medical course, one eight years, one two years, one had one year's experience and the sixth was screening for the first time. Most of the group were thus well acquainted with the work and with one another.

A note on the Screening Committee's usual procedure may at this point be a useful preliminary to the chapter on validation that follows. For each of the past three years there have been over a hundred qualified applicants for admission to pre-medical courses (see Table 6.N). From these a preliminary selection is made, principally on the basis of the best-predicting combinations of matriculation marks for each racial group. Sixty to seventy of these short-listed candidates are brought to Durban for interviews and tests. Before the final meetings of the screening groups, rankings of Africans and of Indians on some simple statistical criterion - Matriculation Total or a combination of Standard Scores - are drawn up as a basis for discussion and these rankings are adjusted by each group of three assessors. The assessors usually classify candidates simply as 'Admission Recommended', 'Doubtful' and 'Not Acceptable', and final decisions are taken after comparing the ratings by both groups. One of the main objectives of the following chapter, then, will be to suggest suitable bases for rankings of candidates as a preliminary to discussion.

7.25 Summary of Chapter VII

(1) Pilot Validation Studies (7.1 - 7.9)

These suggested, but could not of course finally establish:

- (a) That verbal predictor measures were likely to be superior to non-verbal.
- (b) That predictions of African and of Indian results might require rather different methods.
- (c) That results in certain subjects are more easily predicted than results in others (7.5).

(2) Reliability Coefficients (Tests)

These were computed for tests by the split-half method for freshmen and/or applicant groups. For seven out of eight tests the African data yielded a higher reliability coefficient than the Indian.

For African scores, split-half reliabilities ranged from .94 (Vocabulary) to .69 (Scientific Information). For Indians, the range was from .88 (Vocabulary) to .54 (Non-Verbal Reasoning). (Section 7.11).

Considering that these reliabilities are for groups at the matriculant level or above it, most of them appear satisfactorily high.

(3) African-Indian Differences (Tests)

For the scores of pre-medical freshmen on seven tests out of eight, significant African-Indian differences appear. The African variance is greater for five of the tests and significantly greater for two (Verbal and Non-Verbal Reasoning): the Indian mean is higher in all cases and significantly higher in five of the six comparisons that satisfy the t-test's assumption of equivalent variances. (Table 7.G, Section 7.12). Applicants' scores appear to follow generally similar patterns (7.12).

Comparison of test means and variances suggests, but cannot of course establish, that the African school systems tend to select candidates for their capacity to memorise information, while the Indian system selects for intelligence as well.

(4) The Scientific Information Test

Although the internal-consistency reliability of this specially constructed measure is low (about 0.68), for five independent African groups it yields a median correlation of 0.52 with Preliminary Year results (7.13).

(5) Provisional Norms (Tests)

For eight tests these have been established for African and Indian groups of freshmen (7.12).

(6) Estimate of Reliability: Matriculation Total (7.14)

A rough estimate of internal consistency yields the following values:

For African marks : 0.86
For Indian marks : 0.75

(7) African-Indian Differences: (Matriculation Marks)

These are such as to call for separate standardisations of African and of Indian marks (7.15 - 7.20).

(8) Provisional Norms: (Matriculation Marks)

Subject to the limitations imposed by small numbers and changing circumstances, Indian and African matriculation marks have been standardised for groups of pre-medical freshmen.

For Matriculation Total, English and Mathematics marks, the mean for the Indian reference group is significantly higher than for the African.

(9) Biographical Data (7.21 and Appendices B and C)

Over half the fathers of pre-medical freshmen enrolled in 1959, 1960 and 1961 can be roughly classified as members of "white-collar" groups. Teachers and ministers of religion form the largest group of African fathers; the largest Indian group is engaged in commerce.

(10) Interviewers' Ratings

For interviewers' ratings of the same African candidates the median correlation of ratings on General Impression was 0.61. For Indians, the interviewers registered a consistently higher measure of agreement than for the Africans, although the validities of their ratings of Indians were lower.

For different pairs of interviewers, however, the patterns of correlation vary considerably: e.g.

P with Q	:	.76, .80
P with R	:	.35, .82, .30, .44
P with S	:	.61, .62, .52, .79
R with S	:	.79, .23, .61.

(11) Group Assessments

Ratings by groups of assessors working independently show a fair measure of agreement; thus for 42 out of 58 short-listed candidates in 1961, the recommendations of the two screening teams were the same. At the same time, agreement is far from being so complete as to make it unnecessary to maintain two independent screening teams (7.24).

CHAPTER VIII

PREDICTION OF PRE-MEDICAL RESULTS

8.1 - 8.2 Introductory

8.1 Status of validation data

Under the circumstances in which this study has had to be conducted - with small numbers, repeated alterations of the pre-medical curriculum, and at a time of far-reaching changes in the school systems from which the Faculty's students are drawn - validations can be only tentative. At the same time it is important for the Faculty to make the best possible use of the predictor data at its disposal.

The appropriate statistics, as explained in Section 2.4, are significance tests rather than multivariate analyses, and groups of cases will wherever possible be subdivided to provide two or three independent estimates of correlation .

8.2 Grouping of Cases

The analyses that follow are limited to the records of candidates first enrolled in the Preliminary Year, as those entering the First Year are too few, and their records too diverse, for separate treatment here. 'The class of such-and-such a year', accordingly, means in this chapter the students first enrolled in the Preliminary Year class of the year in question.

Cases for analysis may be grouped by race, by entrance qualification or by year of first enrolment. (Compare Section 2.3). As significant differences have now been established between the records of Africans and Indians, and between those of students with no previous failures or supplementary examinations, and of students with previous academic failures of any kind, it seems advisable generally to analyse African and Indian records separately and to drop candidates with previous failures from validation studies. As the experience of each class is in a sense unique, the ideal procedure would be to validate for one class at a time. This, however, would produce exceedingly small numbers for each correlation: in the class of 1958, for instance, there were only five African and ten Indian freshmen who had matriculated at the first attempt in 1957; two of the Indians, incidentally, withdrew before writing any examination at all, and two others withdrew before writing the examinations of the First Year.

A further complication is that the same predictor data are not available for all members of any class, so that to validate only for those for whom interview, test and matriculation records are complete will again seriously reduce the numbers. It seems best to present separate but interleaving studies of five kinds of 'predictor' material:

- (1) Age and Sex: (Sections 8.3 to 8.6). While these, as explained in Section 2.20, do not have the same status as measures (such as matriculation marks) expressly designed for prediction, our findings for them are likely to affect the interpretation of all other variables.

- (ii) Matriculation records: (Sections 8.7 to 8.10). These are held for virtually all students back to 1951.
- (iii) Test records: (Sections 8.11 to 8.13). Owing to changes in the testing programme, these vary from class to class, but certain tests have been in use without a break since 1956.
- (iv) Interview records: (Section 8.14). Available only for freshmen of 1956, 1959 and 1960.
- (v) School Principals' Reports: (Section 8.16). In use since 1956, but available for only about two-thirds of the students.

The predictive validity of tests, interviews and school principals' reports can be compared in every case with that of matriculation marks for the same groups.

Validation strategy must take into account the changing circumstances of the Faculty and variations from year to year in the student body.

Age and Sex are considered first for the pooled classes of 1951-1959 but then (in the Indian group) with reference to changes in the later years of the Faculty's existence.

Matriculation records are grouped according to the periods outlined in Section 6.10. From this it will be recalled that the proportion of students completing the pre-medical course on schedule has varied significantly over the years. These variations determine the grouping of matriculation records for validations. African classes will be pooled as follows:

1951-3; 1954-6; 1957-9,

as significant variations in African attainment have been shown for these three periods in Table 6.M(i) of Section 6.10. For the Indians, as shown in Table 6.M(ii), the contrast lies between the periods 1951-4 and 1955-9. The second of these periods has been sub-divided as 1955-7 and 1958-9, to yield three independent groups for correlations. Further, Indian Total Matriculation Marks have also been validated for the same three periods as have African matriculation records.

Unfortunately this grouping cannot be repeated for the analysis of test results, since the first classes tested were the Preliminary and First Year classes of 1956. Since it is important to compare predictions from scores in standardised tests with those from matriculation marks for identical groups of students, the analysis of test results has been limited to cases for which South African matriculation marks are also available. This considerably reduces the number of cases for analysis, but meaningful comparisons would not otherwise be possible. As in the case of the matriculation analysis, the records of students holding previous credits on enrolment have not been included in the groups for special study.

The ideal procedure might be to validate for one year at a time, but from the groups of about eight to fifteen cases each with which it would then be necessary to work, it would be almost impossible to obtain significant correlations. African test records have accordingly been grouped for analysis as follows:-

- (a) Students tested in 1956 (See Section 7.7, N = 20);
- (b) Freshmen of 1957 and 1958 (N = 23);
- (c) Freshmen of 1959 (N = 12);
- (d) Freshmen of 1960 (N = 17).

The numbers are those in each group for whom complete or virtually complete test records were available. Table 7.D shows 21 African Students in the pilot validation study of the 1955-6 group; of these one died in 1957 reducing N to 20 for the present study. This group took only five of the battery of eight tests administered to the others. (See Chapter VII). In 1959 certain students had missed one or more of the tests written by candidates for admission: this reduces the number of African 'Direct' matriculant freshmen with complete test records in that year to 12, the number shown above.

This grouping of cases for validation seems the best possible compromise with the facts. It seems advisable to separate the freshmen of the crisis years of 1957-1958 from those who began in the more tranquil conditions of 1955-1956, and to separate from these two groups the classes recruited by the special selection procedures of 1959 and 1960. To bring the number in each group up to 20 or more it would have been necessary to pool 1959 with 1960, but as there are two years' criterion data for the 1959 students and only one year's for those of 1960, this again would have entailed a sacrifice of information.

There are, of course, drawbacks in the grouping which has been adopted. The first of these is that the '1956' group includes 1956 freshmen tested at the beginning of their pre-medical course, and 1955 freshmen tested in the middle of it. The 1955 students, however, include some who were repeating Preliminary Year courses in 1956 after failure the previous year, so that the range of ability among these students is not likely to differ greatly from that among the freshmen of 1956. Unfortunately there are too few cases for '1955' or '1956' results to be validated separately. A second drawback affects the 1957-1958 group. The arrangement of pre-medical courses in the 1958 curriculum differs from that of 1957 (Section 4.8, Table 4.A), though the courses were the same for both groups. This was felt to be outweighed by certain common factors in the experience of both groups: both were tested during registration, not selection, and both were enrolled during the period of the Government's efforts to separate the Faculty from the University of Natal, i.e. during a period of probably low morale as compared with 1955 - 1956. It will be recalled that in Section 6.10, a significant difference was demonstrated between African results for the period 1954 - 1956 and the periods 1951 - 1953 and 1957 - 1959; this alone would be a sufficient reason for treating the 1957 - 1958 results separately.

For interviewers' ratings, there has been no alternative to running correlations for one class at a time, since interviewers and available follow-up data vary from class to class. (It will be recalled that interviews were conducted only in 1956, 1959 and 1960). While this rather elaborate sub-division complicates the presentation of results, it results in a more meaningful picture than would the indiscriminate pooling of cases, and provides a safeguard to some extent against the instability of correlations run for very small numbers.

8.3 Age: Africans

Biographical data such as age and sex, as explained in Section 2.20, do not perhaps have the same status in validation studies as have measures (such as matriculation marks) expressly devised for prediction. It seems advisable, however, to consider the relationship of age and sex to attainment in pre-medical studies before discussing the predictive value of marks and other formal assessments.

Table 8.A tabulates entrance age against pre-medical result for 143 African students first admitted to the Preliminary Year classes of 1951 - 1959. Entrance Age is reckoned as the student's age in completed years on 1st January of the year of his admission to the Faculty.

From the proportions of passes in each age group shown in the last two columns of Table 8.A (displayed on page 230), it is clear that the youngest and oldest students tend to fail more often than the others, though the difference is not statistically significant. (Chi-square test (iii) of Table 8.A). There are interesting variations between groups, but the only significant difference lies between the nineteen-year-old group and all the others pooled (Chi-square test (ii) of Table 8.A).

In view of the findings for the general population (Section 2.21) that European and non-European test performances diverge increasingly with increasing age, one might have expected the older students - say those entering at age 20 or later - to be at a disadvantage compared with the younger. That this is not so, is likely to be an effect of selection, though not necessarily of the selection applied by the Faculty itself.

Comments follow on each of the main African age-groups:

(i) Seventeen or younger. There are only seven such students. Two of these (shown in the P2 column) are among the ablest in the Faculty; the other five were retarded or eliminated during pre-medical studies. These very young students may be expected to have difficulty in adjusting to university studies. (See the biographies of Strandlooper and Thabanchu, Appendix A).

(ii) Eighteen. The relatively early age at which these students matriculated indicates superior ability or superior opportunity or both. Nine of the nineteen in this group have matriculation Total Standard Scores of 12 or more. In pre-medical studies they are a relatively successful group.

(iii) Nineteen. Only four of the twenty-six in this age-group pass on schedule. Results for this group differ significantly from those of all other groups pooled. The nineteen-year olds are still among the youngest third of the Africans, and thus comparatively immature, but matriculation marks suggest that among them there are far fewer students of high ability than among the eighteen-year-old group. (Only five, i.e. one-fifth, as against half the eighteen-year-olds, have a Matriculation Total Standard Score of 12 or over). Of the 22 failures, 8 recover and pass at the second attempt, but even assessed on total promotions to the Second Year, the nineteen-year-olds are one of the least successful age-groups. It seems likely that this, in many cases, results from immaturity coupled with only moderate attainment.

(text continues on page 231)

Table 8.A
Entrance Age and Pre-Medical Result
Africans 1951 - 1959

Entrance Age (See note)	N	P2	PR	RST	Withdrawn	P2	Completing
Under 18	7	2	2	1	2	29%	57%
18	19	9	4	2	4	41%	68%
19	26	4	8	2	12	15%	46%
20	26	11	5	-	10	42%	62%
21	24	10	4	1	9	42%	58%
22	12	7	3	-	2	58%	83%
23	10	4	-	1	5	40%	40%
24	4	2	-	-	2	50%	50%
25	4	2	1	-	1	50%	75%
26 or over	11	2	1	-	8	18%	27%
Totals	143	53	28	7	55	37%	57%

P2. indicates 'Completed Pre-Medical studies in two years, i.e. on schedule.'

PR. indicates 'Completed Pre-Medical Studies in three years or more.' (R signifies 'Retarded').

RST. indicates 'Retarded, still trying, at the time of writing'.

'Completing.' indicates the sum of P2 and PR cases.

Chi-squared Tests: Plotting for various age-groups, 'P2' cases against all others, chi-squared tests were run as follows:

- (i) Ages: 18 and under:
19
20-22
23 and over.

P2	Others
11	15
4	22
28	34
10	19

Chi-squared: 7.38 (df: 3.)

For df: 3, the 0.05 confidence level is at 7.82.

- (ii) Age 19 versus all others pooled:
Chi-squared: 5.30 (df: 1. $P < 0.05$)
For df: 1, the 0.02 confidence level is at 5.41
and the obtained chi-squared approaches this value.
- (iii) 'Extreme' groups (under 18 or over 26) versus all others pooled:
Chi-squared: 1.28. Not significant.

(iv) Twenty to twenty-five. For these groups, relatively mature judging by chronological age, the percentage of passes rises as compared with that among the nineteen-year-olds. (This finding resembles that of Sanders, 1948, for ex-service students in Western Australia. Compare Section 2.21). The table suggests that twenty-two has been a particularly auspicious entrance age, but the presence of five of the 18 'Foreign' matriculants (See Section 5.14) among the seven passes makes the twenty-two-year-olds an atypical group.

(v) Twenty-six and over. Only two of these eleven students pass on schedule. This is in line with several of the reports on European groups cited in Section 2.21; the older student is likely to have acquired commitments which interfere with his academic work.

Age, of course, in the records of any group, is likely to be correlated to some extent with other variables such as previous university experience, marital status and so on. For this reason an unambiguous evaluation of the effects of age as such is virtually impossible. However, in order to simplify the data, the next stage of analysis was limited to the records of South African matriculants entering the Faculty without previous university credits or Supplementary matriculation examinations. (N = 75: this experimental group is described in more detail in Section 8.7.) For this group, Age, Matriculation Total and pre-medical criterion score, were intercorrelated with the following results:

Pre-Medical Criterion Score and Matriculation Total: $r = 0.37$.

Pre-Medical Criterion Score and Age: $r = -0.10$

Age and Matriculation Total : $r = -0.21$

Of these correlations only the first is significant, though the third also approaches the 0.05 confidence level.

Thus Age, for Africans, yields a small negative correlation with pre-medical attainment, and a somewhat stronger negative correlation with matriculation total. This indicates, as might be expected from the findings of Malherbe (1938) and Gouws (1957) that the older students, both in matriculation forms and university first-year classes, tend to do less well than the younger. Holding Matriculation Total constant, however, (Garrett, 1953, formula 96) results in a partial correlation between age and criterion score of -0.02 , which indicates that age as such and attainment are entirely unrelated in this restricted group.

In groups, however, which vary very considerably both as to age and as to educational history, there may well be a strong formal relationship between age and future university attainment, though the causes may be factors quite other than age *per se*. In 1960, for instance, an exceptionally heterogeneous group of Africans was admitted to the Preliminary Year. Seventeen of these were without previous university credits, though in other ways extremely varied as to personal history; of those over twenty-one on enrolment, one passed and seven failed; of those under twenty-one six passed and three failed. Fisher's Exact Probability Test indicates that this result would have arisen less than once in twenty trials. Matriculation Total (see Table 8.M) is not significantly correlated with attainment in this group.

The relationships of age and test performance in the African group have not as yet been fully investigated, but a correlation of -0.20 between age and Verbal Reasoning Standard Score, again suggests that the younger students entering the Faculty tend to be the abler as regards test performance.

8.4 African men and women

The overall pre-medical results of African men and African women first admitted to the Preliminary Year do not differ significantly, though a slight advantage appears to lie with the men. Of the 143 cases of Table 8.A, 119 were men; of these 46 (39%) passed on schedule as against 7 (29%) of the 24 women. If the assessment is based on the proportions completing the pre-medical course, whether retarded or not, the men are still very slightly ahead; twelve of the women (50%) have passed into the Second Year, one is retarded and still trying, and eleven have withdrawn; the proportion of women passing is thus very slightly lower than that of men and women counted together. (57%. See Table 8.A).

During a preliminary survey undertaken in 1958, seven women were matched with men for age, total matriculation marks (within one point of Standard Score) and year of enrolment. This gave seven roughly comparable pairs, all enrolled two years or more before the time of assessment. Comparing the men and the women in each pair, in five of the seven cases the man, at the time of assessment, had reached a point in the course a year or more ahead of the woman. In the other two cases the standing of the woman was the same as that of the man. The Sign Test (Siegel 1956) applied to these data indicated a just significant difference ($p < 0.03$) between the promotions of men and those of women.

Of the twelve African women who reached the Second Year, however, not one has as yet (1961) abandoned the course, as against twelve of the 46 men. These figures (for what they are worth) suggest, but do not establish, a significant difference at this stage: chi-squared, applying Yates's correction, is only 1.25 and thus falls far short even of the 0.05 significance level for one degree of freedom.

Once adjusted to university life, African women may well fail examinations less often than African men do.

The youngest women, however, are particularly liable to encounter difficulties during the pre-medical phase. Of the cases of Table 8.A, eight were African girls aged eighteen or under on admission to the Preliminary Year and without previous university credits. Of these only one passed on schedule, and four, all with a Matriculation Total Standard Score of 12 or over, were excluded after failure and before completing pre-medical studies. However, two other girls in the same age-group, who had spent a year in the Faculty of Arts before entering pre-medical studies, both passed on schedule.

On the other hand, for the seven African women aged twenty or over on enrolment, the proportions of passes and failures (P2: 3; P3: 1; F: 3) are virtually identical with the corresponding figures for men in the same age-groups.

8.5 Age: Indians

For 125 Indian students first admitted to the Preliminary Year classes of 1951-1959, entrance age and pre-medical result are presented in Table 8.B.

Table 8.B
Entrance Age and Pre-Medical Result
Indians 1951 - 1959

Entrance Age	N	P2	PR	RST	Withdrawn	P2	Completing
Under 18	18	11	2	-	5	61%	72%
18	34	20	3	2	9	59%	68%
19	28	10	7	1	10	36%	61%
20	19	5	4	-	10	26%	47%
21	11	4	2	-	5	36%	55%
22	6	3	2	1	-	50%	83%
23	2	2	-	-	-	100%	100%
Over 23	7	2	1	-	4	28%	43%
Totals	125	57	21	4	43		

P2. indicates 'Completed pre-medical studies in two years, i.e. on schedule'.

PR. indicates 'Completed pre-medical studies in three years or more.' (R signifies 'Retarded').

RST indicates 'Retarded, still trying, at the time of writing'.

'Completing' indicates the sum of P2 and PR cases.

Chi-squared test. For this, candidates aged 18 or under on enrolment were contrasted with all older groups, plotting in a two-by-two table the P2 cases in each group against all others.

Chi-squared: 6.12 (df: 1.) $p < 0.02$

The last two columns of Table 8.B suggest a fairly simple relationship in the Indian group between entrance age and pre-medical result. Of the younger students, those under the age of 18 on admission are the most successful: the proportion of passes falls steadily until the entrance age of 20, rises for entrance ages 21-23 and falls sharply for the oldest group of all. This again recalls the findings of Sanders (1948) in Western Australia, quoted in Section 2.21. The chi-squared test which contrasts the results of students aged 18 or under on enrolment with those of all older students indicates a significantly higher proportion of passes in the younger group.

This test, however, oversimplifies the relationship, since:

- (a) Indian freshmen have of recent years been younger than they were in the first years of the Faculty (the mean age of Indians admitted to the Preliminary Year was 20.24 in 1951 and 19.17 in 1960);
- (b) The proportion of Indians completing the pre-medical course on schedule has risen considerably since 1955. (Section 6.10). Table 8.B shows 29 Indians aged 20 or over on enrolment who failed to complete pre-medical studies on schedule; of these 23 belong to the classes of 1951-1955 and only six to later classes.

The records of the three most recent classes under study (1957-1959) present a picture (Table 8.C) rather different from that of Table 8.B.

Table 8.C
Entrance Age and Pre-Medical Result
Indians: 1957-1959

Entrance Age	N	P2	PR	RST	Withdrawn
18 and under	22	12	1	2	7
19	14	4	3	1	6
20 and over	11	8	1	1	1
* Retarded, still trying.					

In this group the contrast between older and younger students no longer holds. There is approximately the same proportion of passes in the youngest group as in the other two combined, and, exactly as with the Africans (Table 8.A) the nineteen-year-olds fail with considerably greater frequency than do the students over or under nineteen on enrolment, so that the relationship between age and attainment takes a non-linear form.

Assuming for the moment a sufficiently linear relationship to warrant the computation of Pearson r 's, the interrelations in the Indian group of age, Matriculation Total and pre-medical attainment may now be considered. For a group of 79 Indians without previous failures admitted to the Preliminary Year from 1951 to 1959, and described in more detail in Section 8.7, the intercorrelations of these variables are:

Pre-Medical Criterion Score and Matriculation Total: $r = 0.47$
 Pre-Medical Criterion Score and Age: $r = -0.09$
 Age and Matriculation Total: $r = -0.22$

Of these correlations the first is significant ($p < 0.01$) and the third lies just at the 0.05 confidence level for $N = 79$. The correlations of age with Criterion Score and Matriculation Total are almost identical with those obtained for the African group. Holding Matriculation Total constant yields a partial correlation between age and Criterion Score of +0.01, which again indicates that in this restricted group these variables are not related.

This result, however, is for the classes of 1951-1959 counted together. The records of the three most recent groups of Indian pre-medical freshmen for whom criterion data are available (1957-1959) yield a rather different pattern. For the 32 Indians in these classes without previous failures or university credits, age, Matriculation Total and Pre-Medical Criterion Score intercorrelate as follows:

Pre-Medical Criterion Score and Matriculation Total: $r = 0.27$
Pre-Medical Criterion Score and Age: $r = 0.12$
Age and Matriculation Total: $r = -0.15$

None of these correlations is significant: they are nevertheless interesting. Although age and Matriculation Total are still negatively correlated, the relationship of age and Pre-medical Criterion Score is now positive and with Matriculation Total held constant the partial r for these variables rises to $+0.17$. Thus the older students in this group tend to be the more successful, although the negative correlation between age and Matriculation Total indicates that their matriculation marks are a little lower than those of the younger men.

The matriculation marks of these older men, however, are likely to be considerably higher than those of applicants in the corresponding age-groups who did not succeed in gaining admission to the Faculty. At the same time, compared with their younger associates in the Preliminary Year, they are likely to have the advantages of maturity and perhaps of a more soundly based choice of vocation. (Particularly in view of the lack of openings for Indians in the Republic at present, it is possible that bright young matriculants who in an open society would disperse into a number of different careers tend to move into the Faculty for lack of a wider choice. See Section 6.9).

As with the Africans, the relationship between entrance age and test performance has not been investigated in detail for the Indian group. The only correlation computed so far (Age with Verbal Reasoning: $r = -0.01$ for $N = 45$) suggests that amongst recent recruits to the Faculty the relationship, if any, is very slight.

8.6 Indian Men and Women

The 125 Indian students of Table 8.B include 20 women. Of these five (25%) are counted as having completed pre-medical studies on schedule as against 52 (50%) of the 105 men. The difference falls just short of the 0.05 confidence level. (Chi-squared is 3.14 with one degree of freedom). Three of the women who passed on schedule were members of the somewhat exceptional class of 1953; of the other two, one was married and withdrew without entering the Second Year, so that of the fourteen Indian women enrolled in Preliminary Year classes from 1952 to 1959, only one actually entered the Anatomy-Physiology class within two years of her first registration in the Faculty. The 1960 class (not counted in the figures above) included two Indian women. Their Matriculation Total Standard Scores were 11 and 12; both failed and were excluded at the end of the year. In the pre-medical course the proportion of passes for Indian women is thus lower than for African women (Section 8.4) and considerably lower than for Indian men.

For a pair comparison, nine Indian women entering the Preliminary Year without previous university credits can be matched with Indian men on year of enrolment (e.g. 1957), age (within one year) and Matriculation Total within one point of Standard Score. In two cases both the man and the woman abandoned the course and in two both completed the course on

schedule. In four cases the man completed the course on schedule and the woman did not, and in one the man passed in three years and the woman in four. This gives a total of five differences in favour of the men, which, dropping the ties so that $N = 5$, yields a one-tailed probability of 0.03 by the Binomial Test. (Siegel, 1956, pp. 68-74 and Table D).

For what it is worth, this test indicates that even when age and matriculation total are held constant, Indian men are more successful in pre-medical studies than are Indian women.

At the pre-clinical level, however, the surviving Indian women are a relatively successful group. Nine of the twenty women whose pre-medical records are now under consideration eventually began Anatomy and Physiology, and of these only one has as yet had to discontinue.

The records of Indian women admitted to the Preliminary Year show a nearly significant Muslim-Hindu difference. The twenty girls mentioned above comprised one Christian, five Muslims and fourteen Hindus. At the time of writing, the Christian and four of the five Muslims have withdrawn, but eight of the fourteen Hindu girls are continuing their studies in the Faculty. (See the case of Amina, Appendix A).

It is worth noting, incidentally, that several of the women, both African and Indian, who abandoned the pre-medical course, nevertheless began university studies elsewhere. Two are known to have graduated, though not in medicine, and others are continuing medical studies. This suggests that tutorial guidance and liaison with the families of women students might make a considerable difference to the attainment of women in the pre-medical course.

8.7 Matriculation Total Mark: (a) Africans and Indians Separately.

The African group for analysis of matriculation marks consists of 75 pre-medical freshmen, all South African matriculants enrolled without previous university experience. All had taken English Higher, Mathematics, and at least one science subject for matriculation, and all except three in the 1951-1953 group had matriculated at the first attempt. Students who had died or withdrawn before failing any pre-medical examinations were not included. Also left out were students who at the time of writing (1961) had not yet completed the pre-medical course but who were retarded and still trying: this omission may make the correlations for the 1957-1959 group larger than they would otherwise be. But as no criterion score can be assigned to these candidates there is no practicable alternative. Subject to these limitations, the group includes all South African matriculants in the "Direct" and "Lapsed" categories enrolled from 1951 to 1959.

An Indian group ($N = 79$) for the validation of total Matriculation marks was constituted on exactly parallel lines, except that the 1951-1953 group included no cases of supplementary matriculation examinations. The main validations of Indian matriculation marks, however, were carried out at the end of 1958 with a group selected on slightly different criteria. But it will be convenient, before considering this group, and the validity of matriculation marks in general, to begin with a comparison of Indian and African results for a single variable, Total Matriculation Mark, which has more influence than any other on the decisions of the Screening Committee.

For this comparison, the simplest form is that of an expectancy table, which must, however, be interpreted with extreme caution in view of the contrasts between the different periods of the Faculty's operation demonstrated in Chapters V and VI.

The table, incidentally, like the correlations presented later, overestimates the predictive accuracy of matriculation marks because of the omission of the records of candidates who withdrew before writing any examinations and of those classed at the time of writing as 'Retarded, Still Trying.' In the case of the former, it seems inappropriate to expect Matriculation Total to predict changes of career, illness or death, and for the latter group, as already explained, criterion scores cannot as yet be assigned.

The table shows, for each of six levels of matriculation marks, the proportions of matriculants classed as:

- N2 and N2S - completing the pre-medical course in two years;
- N3 - completing the course in three years;
- F - excluded or withdrawn after failure.

The percentage of N2 and N2S cases at each of three levels is shown under 'Regular Promotions' in the right-hand cells.

Table 8.D

Expectancies

Total Matriculation Marks and Pre-Medical Result

(a) Africans (N = 75) 1951-1959

Standard Score	Mark as %	N2-N2S	N3	F	Regular Promotions
16-20	64-71	2			52%
14-15	60-63	3	3	1	
12-13	55-59	6	2	4	
10-11	51-54	8	6	10	33%
8-9	47-50	5	7	11	20%
6-7	42-46	1	1	5	
TOTALS		25	19	31	
(b) <u>Indians (N = 79)</u>					
Standard Score	Mark as %	N2-N2S	N3	F	Regular Promotions
16-20	70-81	3			91%
14-15	66-69	3			
12-13	61-65	9		1	
10-11	56-60	13	3	4	65%
8-9	51-55	12	6	6	37%
4-7	42-50	4	7	8	
TOTALS		44	16	19	

It will be seen from Table 8.D that Indians in the upper and middle ranges of Standard Scores for their group pass about twice as often as do Africans in the corresponding African ranges.

The large proportion of Indian cases in the lower half of the table results from the use of the Standard Scores of the Revised Scale (1955-9; see Section 7.16) for the entire group.

A somewhat similar table for 294 graduates of the University of Cape Town appeared in Section 2.28 as Table 2.D. Of these Cape Town graduates, 179, i.e. over 60%, had matriculation aggregates of 60% or over: for the cases of Table 8.D the corresponding proportions are approximately: Africans, 12%; Indians 20%.

It is interesting to consider Table 8.D in the light of McClelland's proof (cited in Section 2.16) that the point at which the number of misfits (i.e. admit-fails and reject-successes) will be a minimum will be the point on the ranking of entrance examination marks "at which a pupil has a 50 per cent chance of success:" as indicated in 2.16 a zone rather than a point may be the appropriate metaphor.

If success is defined as completing pre-medical studies on schedule, the critical zone for the Africans lies in the region of African Standard Scores 12 to 13, where we have six passes against six retarded or failed. For the Indians, the corresponding zone is at Indian Standard Scores 8 to 9, where twelve pass and twelve are retarded or fail. The percentage equivalents of these Standard Scores suggest that the critical zone may lie somewhat lower for the Indians (in the 51-55% bracket) than it does for the Africans (55-59%).

The marks of about 60% of the Africans (54 out of 75) lie below the critical zone of their table, but only a quarter of the Indians' marks lie below the critical zone of theirs. As, however, the tables pool the results of ten years, they must be interpreted with some caution.

The relatively large groups of Table 8.D may now be broken down for the correlation of Matriculation Total with Pre-medical Criterion Score in each of the three periods already described - 1951-1953, 1954-1956 and 1957-1959. (The computation of Pre-medical Criterion Scores was described in Section 5.16).

Product-moment correlations were run for Pre-Medical Criterion Scores with total matriculation marks in Standard Score form. Pre-medical and matriculation records were also dichotomised and plotted against one another in two-by-two squares yielding phi-coefficients as a non-parametric check on the relationship. For the pre-medical record, 'Passed on Schedule' (P2) was contrasted with 'Failed or Retarded' (F/R); for matriculation marks the cutting-point likeliest to yield a high value of ϕ was selected by eye for each group. Biserial r 's were computed for the 1957-1959 groups. The standard deviations of Matriculation Total Marks are expressed in Standard Score form in the table that follows and the mean Standard Score was computed for passes (Mp) and failures (Mq) in each group. The data follow in Table 8.E, using the following abbreviations:

- F/R = Failed or retarded.
- P2 = Passed on schedule.
- Mp = Mean Matriculation Standard Score of Passing Group.
- Mq = Mean Matriculation Standard Score of Failing Group.

Table 8.E

Correlations: Total Matriculation Mark and Pre-Medical Result

(a) Africans

Total Matriculation Mark in Standard Score Form	Pre-Medical Result	Correlation Data
(I) Classes of 1951-3 (N = 18) "High" (10 or over) "Low" (9 or under) m: 9.0 S.D : 2.26	F/R	P2
	4	3
	8	3
(II) Classes of 1954-6 (N = 31) "High" (11 or over) "Low" (10 or under) m: 10.74 S.D : 2.70	F/R	P2
	5	7
	14	5
(III) Classes of 1957-9 (N = 26) "High" (12 or over) "Low" (11 or under) m: 10.50 S.D : 2.34	F/R	P2
	5	6
	14	1
Classes of 1951-9: N = 75: r = 0.37 (P < 0.01) Passed 25 : Failed 50		Mp 9.08; Mq 8.83 ϕ = 0.16 r = 0.09 Mp 12.0; Mq 9.95 ϕ = 0.32 r = 0.42 (p < 0.01) Mp 12.43; Mq 9.80 ϕ = 0.53 r = 0.53 (p < 0.01) r_{bis} 0.67

(b) Indians

Total Matriculation Mark in Standard Score Form	Pre-Medical Result	Correlation Data
(I) Classes of 1951-3 (N = 20) "High" (10 or over) "Low" (9 or under) m: 8.83 S.D : 3.15	F/R	P2
	1	8
	9	2
(II) Classes of 1954-6 (N = 27) "High" (10 or over) "Low" (9 or under) m: 9.07 S.D : 2.68	F/R	P2
	3	8
	9	7
(III) Classes of 1957-9 (N = 32) "High" (10 or over) "Low" (9 or under) m: 9.97 S.D : 2.76	F/R	P2
	4	12
	9	7
Classes of 1951-9: N = 79 r = 0.47 (p < 0.01) Passed 44 : Failed 35		Mp 11.2; Mq 6.50 ϕ = 0.70 r = 0.77 (p < 0.01) Mp 9.93; Mq 8.0 ϕ = 0.29 r = 0.44 (p < 0.05) Mp 10.79; Mq 8.77 ϕ = 0.32 r = 0.27 r_{bis} 0.52

The most important entries in these tables are the last, from which it will be seen that the pre-medical course was completed on schedule by only one African in three, but by over half the Indians. The actual proportions of passes (African, 25/75 and Indian, 44/79) yield a chi-squared of 6.902, significant at the 0.01 level for one degree of freedom, and the proportion of Indian passes is somewhat higher for each of the three periods under study, the greatest difference being for the classes of 1957-1959. Thus, however the correlations are interpreted, the selection of Indians has throughout been considerably more successful than the selection of Africans.

Secondly, comparing the values of r , first for the three African and then for the three Indian groups, it will be seen that the size of r increases in the African series and declines in the Indian. For the Indians, there is a significant difference between the correlation obtained for the first period and the correlation obtained for the third. (Z-transformations yield a critical ratio of $2.43 - Dz/S.E.Dz$ - for the values of r obtained for Indians, 1951-3 and Indians 1957-9). For the African data, the corresponding difference is large but not significant. (Comparing the African r for 1951-3 with that of 1957-9, yields a value of only 1.51 for $Dz/S.E.Dz$.) It will be seen that the Indian standard deviation is considerably larger for the 1951-1953 group than for either of the other two, while the African standard deviation for 1951-1953 is somewhat smaller than for the two later periods. Thus the differences between the correlations are associated with differences between the distributions of standard scores in the various groups, the more heterogeneous groups yielding, as might be expected, somewhat higher values of r . The variations over the years indicate that the situation is too fluid for comparisons with the European results summarised in Section 2.28.

A point of some interest emerges from the comparison of Africans and Indians who do not run true to form - those who pass the pre-medical course in spite of low matriculation marks, or fail it in spite of high ones. Pooling the entries from the relevant cells of Table 8.E yields the following comparison:

Failed despite "high" matriculation mark: Africans 14,
Indians 8.

Passed despite "low" matriculation mark: Africans 9,
Indians 16.

This might suggest a tendency for the African's pre-medical attainment to fall short of his matriculation record and for the Indian's to improve upon it. But the mean African standard score reflects, of course, a much lower actual mark than the mean Indian standard score.

In the classes of 1957-1959, only one African with standard score of 11 or under completed the pre-medical course on schedule. With this exception, all candidates in the lower half of the group have failed, and only 6 of the top 11 students have passed.

A question of some interest is whether the validity of total matriculation marks differs as between Africans and Indians. For the classes of 1951-1953, a highly significant difference emerges: r is 0.77 for the Indian group and 0.09 for the African, and for this the Z-transformation yields a critical ratio of 2.62 for $Dz/S.E.Dz$. For the 1954-1956 group, however, African and Indian r 's are almost identical, and for the classes of 1957-1959 the African r is considerably, though not significantly, higher. Pooling the three periods yields an African r of 0.37 and an

Indian r of 0.47: Averaging each set of three correlations after a z-transformation yields approximately the same result. These values do not differ significantly, but suggest that Matriculation Total may be a somewhat more reliable predictor for the Indians.

These values of r , however, must be interpreted in the light of the distributions of total matriculation marks amongst applicants for admission to the Faculty. The problem is that of estimating, from the correlation for a restricted group (pre-medical freshmen) the correlation for a group in which there is likely to be a considerably wider dispersion of abilities (applicants for admission to the Faculty). Such an estimate, of course, can be accurate only when the basis of selection is quantifiable and well defined; and a satisfactory estimate is not possible 'when selection is based, as it often is, on a clinical judgment which combines in an unspecified and inconstant fashion various types of data about the applicant.' (Thorndike, 1949).

The estimates that follow are based upon the artificial assumption that Matriculation Total Mark is the sole basis for selection. While this assumption over-simplifies the facts, it probably matches them as accurately as any other which is practicable, and has the advantage of presenting a clear-cut hypothetical situation rather than a makeshift approximation to what is thought to be the truth.

The estimates, of course, will vary according to the data which are chosen as their basis. At the risk of ambiguity, two different sets of data have been chosen to furnish two separate estimates:

(a) Correlations for the freshmen of 1957-1959: variances of marks for the qualified applicants of 1961 (Table 6R); i.e. the most recent data, and

(b) Correlations for the freshmen of 1951-1959: variances of marks for qualified African Joint Board candidates, (1951-1959) and qualified Indian Natal Senior Certificate applicants, (1953-1959); i.e. a more comprehensive set of data.

The estimation formula is formula 13-29 of Guilford (1950):

$$R_{12} = \frac{r_{12} \left(\frac{S.D._1}{s.d._1} \right)}{\sqrt{1 - r_{12}^2 + r_{12}^2 \left(\frac{S.D._1^2}{s.d._1^2} \right)}}$$

for which:

R_{12} is the correlation in the unrestricted group, $s.d._2$ is the standard deviation of the predictor variable in the restricted group, and $S.D._2$ is the standard deviation of the same variable in the unrestricted group.

Variances and S.D's of Matriculation marks were expressed in standard score form by multiplying the African raw marks by 0.46 and the Indian marks by 0.42. The data and results for each computation follow in Table 8.F.

Table 8.F
Total Matriculation Mark
Estimation of Correlations with Pre-Medical Result
for Qualified Applicants.

(a) Africans.

(i) Data of 1957-61.

r_{12} : Correlation of Matriculation Total Standard Score with Pre-Medical Result, classes of 1957-9: 0.53

s.d.₁ Standard Deviation of Matriculation Total Standard Score in validation group, freshmen of 1951-7: 2.53

S.D.₁ Standard Deviation of Matriculation Total Standard Score, qualified applicants for admission in 1961 (from data of Table 6.R): 3.68

$$R_{12} = 0.70.$$

(ii) Data of 1951-1959

r_{12} : Correlation of Matriculation Total Standard Score with Pre-Medical Result, classes of 1951-9: 0.37

s.d.₁ Standard Deviation of Matriculation Total Standard Score in validation group; freshmen of 1951-9: 2.58

S.D.₁ Standard Deviation of Matriculation Total Standard Score, qualified Joint Board Applicants of 1951-9 Table 7.AA.iii (Appendix H): 4.084

$$R_{12} = 0.53.$$

(b) Indians.

(i) Data of 1957-61.

- r_{12} : Correlation of Matriculation Total Standard Score with Pre-Medical Result, classes of 1957-9: 0.27
- s.d.₁ Standard Deviation of Matriculation Total Standard Score in validation group, freshmen of 1957-9: 2.43
- S.D.₁ Standard Deviation of Matriculation Total Standard Score, qualified applicants for admission in 1961, (Table 6.R): 5.04

$$R_{12} = 0.50.$$

(ii) Data of 1951-59.

- r_{12} : Correlation of Matriculation Total Standard Score with Pre-Medical Result, classes of 1951-9: 0.47
- s.d.₁ Standard Deviation of Matriculation Total Standard Score in validation group, freshmen of 1951-9: 2.76
- S.D.₁ Standard Deviation of Matriculation Total Standard Score, qualified Natal Senior Certificate applicants, (1951-1959). (Table 7.FF.iii, Appendix H): 4.77

$$R_{12} = 0.68$$

For the hypothetical correlation of applicants' Matriculation Total Standard Score with overall pre-medical result, the data of 1957-61 yield an estimate of 0.70 for Africans and 0.50 for Indians; for the data of 1951-1959, the African estimate is 0.53 and the Indian 0.68. Averaging the values would suggest a correlation of the order of 0.6 in both cases. This is close to the value of 0.64 reported by Gouws for the correlation of mean Matriculation Standard Score with his pre-medical criterion score at the University of Pretoria. (Section 2.28). The value obtained by Gouws is not adjusted for restriction of range, but pre-medical courses at the University of Pretoria, as explained in Chapter I, are open to all qualified candidates so that the restriction may be inconsiderable. There is, however, an important African-Indian difference. If we consider the two-by-two squares of Table 8.E, the largest African entry invariably represents candidates with "low" matriculation marks who fail according to expectation, and it is clear that the major contribution to the African correlations is from the records of this class of candidate. In the Indian tables, while the same tendency appears in 1951-53 and 1957-59, there is a more even balance between candidates with high matriculation marks who pass according to expectation and candidates with low matriculation marks who fail, and the former actually outnumber the latter for the three periods combined. Matriculation Total, in short, tends to be a better predictor of failure in the African group and of success in the Indian.

8.8 Matriculation Total Mark: (b) Africans and Indians
pooled

One may consider, finally, whether predictions from matriculation total mark would be improved if selection were from a combined Indian-African list and not from each group separately. For estimating this, the Indian and African records upon which Table 8.E is based were pooled to form three mixed groups for validation (1951-1953, 1954-1956 and 1957-1959).

The criterion was again Pre-Medical Criterion Score, (Section 5.16) derived this time from a transformation carried out for the pooled records of all South African Indian and African matriculants admitted to the classes of 1951-1959 (omitting, as before, students classed at the time of writing as "Retarded, still trying."). The predictor was again Matriculation Total Mark expressed, to shorten computation, in Standard Score form, but the Indian conversion tables were used for converting both African and Indian raw marks. (It will be recalled that this is a linear transformation only.)

It is of interest to compare the resultant correlations for mixed groups with those of Table 8.E (Africans and Indians separately).

Table 8.G
Total Matriculation Mark and Pre-Medical Result
Africans and Indians separately and together

Period	Numbers			Correlations (r)		
	Africans	Indians	Pooled	Africans	Indians	Pooled
1951-3	18	20	38	0.09	0.77	0.56
1954-6	31	27	58	0.42	0.44	0.44
1957-9	26	32	58	0.53	0.27	0.47
1951-9	75	79	154	0.37	0.47	0.48

All correlations for pooled groups are significant at the 0.01 level.

If we consider each group of three correlations for a given period, it will be seen that in each case the value of r for the pooled group approaches the higher of the other two values, e.g. 0.56 for the pooled group in 1951-3 is closer to 0.77 than to 0.09, and its z-equivalent will be found to be somewhat larger than the mean of their z-values. For the overall results of the nine classes under survey, the pooled group yields the highest correlation.

The procedure of Table 8.F the correlations of matriculation total marks with the criterion may now be estimated for a mixed group of qualified applicants for admission to the Faculty. The data of Table 7.FF,iii (Appendix H) yield a pooled estimate of variance of 48.3 for the raw matriculation marks of qualified African Joint Board and Indian Natal Senior Candidates. (As African and Indian variances differ significantly, pooling them is questionable, but our assumption is a selection procedure which disregards differences both of race and of

examining body.) The other data for the estimate are the standard deviation of 2.61 for matriculation total standard score for the 154 freshmen of 1951-9, and the correlation of 0.48 of this score with the criterion for the same group. (Table 8.G) From these statistics, by the same procedure and on the same assumptions as before (Guilford, 1950, formula 13.29) the correlation of the criterion with Matriculation Total Mark amongst qualified applicants is estimated as 0.68, which is identical with the corresponding estimate for Indians alone (Table 8.F, b.ii.) and higher than the corresponding estimate for Africans (Table 8.F, a.ii).

From this it appears that correlations for mixed groups of Matriculation Total with the criterion are likely to compare favourably with correlations for Africans and Indians separately, and that a useful starting-point for the discussions of the Screening committee will be a simple ranking of all candidates on Matriculation Total. (Such a ranking is in fact, regularly supplied to the Committee.) Pooling the races on combinations of variables, however, is felt to be likely to obscure meaningful differences, and to alter patterns of intercorrelation. Accordingly, such pooling has not been attempted.

8.9 Indians : Predictions from Matriculation Marks

Predictions from the results of different matriculation subjects will now be considered. Indian results are presented first since they are, on the whole, simpler and clearer than those of African students.

As already explained, the Indian groups for the validation of matriculation marks were (a) 1951-1954; (b) 1955-1957 and (c) 1958-1959. The total of 81 cases for special study consists of all candidates who attempted at least the Preliminary Year examinations and who on enrolment were:

- (i) Fully qualified for admission - i.e. matriculated with a pass in mathematics;
- (ii) Without previous credits in courses prescribed by the Faculty;
- (iii) Below the age of twenty-four.

Analysis of the data of the first two periods was completed early in 1958, before the formulation of the Pre-Medical Criterion Score explained in Section 5.16. Hence the criterion is the simple pass-fail dichotomy: "Promoted on Schedule to the Second Year" versus "Retarded or Withdrawn"; the latter group including a few candidates classed at the time of writing as "Retarded, Still Trying."

Five matriculation predictors - Total, English, Mathematics, Latin and Biology - have been investigated in some detail. Correlations were run early in 1958 for two others - History and Geography. History yielded a biserial r of 0.46 for 61 cases, Geography a biserial r of 0.39 for 64 cases. While both values are significant, they are much lower than were those obtained at the same time for marks in other subjects, so that further study was limited to the variables shown below in Table 8.H.

Table 8.H
Indian Matriculation Marks and Pre-Medical Result
Biserial Correlations

Period	N	P2	%P2	Correlation of pass-failure with Matriculation				
				Total	English	Maths	Latin	Biology
1951-4	34	13	38	<u>.91</u>	<u>.49</u>	<u>.66</u>	<u>.79</u>	<u>.60</u>
1955-7	32	16	50	<u>.47</u>	.26	.25	<u>.57</u>	<u>.44</u>
1958-9	25	16	64	<u>.45</u>	-.07	.07	.28	<u>.50</u>
				N as shown in 2nd column			N = 21 to 32	
Underlining denotes a coefficient more than twice the size of its own Standard Error.								
P2 denotes 'Completed Pre-Medical Course in two years, i.e. on schedule'								

As with the validation groups for Matriculation Total only, (Table 8.E) the correlations decrease as the proportion of passes rises. For 1951-1954, with only 38% passes, biserial r is significant for every matriculation predictor and once exceeds 0.9. (The results for this group agree fairly well with those of the pilot study - of many of the same cases - undertaken in 1956 and reported in Section 7.8). For 1958-1959, with 64% passes, only two of the biserial r 's are significant, and the highest value is only 0.5.

Only two predictors - Total and Biology - yield a significant relationship for all three groups. Total, representing the pooled opinions of at least six examiners in different fields, might be expected to yield the highest correlations, particularly with a criterion reflecting attainment in so many different subjects. Matriculation Biology, apart from its general relevance to pre-medical studies, is likely to yield significant correlations with a pass-fail criterion because there are a relatively large number of failures in Botany I.

The relatively high correlation of Latin marks with the criterion is also to be expected. 'Among school subjects, classics is most dependent on g' (Vernon, 1956; cp. Spearman, 1927, Ch.VI); attainment in Latin is likely also to reflect 'w', i.e. Webb's factor 'in some close relation to persistence of motives'. (Compare Section 2.10).

More surprising is the failure of English and Mathematics as predictors in the second and third of the periods under study. For this there are several possible explanations:

(a) Significant fluctuations from year to year in the mean Matriculation English and Mathematics marks of Indian pre-medical freshmen have been demonstrated in the analyses of variance set out in Tables 7.KK and 7.QQ (Appendix H). As between 1955 and 1956, for instance, the mean mathematics mark of Indian pre-medical freshmen rose from 55% to 61% and the variance of mathematics marks from 42 to 219. Similarly, in the general population of Indian Natal Senior Certificate candidates, English and Mathematics results have been shown to vary significantly from year to year (Section 6.6 and Table 6.G).

(b) The Screening Committee pays considerable attention to attainment in English and Mathematics: a candidate with low marks in either is not likely to be admitted unless he has shown strength in other fields, or unless there is evidence (e.g. from tests or his school principal's report) that his English and Mathematics are better than his marks would suggest.

(c) At least two Indian pre-medical freshmen with high English and/or Mathematics marks subsequently abandoned the course after failure which was attributed to their having been probably disinclined to enter medicine at all. There may be more such cases, and even one or two would suffice to affect correlation in a group of 30 or fewer.

(d) A fourth possibility is that the examinations in English and Mathematics do not measure ability in these fields accurately, but to substantiate this would call for an analysis far beyond the scope of the present study.

Intercorrelations. The correlations of Matriculation Total with other marks were computed in 1958 for the Indian pre-medical freshmen of 1951-1957 (i.e. the first two groups of Table 8.E. This yielded the following values of r :

Total with Mathematics	(N = 66):	0.68
Total with English	(N = 66):	0.50
Total with Latin	(N = 58):	0.70
Total with Biology	(N = 60):	0.66
Total with Geography	(N = 64):	0.67
Total with History	(N = 61):	0.58

English and Mathematics (N = 66) correlated 0.37.

The high correlations of Total with the other marks indicate that combining Total with other matriculation predictors is not likely substantially to improve validity. A discriminating function set up experimentally in 1958 by the procedure outlined by Moroney (1953, Chapter 16) yielded the following weights: Total, 71; English, 5, Mathematics, -0.2. Such a composite would hardly differ appreciably from Total alone; it was not cross-validated. Experimental correlations, however, were run for three arbitrary combinations of Standard Scores: Total plus Biology, Total plus Latin, and Mean Standard Score. (Mean Standard Score was computed for those of the following in the candidates' record: Total, English, Mathematics, Latin, Biology. It thus resembles some of the composite matriculation predictors of Gouws). Biserial r 's for these predictors are given in Table 8.I, together with the correlations of Matriculation Total for the same periods. The numbers of cases for each variable (except Total and Mean Standard Score) are not the same, though the validation groups for different subjects in any one period overlap very extensively.

Table 8.I
Combinations of Indian Matriculation Marks
and Pre-Medical Result
Biserial Correlations

Period	Correlation of pass/failure with							
	Total		Mean SS		Total plus Biology		Total plus Latin	
	r_{bis}	N	r_{bis}	N	r_{bis}	N	r_{bis}	N
1951-4	.91	(34)	.95	(34)	.86	(32)	1.00	(28)
1955-7	.47	(32)	.48	(32)	.53	(28)	.63	(28)
1958-9	.45	(25)	.35	(25)	.52	(24)	.38	(21)

Note: The biserial r of 1.00 for Total plus Latin in the 1951-1954 group overestimates the correlation. Of students with combined SS of 21 and over, 11 passed and one failed; of those with combined SS of 20 and under, four passed and 14 failed.

None of the three combinations yields a higher correlation in all three periods than does Matriculation Total, though each improves slightly upon it in two periods out of three. The differences, however, are not such as to suggest that anything is to be gained by basing the initial rankings for discussion by the Screening Committee on a combination rather than on Total Matriculation Mark.

A contribution to the apparently high validity of Biology probably arises from its having been accorded relatively little weight in the discussions of the Screening Committee up to the time of writing. Latin marks, similarly, had little influence on the decisions of the Committee until the selection procedure of 1958, during which the high correlations yielded by Total plus Latin for the period 1951-7 were first reported. Thereafter, as the tables show, the apparent validity of Latin marks falls steeply.

8.10 Africans: Predictions from Matriculation Marks

The principal African groups for the validation of Matriculation English, Mathematics and 'Science' marks are identical with those (Table 8.E) for which Matriculation Total Marks have already been validated, and the criterion measures are the same.

Product-moment correlations for these groups follow in Table 8.J.

Table 8.J

African Matriculation Marks and Pre-Medical Result:
Product-moment correlations.

Period	N	P2	% P2	Correlation of classification on pre-medical result with matriculation			
				Total	English	Maths	Science
1951-3	18	6	33	.09	.36	.08	.05
1954-6	31	12	39	<u>.42</u>	.25	.28	.18
1957-9	26	7	27	<u>.53*</u>	<u>.60*</u>	<u>.44</u>	.04
1951-9	75	25	33	<u>.37*</u>	<u>.36*</u>	<u>.29</u>	.08

Underlining denotes a coefficient significant at the 0.05 level. An asterisk and underlining denote a coefficient significant at the 0.01 level.

Of the sixteen correlation coefficients above, only seven are significant. Three of these are for the pooled group of 75, for which number quite a tenuous relationship may yield a technically significant result. Another three are for the evident rather 'predictable' group of 1957-9. (It may be recalled that this group does not include the records of students classed at the time of writing as 'Retarded, Still Trying': these would probably reduce the correlation). Total is the only predictor to yield a significant correlation in two independent groups out of three, and Science does not achieve any significant correlations with the criterion.

Intercorrelations. These were calculated for Matriculation Total, English and Mathematics marks for the entire group of 75 African students. The obtained values of r :-

Total with English : 0.55
Total with Mathematics : 0.53
English with Mathematics : 0.23

- suggest slightly greater independence than do the corresponding inter-correlations of Indian marks. Hence it is not surprising that the sum of Standard Scores for Total, English and Mathematics correlates 0.43 with Pre-medical Criterion Score, i.e. slightly better than does Total alone.

With these findings may be compared those of various pilot and interim studies. Most of these are only preliminary analyses of the same data as those presented above, but since the general evidence for the validity of matriculation marks in European groups (Section 2.28) would not lead one to expect the results presented in Table 8.J, further detail would seem to be desirable.

Predictions of the results of the pre-medical course as a whole must be distinguished from predictions of Preliminary Year results only.

Prediction of overall pre-medical result. The 1956 pilot validation of matriculation marks reported in Section 7.8 yielded correlations about as low as those for 1951-1953 and 1954-1956 summarised in Table 8.J. Though this earlier study suggests a different order of predictive validity, with Mathematics as the most promising mark, this probably reflects only a different selection and grouping of cases (many students' marks had not been traced at the time of the pilot study) and the measure of disagreement between the two sets of results is itself a sign of the instability of the correlations in question.

Biserial correlations run early in 1957 for the matriculation marks of 56 African pre-medical freshmen against the criterion dichotomy 'Promoted on Schedule to the Second Year' versus 'Retarded or Failed' confirmed, on the whole the findings of 1956.

Promotion on Schedule to the Second Year:
Biserial coefficients of correlation with
matriculation marks.

	<u>r_{bis}</u>	<u>Standard Error</u>
(1) Adjusted Total :	0.29	0.159
(2) Total :	0.26	0.161
(3) Science :	0.26	0.161
(4) "Other Subjects" :	0.19	0.165
(5) English :	0.18	0.166
(6) Mathematics :	0.17	0.166

These coefficients, as their Standard Errors show, do not differ significantly from zero.

A threefold classification of the same group was also undertaken, separating (a) those reaching the Second Year on schedule; (b) those who were merely retarded; (c) those who abandoned the course altogether before reaching the Second Year. The mean adjusted Total Matriculation Mark for each group was as follows:

<u>Group</u>	<u>Adjusted Total Matriculation Mark</u>
Regularly Promoted (20 students):	52.35
Retarded (18 students):	50.33
Abandoned the course (20 students):	48.45

The standard deviation of Adjusted Total mark in this group is 6.39. Even the difference between the top and bottom groups ("Regularly Promoted" and "Abandoned the Course") does not quite reach the 0.05 significance level, and the coefficient of triserial correlation, using Burt's formula (Burt, 1944) is only 0.28.

Prediction of Preliminary Year Results. For the group of 56 African freshmen studied in 1957, all matriculation marks except English failed to correlate significantly with promotion to the First Year. This group, however, includes a high proportion of cases from the 'unpredictable' groups of 1951-1953 and mixes these with 1954-1956 candidates for whom means and/or variances of certain matriculation marks differ significantly from those of the marks of earlier classes.

The pilot studies of 1956 (Table 7.D) showed that matriculation Total, English and Mathematics marks correlated significantly with the sum of Standard Scores in Preliminary Year examinations for a group of 21 Africans. Later, matriculation marks were validated against Preliminary Year results for three independent African groups:

(a) Thirty-nine African candidates examined in 1955, 1956 and 1957. The group includes a few who had written supplementary matriculation examinations or who had had previous university experience, but none with credits in courses prescribed by the Faculty. The criterion is the sum of standardised Preliminary Year marks; for 32 students this yielded a biserial r of 0.86 with promotion on schedule to the Second Year.

(b) Nineteen African freshmen who wrote the Preliminary Year examinations in 1959. The criterion is a C-score (Guilford, 1954) based on a ranking of the students by the lecturers in charge of pre-medical classes.

(c) Seventeen African freshmen without previous university credits who wrote the Preliminary Year examinations of 1960.

1958 students are not included in any of these groups. Only 8 African matriculants from the Union were admitted in 1958; of these three had written supplementary examinations. The group is thus too small for separate validation.

Correlations follow in Table 8.K.

Table 8.K

African Matriculation Marks and Preliminary Year Criteria

Predictors	Criteria		
	Sum of Standardised Examination Marks 1955-1957 (N = 39)	Staff Ratings 1959 (N = 19)	Pass/Fail, 1960 (N = 17)
<u>Matriculation:</u>	<u>$r =$</u>	<u>$r =$</u>	<u>$\phi =$</u>
Total	<u>.55*</u>	<u>.61*</u>	.37
Mathematics	<u>.51*</u>	<u>.48</u>	.27
English	<u>.48*</u>	.36	.41
Science	<u>.38</u>	<u>.49</u>	.17

Underlining denotes a coefficient significant at the 0.05 level. An asterisk and underlining denote a coefficient significant at the 0.01 level.

Here, except in the case of the 1960 group and the English marks of the 1959 students, matriculation marks and Preliminary Year criteria are significantly related.

Other matriculation subjects. For marks other than Total, English, Mathematics and 'Science' there are too few African cases for detailed validation. In 1957, however, the marks in as many subjects as possible of a small group of Joint Board candidates were correlated with criterion ratings of performance in the pre-medical course as a whole. Results are listed below:

<u>Marks</u>	<u>N</u>	<u>Coefficient</u>	<u>Value</u>
Latin	7	rho	<u>0.92</u>
Biology	8	rho	0.66
English	30	r	<u>0.49</u>
Total	30	r	<u>0.42</u>
Geography	13	rho	0.38
Afrikaans (Lower)	14	rho	0.35
History	24	r	0.32
Botany	8	rho	0.28
Physical Science	23	r	0.19
Mathematics	30	r	0.19

Only three of these correlations are significant; it is interesting that Latin, with an N of only 7, yields one of the significant three ($p < 0.01$, Siegel, 1956, Table P). While English correlates significantly with the criterion, Mathematics, for the same group of cases, does not; the list shows the same tendency as does Table 7.D for verbal subjects to predict African results best.

Bantu Language, Higher Grade, in view of its special importance at present, has been dealt with separately. There are too few cases for independent validations of marks for Zulu, Sotho, Tswana, etc., but the marks for Bantu Language (Higher Grade) and English (Higher Grade) for all students who had taken both subjects, were correlated with the same criterion as before for the groups of 1951-3, 1954-6 and 1955-9. The results were:

Table 8.L

Bantu Language Higher, English Higher and Pre-Medical Result

<u>Period</u>	<u>N</u>	<u>Bantu Language</u>	<u>English</u>
1951-3	11	.02	.49
1954-6	25	.34	.35
1957-9	23	.25	<u>.61*</u>
1951-9	59	.25	<u>.41*</u>

An asterisk and underlining denote a coefficient significant at the 0.01 level.

Bantu Language (Higher Grade) is not significantly related to the criterion in any of the groups under study, and English for all groups yields a correlation higher, though not significantly higher, than that yielded by the Bantu Language mark.

Discussion. For Africans, matriculation marks other than Total appear to be short-range predictors, though experience may modify this conclusion now that all African candidates write the same matriculation examination.

Many factors probably combine to depress the correlations observed so far of African matriculation marks with overall pre-medical result. The African school system has been radically transformed during the years under study, and the Faculty's pre-medical curriculum has also been altered from year to year. Differences between examining bodies, or from year to year between the marks of the same examining body, would also disturb correlations. Most of these factors, however, can be paralleled for the Indians, for whom the validities of matriculation marks are generally higher. Perhaps the most important single factor for the Africans is the radical nature of the transition from school or employment to pre-medical studies; it is perhaps significant that prediction tends to break down for the first-year group, which has had time to acquire the outlook and values of the pre-medical school.

8.11 Predictions from Tests: Africans

The grouping of test results for analysis has been described in Section 8.2. Validation was in two stages: a preliminary survey by non-parametric methods to identify the most effective predictors, after which product-moment correlations were run for these with Pre-medical Criterion Score.

For the preliminary survey, a three-by-three classification was set up for each group (except for that of 1960, for which only Preliminary Year results were available at the time of writing). For the first two groups the criterion classification was:-

- (a) P2 Completed the pre-medical course in two years.
- (b) P3 Retarded, but completed the pre-medical course in three years.
- (c) F Excluded or withdrawn after examination failure; did not complete pre-medical studies.

For the 1959 group, not all of whom had completed the pre-medical course at the time of writing (1961), the criterion classification had to take the form:-

- (a) Passed on schedule;
- (b) Retarded, still trying;
- (c) Excluded or withdrawn after failure.

On the 'Predictor' axis, the students of these three groups were classified for each test according to Standard Score as:-

- (a) 12 or over; (i.e. over 0.8 S.D. above the mean);
- (b) 9, 10 or 11; (-0.8 to +0.8 S.D.);
- (c) 8 or under (below -0.8 S.D.).

It will be recalled that the standard deviation for all Standard Scores is 2.5.

Correlation in each of the resultant three-by-three tables was computed by Kendall's tau (Kendall, 1955, formula 3.18) which measures association in ordered contingency tables. This, incidentally, was the measure of correlation used in Parkyn's investigation (1959). Significance tests, owing to the very large standard error of τ_c , were not applied at this stage, the object of computation being simply to identify the three or four predictors most consistently related to the criterion.

Kendall (1955) points out that whatever tau may be, its standard error is of the order of the square root of $2/N$. Thus, even in $N = 50$, the standard error of tau will be of the order of 0.2, and that of τ_c somewhat higher.

The 1960 group, for whom only Preliminary Year criterion data are available, were classified simply as "Promoted on Schedule to the First Year" (7) versus "Retarded or Excluded on Preliminary Examination Results" (10), and in an nearly as possible the same proportions on each test score.

Table 8.M

Africans

Test Scores, Matriculation Total and Pre-Medical Results

Predictors	Groups and Criteria			
	1955-6 N = 20 Criterion: P2, P3, F	1957-8 N = 23 Criterion: P2, P3, F	1959 N = 12 Criterion: P2, R, F	1960 N = 17 Criterion: Pass-Fail, Year 0
	τ_c	τ_c	τ_c	Φ (τ_b)
Matriculation Total.	.00	.26	.50	.37
Vocabulary.	.15	.27	.25	.38
Verbal Reasoning.	.18	.36	.60	.55
Scientific Information.	-	.25	.44	.63
Mechanical Comprehension.	.52	.23	-.34	-
Mathematics Test.	-	.18	.42	.13
A2	.08	.43*	.15	.38
Non-Verbal Reasoning.	.12	-.09	.31	-.17
G.L.	-	.13	-.06	.38
Index of Accuracy.	.45	.39	.25	.55

Significance tests, as explained in the text, were not applied at this stage.

Notes: P2 : Passed pre-medical course in two years.
 P3 : Passed pre-medical course in three years.
 R : Retarded, still trying.
 F : Excluded or withdrawn after failure.

A dash denotes 'Test not taken by this group'.
 * N = 15: 1957 cases only. Test A2 was omitted in error from the 1958 battery.

Table 8.M yields four independent series of tau's. Of these the three highest in each group, arranged in order of magnitude, are as follows:-

<u>1955-6</u>	<u>1957-8</u>	<u>1959</u>	<u>1960</u>
1. Mechanical Comprehension.	1. A2 (But see footnote to Table 8.M).	1. Verbal Reasoning.	1. Scientific Information.
2. Index of Accuracy.	2. Index of Accuracy.	2. Matriculation Total.	2. Index of Accuracy.
3. Verbal Reasoning.	3. Verbal Reasoning.	3. Scientific Information.	3. Verbal Reasoning.

Considering the very small numbers on which these correlations are based, the list is reasonably consistent from year to year. The Verbal Reasoning Test is one of the three best predictors in all four groups. The Index of Accuracy is similarly placed in three groups out of four. The Scientific Information Test is available for three groups only, but it is one of the three best predictors in two of these. Matriculation Total (shown in Sections 8.9 and 8.10 to be the best matriculation predictor) is among the first three predictors in only one group out of four. The Vocabulary Test, incidentally, takes fourth place (or ties for it) in three of the four groups.

Certain other tests tend with a similar consistency to appear at the bottom of the list. Among the three lowest correlations for each group that of Non-Verbal Reasoning appears three times out of four, and G.L., A2, Mathematics, and Matriculation Total twice each. The presence of Matriculation Total and A2 at this end of the list reflects in part, no doubt, their use in actual selection.

A2 was written by applicants (in 1956, 1959 and 1960). Mathematics was also a selection test for the 1959 and 1960 groups. G.L. and Non-Verbal Reasoning, however, were research tests until 1960; their low correlations with the present criterion are in line with the findings of the pilot studies (Sections 7.4 to 7.6).

As nothing is known of the factorial content of these tests for an African population, inferences can be drawn only with caution, but the results so far suggest that the African student who survives the pre-medical course tends to be characterised at enrolment by verbal ability, accuracy and scientific knowledge, i.e. by the very qualities which the course is designed to impart (Section 4.5). A capacity for solving non-verbal problems, on the other hand, appears relatively unrelated to attainment. Of 25 students in the 1955-1959 groups who failed to complete pre-medical studies, seven were among the highest scorers (with Standard Scores of 12 or over) in the Non-Verbal Reasoning Test. These findings parallel some of those of Himmelweit and Summerfield (1951: cited in Sections 2.8 and 2.32) for students at the London School of Economics. However, in both these studies the obtained correlations leave substantial proportions of the criterion variance unaccounted for. Hence, it may be felt, the description of the successful student that can be built up on the evidence of such correlations is far from complete.

A question of practical importance is whether predictions from Matriculation Total by itself are likely to be improved by the addition of scores in standardised tests. Two arbitrary combinations of Standard

Scores were tested by the same procedure as before:-

- (a) Matriculation Mathematics plus A2 plus Vocabulary.
- (b) 2 (Matriculation Total) plus Verbal Reasoning plus Non-Verbal Reasoning.

Table 8.N
Africans
Predictions from Combinations of
Standard Scores

Predictors	Groups and Criteria			
	1955-6 N = 20 Criterion P2, P3, F	1957-8 N=15-23 Criterion P2, P3, F	1959 N=15-17 Criterion P2, R, F	1960 N = 17 Criterion: -Fail Year 0 only
	<u>Tau_c</u>	<u>Tau_c</u>	<u>Tau_c</u>	<u>Phi</u>
Matriculation Total	.00	.41	.43	.37
Combination (a)	.25	.55	.52	.63
Combination (b)	.08	.36	.49	.41
Matric. Total	-	.26	.43	

Notes: P2 : Passed pre-medical course in two years.
P3 : Passed pre-medical course in three years.
R : Retarded, still trying.
F : Excluded or withdrawn after failure.
Combination (a) is the sum of Standard Scores in A2, Vocabulary and Matriculation mathematics.
Combination (b) consists of Standard Scores in the following combination:
2 (Matriculation Total) plus Verbal Reasoning plus Non-Verbal Reasoning.
The vertical lines in each column link correlations which are comparable, i.e. run for the same group of students.
In each case N is the maximum available for the comparison in question.

While the numbers are too small for the establishment of significant differences, it will be seen that in each of six comparisons the combination of predictors yields a higher correlation than does Matriculation Total alone. In the 1959 and 1960 groups, the ranking of candidates on the combination of Matriculation Mathematics, A2 and Vocabulary was noted by the Screening Committee and minuted before final selection decisions were taken; this combination of predictors has thus stood the test of two successive, but of course, very small, selection procedures.

By way of a formal significance test, product-moment correlations were run for certain predictors with Pre-Medical Criterion Score. The 45 cases for this test consisted of all African candidates without previous credits on enrolment who had been tested at the beginning of their Pre-Medical course and who at the time of computation had either completed or abandoned Pre-Medical studies. The group is made up of candidates tested in 1956, 1957, 1958 and 1959: it does not include the 1955 students who wrote the tests at the beginning of their second year of Pre-Medical studies or the students enrolled in 1959 who were 'Retarded, still trying' at the time of computation. The obtained correlations were:-

Verbal Reasoning	0.67
Matriculation Mathematics plus A2 plus Vocabulary	0.52
2 (Matriculation Total) plus Verbal Reasoning plus Non-Verbal Reasoning	0.50
Vocabulary	0.39
Matriculation Total	0.35
A2	0.28

(N = 45. For df:40, an r of 0.304 is significant at the 0.05 level and r of 0.393 at the 0.01 level.)

The superiority of the Verbal Reasoning Test on its own to the two composite predictors in this group is interesting. None of these students had taken this test as part of selection procedure: indeed the only tests which played any part in the selection of this group were A2 (for 1956 and 1959 freshmen) and Vocabulary (for the 1959 freshmen only). This has some bearing on the apparently low position of Matriculation Total.

From this section and from the pilot studies reported earlier (7.4-7.7) it will be seen that standardised tests of ability yield somewhat higher validities for the Africans than might be expected from European studies, (Sections 2.31 and 2.32) and particularly from that of Gouws (1957) who used some of the same tests for predictions of a pre-medical criterion at the University of Pretoria. With this criterion, for instance, the Afrikaans version of the Verbal Reasoning Test correlated only 0.18 and 0.22 in two successive groups of over a hundred cases each.

For the considerably higher validities for tests in the African group, there are probably several reasons, among them:

(a) Test performance, particularly since the language of the tests is English, is likely to reflect general education and 'Western' culture to a greater extent in an African group than among Europeans;

(b) As Section 3.3 has shown, it is possible that African matriculants are relatively unselected for general ability. It has been shown in Section 7.12 (Table 7.G) that in six of the eight tests under study the variance of African freshmen's scores was greater than that of the scores of Indian freshmen.

8.12

Predictions from Tests

Indians

At an early stage of the research it became clear that the standardised tests which for African students appeared to have some prognostic value were yielding low or even negative correlations with Indian results for the two-year pre-medical course as a whole.

Indian test records were selected, grouped and analysed in the same way as were African test records, except that product-moment correlations (other than those reported in Chapter VII) were not run in view of the tenuous and unstable relationship between test scores and pre-medical results that the preliminary analysis revealed. Further, as shown in Section 7.12, the distribution of Indian scores in certain tests shows significant negative skew: the non-parametric tau is thus an appropriate measure of correlation.

Table 8.0 presents the results of the preliminary correlational study of Indian test results.

Table 8.0

Indians

Test Scores Matriculation Total and Pre-Medical Result

Predictors	Groups and Criteria			
	1955-6 N = 18 Criterion P2, P3, F	1957-8 N = 17 Criterion P2, P3, F	1959 N = 16 Criterion P, R, F	1960 N = 13 Criterion Pass-Fail Year 0
	<u>Tau_c</u>	<u>Tau_c</u>	<u>Tau_c</u>	<u>Phi</u>
Matriculation Total	.14	.18	.26	.03
Vocabulary	.24	-.25	.12	.13
Verbal Reasoning	.08	-.04	.09	.43
Scientific Information	-	.02	.06	.13
Mechanical Comprehension	.11	.18	-.09	-
Mathematics	-	-.19	-.11	.53
A2	.39	.09*	-.14	1.00
Non-Verbal Reasoning	.03	.114	-.35	.53
G.L.	-	- 16	-.40	.53
Index of Accuracy	.38	-.15	.09	.20

Significance tests, as explained in the text, were not applied.

Notes: P2 : Passed pre-medical course in two years
 P3 : Passed pre-medical course in three years.
 R : Retarded, still trying.
 F : Excluded or withdrawn after failure.
 *N = 10 : 1957 cases only. Test A2 was omitted in error from the 1958 battery.
 A dash denotes 'Test not taken by this group'.

Table 8.0 presents thirty-seven tau coefficients for Indian test scores, each of which may be compared with the corresponding African tau in Table 8.M. In only seven of these thirty-seven pairs does tau denote a more positive relationship in the Indian case, and while in the African table there are only four negative values of tau, in the Indian table there are ten. Negative correlation for the Indians is not associated with any one test. The only variables correlating positively with the criterion in every group are Matriculation Total and Scientific Information scores.

It has been shown (Section 7.11) that the reliabilities of tests tended to be lower for the Indians than for the Africans. One would expect, also, in the more highly selected Indian groups, considerably lower correlations of tests with the criteria than among the Africans. The number of negative relationships, however, is unexpected, even when the instability of tau's computed from very small numbers is taken into account.

It will be recalled that the correlations (except those for the 1960 group) are based on a threefold classification of students as Passed in Two Years, Passed in Three Years (or Retarded in the case of the 1959 group), and Failed. It seemed possible that the tests might correlate positively with a simple Pass-Fail criterion, contrasting either students who pass on schedule with those who do not, or students who pass at all with those who fail and abandon the course. Re-casting the 1957-1958 and 1959 data in two-by-two tables on these lines did not, however, affect the general pattern of relationships.

The negative or low correlations in 1957-1958 and 1959 are generated by records of two kinds:-

(a) In each group there are three or four students who pass in spite of low Standard scores (8 or less) in the tests.

These students tend to have very low or very high matriculation Standard Scores (12 or over, or 8 or less) and may thus either be people who built up a habit of over-achievement at school, or, on the other hand, were in some sense late developers.

(b) Conversely, in each group one to three students, usually very young ones, failed and abandoned the course despite Standard Scores of 12 or over in a number of the tests. The reason for failure can often be labelled "immaturity" though it has already been shown (Section 8.5) that the highest proportion of Indian passes is among the younger students. But of course all young students are not necessarily immature.

The Indian results have been considered so far simply as what would ordinarily be expected in a highly selected group which includes, incidentally, a few cases in which the selectors have deliberately set aside the evidence of low matriculation and/or test scores on the grounds of favourable school principals' or interviewers' reports, and thus admitted certain candidates for whom there is strong evidence that marks or scores are likely to be bad predictors. One other factor, however, must also be taken into account. Of the ten negative tau's in the Indian table, eight are for tests taken in 1957-1958 or 1959, not in selection but as part of registration procedure. It is interesting that in 1960, when all tests were written during actual selection, all the tau's are positive. This might suggest that the Indian response to testing tended to vary rather sharply as between purely experimental situations and actual selection procedures in which something was at stake for the candidates.

(The Africans - see Table 8.M - did not appear to make such a distinction). Unfortunately, for the theory, two of the 1959 selection tests - A2 and Mathematics - also yielded negative correlations, and all tau's are positive for the 1955-1956 group who wrote the tests experimentally (except for the 1956 freshmen who took A2 as part of an actual selection procedure). It is arguable, however, that the 1955-1956 group was exceptionally well disposed towards the testing in view of the efforts that had been made in 1955 to win the interest and co-operation of students.

The possibility of deliberate sabotage by some candidates was also to be considered. There is nothing, however, in the African results to suggest this, and the Africans are just as likely to respond to political pressure as the Indians. Further, the effects of sabotage are most likely to have appeared in the results of the 1955-1956 students who were tested at the time of the Non-European Unity Movement's agitation against the Faculty's selection procedure (See Section 4.11) and in this set of results there is nothing to suggest this. Incidentally, certain students with strong political affiliations of which they made no secret, scored very highly in the tests taken experimentally.

The Indian test results, then, are probably best explained in terms of the normal phenomena of highly selected groups, described in Sections 2.31 and 2.32. However, a casual approach by sophisticated students to tests on whose results they had nothing to lose, may also have influenced certain correlations. As matriculation is a relatively satisfactory predictor in the Indian group, the test correlations are not a matter of great immediate concern, though an intelligence test that showed a consistent positive correlation with attainment in the Faculty would obviously be useful. Test G.L., in selection conditions, is a possible candidate for this role: A2, despite its phi-correlation of 1.0 with the 1960 criterion, has probably too low a ceiling. Study of these and other measures will continue.

8.13 Over- and under-achievers

Over- and under-achievers were briefly discussed in Section 2.33. A question of importance is whether they can be identified in the course of selection.

A test of this was set up by treating Matriculation Total and Pre-Medical Criterion Score as measures of achievement, and the Verbal Reasoning test as a measure of intelligence. The Verbal Reasoning Test was chosen for this role chiefly because for the Africans it correlates highly with pre-medical result (Section 8.11). As none of the standardised tests correlates satisfactorily with Indian attainment, it seems as well to use the same test for both groups. The Non-Verbal Reasoning Test was also considered, as a measure likely to be more independent of 'v.ed' material, but it has not been shown to correlate consistently with attainment. A2 is not available for all cases tested.

All three measures were expressed in Standard Score form, i.e. with a mean of 10 and Standard Deviation of 2.5 (See Section 7.12).

'Over-', 'Level-' and 'Under-' achievers were then defined as follows:

Over-achiever: Achievement Standard Score (matriculation total or pre-medical criterion) exceeds Verbal Reasoning Standard Score by two points or more.

Level-achiever: Achievement and Verbal Reasoning Standard Scores differ by not more than one point.

Under-achiever: Verbal Reasoning Standard Score exceeds Achievement Standard Score by two points or more.

Each of the cases chosen for analysis was then rated as an over-, under- or level-achiever:

- (a) on Matriculation Total,
- (b) On Pre-medical Criterion Score, in relation to his score in the Verbal Reasoning Test, regarded as a measure of intelligence.

The resultant ratings were plotted against each other in the three-by-three tables that follow.

The data chosen for the test are the records of 54 African and 53 Indian students: these groups include all candidates without previous credits who had taken the Verbal Reasoning Test and for whom full pre-medical criterion data were available at the time of computation (1961). They differ by only two or three cases each from the groups of Table 8.M and 8.O, which could not be used as they stood because, as explained, criterion data for some cases are incomplete.

The association was tested by means of Kendall's τ for the three-by-three classification, using the formula of Stuart (1955) for the upper limit to the variance of τ_c . Two-by-two tables were also set up for the classification:

- (a) School versus university record:
- (b) Under- versus level- or over-achievers:

which was tested by chi-squared with one degree of freedom. (Table 8.P follows on page 262).

It will be seen from Table 8.P that in the African group the classification into Under-, Level- and Over-Achievers on Matriculation Total is positively but not significantly related to the similar classification on Pre-Medical Criterion Score. Of the nineteen under-achievers on the Matriculation assessment, only two are over-achievers in their University course. Only four of the nineteen, incidentally, completed the pre-medical course on schedule.

Amongst the Indians, the classifications on Matriculation Total and Pre-Medical Criterion Score are significantly related, and none of the under-achievers at school is an over-achiever at the university. Over- and under-achievement thus appear rather more stable in the Indian than in the African group; this is to be expected on the hypothesis that the change from school to university is more radical for the African than for the Indian. In both groups, however, more than half the under-achievers on the matriculation assessment are under-achievers in pre-medical studies.

Table 8.P

Over- and Under-Achievers

(a) Africans (N = 54)

Classification of Achievement on Matriculation Total	Classification of University Achievement on Pre-Medical Criterion Score		
	Over-	Level-	Under-
Over-	5	3	4
Level-	4	8	11
Under-	2	5	12

$\tau_c = 0.23.$ $\text{Var. } \tau_c \leq 0.15$
 Chi-squared (University versus Matriculation: under- versus level- or over-achievers: 1.299. Not significant for df: 1).

(b) Indians (N = 53)

Classification of Achievement on Matriculation Total	Classification of University Achievement on Pre-Medical Criterion Score		
	Over-	Level-	Under-
Over-	13	1	2
Level-	9	6	4
Under-	0	7	11

$\tau_c = 0.64$
 From Stuart (1953), the upper limit to the variance of τ_c for these data will be 0.098, whence its Standard Error will be 0.313. τ_c is thus just over twice its own Standard Error.
 Chi-squared (University versus Matriculation: under- versus level- or over-achievers; df: 1):
 8.626 $P < 0.01.$

Impressionistic Judgements (8.14-8.16)

8.14 Interviewers' Ratings

No evaluation of the interview as such could be attempted in the present study. As explained in Section 7.23, candidates' files were available to every interviewer; nearly every interview rating was recorded with knowledge of the candidate's matriculation marks and of the administrative facts of his academic record. It is, however, possible to compare the predictive validity of the interviewer's rating with that of the matriculation marks which formed part of the information upon which the rating was made.

"Interviewer's Rating", accordingly, for the purposes of the present study, means a rating recorded at the end of an interview but based on much more information than was yielded by the interview alone.

Candidates interviewed in 1956. From Section 7.23 it will be recalled that candidates for admission in 1956 were interviewed by two representatives of the Faculty, P and Q, who sat sometimes separately and sometimes together. As there are so few cases for validations, the five types of interview described in Section 7.23 cannot be considered separately. Unfortunately, too, only seven Africans and two Indians admitted to the Preliminary Year had been interviewed both by P and by Q, so that there is no basis for comparing interviewers.

In spite, however, of the unfavourable circumstances of interviewing in 1956 and the very small numbers of cases for validations, follow-up data are worth presenting because it is now (1961) nearly six years since the 1956 ratings were made. It will be necessary, however, to distinguish between ratings made during actual selection, and the ratings of the six Federation and Protectorate students who were interviewed after their admission to the Faculty.

Table 8.Q (on page 264) presents the follow-up data for candidates interviewed during selection procedure and admitted to the Preliminary Year.

Each of the three sections of Table 8.Q calls for a note.

(i) P's ratings: Six Africans. There is a one-to-one correspondence between P's ratings of these six students in the 1956 selection procedure and their positions in 1961. Even for $N = 6$ (Siegel, 1956, Table P) this result is significant at the 0.01 level. P has never acted as the students' examiner, nor are his ratings known to the examiners. P's ratings predict the students' present positions appreciably better than do matriculation Total marks. The seventh African student interviewed by P in 1956 and admitted to the Preliminary Year, died in 1957.

(ii) P's ratings: Twelve Indians. For a rough comparison for the Indians of matriculation total with P's predictions, three dichotomies were set up, each, as it happens, of five cases against seven. These are:

Interviewer: B's versus C's.
Matriculation: Over 53 versus 53 and under.
Position 1961: 5th year versus others.

Correlated with "Position 1961", the two predictors yield the following phi-coefficients:

Interviewer P: -0.03
Matriculation Total: +0.31

In neither case does Fisher's Exact Probability Test indicate a significant relationship.

Table 8.Q

Follow-up Data : Interviewers' Ratings, 1956
Candidates Interviewed in Selection Procedure

(i) P's ratings: Six Africans					
Student's Serial Number:	Interviewer's Rating	Matriculation Total	Position August 1961	Pre-Medical Record	Pre-Clinical Record
6.1	A	71	5th year	P2	P2
6.7	B	54	4th year	P2	P3
6.3	B	46	4th year	P2	P3
6.16	C	43	3rd year	P2	Retarded Still trying
6.8	D	52	Excluded	Excluded	
6.14	D	53	Excluded	Excluded	
(ii) P's ratings: Twelve Indians					
Student's Serial Number:	Interviewer's Rating	Matriculation Total	Position August 1961	Pre-Medical Record	Pre-Clinical Record
6.26	B	58	5th year	P2	P2
6.23	B	54	5th year	P2	P2
6.22	B	49	3rd year	P2	Retarded, still trying
6.19	B	61	Withdrawn	Failed	-
6.31	B	53.14	Unknown	Withdrew	-
6.25	C	53	5th year	P2	P2
6.24	C	58	5th year	P2	P2
6.29	C	48	5th year	P2	P2
6.28	C	47	3rd year	P3	Retarded, still trying
6.29	C	49	Withdrawn	Failed	-
6.30	C	50	withdrawn	Failed	-
6.32	C	48	Withdrawn	Withdrew	-
(iii) Q's ratings: Ten Africans					
Student's Serial Number:	Interviewer's Rating	Matriculation Total	Position August 1961	Pre-Medical Record	Pre-Clinical Record
6.1	A	71	5th year	P2	P2
6.3	B	46	4th year	P2	P3
6.13	B?	48	Excluded	Excluded	-
6.11	C	54	3rd year	P3	Retarded, still trying
6.16	C?	43	3rd year	P2	Retarded, still trying
6.18	D	51	4th year	P2	P3
6.5	D	52	3rd year	P3	Retarded, still trying
6.4	D	56	Excluded	P2	Excluded
6.8	D	52	Excluded	Excluded	
6.14	D	53	Excluded	Excluded	

Table 8.Q
(Continued)

Follow-up Data : Interviewers' Ratings, 1956
Candidates Interviewed in Selection Procedure

(iv) Q's ratings of Indians

<p>Only four of the Indians interviewed by Q were admitted to the Preliminary Year in 1956.</p>
<p>Notes: P2 = Passed this section on schedule, i.e. in two years.</p> <p>P3 = Passed in three years, i.e. retarded by one year.</p>

(iii) Q's ratings: Ten Africans. Three dichotomies were set up as before:

Interviewer: A's, B's and C's, versus D's.
Matriculation: 52 and over, 51 and under.
Position, August 1961: 'Excluded' versus 'Survivors'.

On these, the two predictors correlate as follows (ϕ) with "Position 1961".

Interviewer Q: +0.41
Matriculation Total: -0.25

Neither relationship is significant.

One more validation group, this time of twelve Africans, can be set up if P's research interviews with Federation and Protectorate candidates interviewed after admission to the Faculty, are pooled with his interviews in the course of selection procedure. Two-by-two tables present the results below:

Interviewer P's Rating	Pre-Medical Record	
	Retarded or Excluded	Passed in Two Years
A or B	0	7
C or D	4	1

By Fisher's Exact Probability Test (Siegel, 1956, Ch.7 and Table I) $p < 0.025$.

Plotting Matriculation Total Mark against Pre-Medical Record in the same way yields:

Matriculation Total Mark	Pre-Medical Record	
	Retarded or Excluded	Passed in Two Years
"High"	2	6
"Low"	2	2
Here the relationship is not significant		

Conclusions from the 1956 interviews. From these rather scanty data, for what they are worth, it appears:

- (1) That both interviewers predict African results rather better than does Total Matriculation Mark.
- (2) That for the Indians, on the other hand, academic standing five years after selection correlates positively with matriculation total, and negatively with the interviewer's rating.

Candidates interviewed in 1959. Two sets of validation data can be presented for these. After the November examinations of 1959, a ranking of the Preliminary Year class was drawn up by the lecturers in charge of pre-medical courses. This ranking, taking Indians and Africans separately, was converted to C-scores (Gullford, 1954, Table M) for correlation with predictor measures. After the 1960 examinations, students were classified on the lines explained in Section 5.7. For Africans, a criterion score of 4 was awarded for an 'N.2' result, 3 for 'N2S' 2 for 'Retarded, Still Trying' and 1 for 'Excluded or Withdrawn after Failure'. For the African group this yielded a reasonable approximation to the normal distribution; the Indian distribution, however, was heavily skewed by 12 criterion scores of 4 in a sample of 20. For the Africans, accordingly, product-moment correlations with predictors were run and for the Indians, biserials on the criterion dichotomy of "Passed on Schedule" versus "Excluded or Withdrawn". Phi-coefficients, run as a non-parametric check on the Indian results, approximate to the values of biserial r shown below. The African results were not adjusted for coarse grouping. Correlations follow in Table 8.R.

Each interviewer had rated all the African candidates, but only P had seen all the Indian candidates in either year. It was necessary, therefore, to pool the ratings of R and S (their means and variances were similar) for a second prediction of the Indian result.

Table 8.R

Validations of Interviewers' Ratings
Candidates of 1959

(a) Africans, N = 17

Predictor	Criteria			
	Ratings of One Year's Work		Classification on Two Years' Work	
	<u>r</u>	<u>p</u> <	<u>r</u>	<u>p</u> <
Matriculation Total:	0.65	0.01	0.42	-
Ratings: <u>'Academic Performance'</u>				
Interviewer P	0.67	0.01	0.67	0.01
Interviewer R	0.28	-	0.26	-
Interviewer S	0.39	-	0.46	-
P's rating plus Matriculation	0.80	0.01	0.65	0.01
Ratings: <u>'General Impression'</u>				
Interviewer P			0.32	-
Interviewer R			0.21	-
Interviewer S			0.35	-

(b) Indians, N = 20

Predictor	Criteria			
	Ratings of One Year's Work		Classification on Two Years' Work	
	<u>r</u>	<u>p</u> <	<u>r_{bis}</u>	<u>p</u> <
Matriculation Total:	0.63	0.01	0.26	-
Ratings: <u>'Academic Performance'</u>				
Interviewer P	0.32	-	0.08	-
Interviewers R and S	0.38	-	0.31	-
Three Interviewers (Pooled):	0.40	-	0.26	-
R and S plus Matriculation Total:	0.59	0.01	0.38	-
Mean Interviewer plus Matriculation Total:	0.60	0.01	0.38	-
Correlations for ratings on General Impression were not run for the Indians nor for the ratings of the Africans on one year's work. Inspection of the data shows that these ratings would correlate substantially less with the criteria than do the ratings of Academic Performance.				

From the validations of the 1959 ratings it will be seen that:

(i) P's ratings of Academic Performance again correlate significantly with African results, but not with Indian. For the Africans, they predict the results of the pre-medical course as a whole as accurately as they predict staff ratings on the work of the Preliminary Year alone. P's ratings correlate somewhat better with the African final result than does Matriculation Total. For the Indians, Matriculation Total is the better predictor.

(ii) The ratings of Academic Performance by R and S fail to correlate significantly with any of the criteria, though they predict Indian results somewhat better than do the ratings of P. The contrasts between interviewers recall Furneaux's comment quoted in Section 2.40.

(iii) For the Indians, however, a slightly more promising correlation is yielded by the combination of pooled interviewers' rating with Matriculation Total. This combination does not predict the Preliminary Year criterion any better than does Matriculation Total, but with the overall result of the pre-medical course it yields an appreciably, though not of course significantly, higher value of biserial r than does Matriculation Total alone.

(iv) None of the ratings on "General Impression" correlates significantly with any of the criteria.

Candidates interviewed in 1960.

For these, only Preliminary Year results are as yet available, and a detailed follow-up study is not as yet worth undertaking.

For the 17 Africans admitted with previous university credits in 1960, Matriculation Total and interviewers' ratings of Academic Performance correlated as follows (ϕ) with promotion versus failure in the Preliminary Year.

Interviewer P	:	0.55
Matriculation Total	:	0.37
Interviewer R	:	0.17
Interviewer S	:	-0.38

Fisher's Exact Probability Test indicates that P's ratings again correlate significantly with the criteria ($p < 0.05$); the other three predictors do not.

For the 16 Indians admitted to the Preliminary Year in 1960, neither interviewers' ratings nor Matriculation Total correlated significantly with promotion versus failure, though the combination of R's and S's rating of Academic Performance with Matriculation Total yields a prediction better than that of Matriculation Total or the ratings alone. (For this combination ϕ is 0.42; for the rating alone 0.24 and for Matriculation Total, 0.22. None of these values is significant.)

Interviewers' Ratings: Conclusions.

(i) The ratings on Academic Performance by one interviewer, P, correlate significantly with various criteria for three different groups

of Africans and in each case predict the criterion rather better than does Matriculation Total. For three separate Indian groups, on the other hand, none of P's ratings correlated significantly with results.

(ii) None of the ratings by the other interviewers, Q, R and S, correlate significantly with any criterion measure. Some predictions, however, by these judges approach significance; Q's ratings of Africans correlate better with standing after five years than does Matriculation Total, and the ratings of R and S, in combination with Matriculation Total, improve upon predictions from Matriculation Total alone.

(iii) The results show considerable differences between interviewers and between the results obtained by the same interviewer in different groups.

(iv) Among Africans, the impressionistic judgments of P and Q have correlated about as highly with candidates' later attainment as have the most successful impressionistic ratings of Europeans (See Sections 2.36 - 2.41). For Indians, the impressionistic judgments recorded in the present study have lower validity than the 'best' assessments of Africans. This may well reflect both the greater variety of personal history and circumstances amongst African candidates for admission, and differences between interviews with Africans and Indians in such matters as rapport and the role of facade.

(v) Validities do not reflect the tendency, noted in Section 7.23, for interviewers to agree with one another to a greater extent on ratings of Indians than on ratings of Africans.

8.15 Group Assessments

From 1952 to 1957 the Screening Committee minuted rankings of candidates in order of preference. The status of these rankings varies: some represent the final decisions of the Committee, others were drawn up in advance by two or three members as a basis for discussion by a larger group. Their details often probably reflect the views of the more dominant members of the groups who drew them up rather than a genuinely pooled opinion. (Compare Section 2.14, page 24). At the same time they provide a comparison with predictions from Matriculation Total Mark that is worth recording.

Rankings from the Screening Committee's minutes and on Matriculation Total were correlated with the dichotomy 'Passed on Schedule' versus 'Referred or Failed' in the two-year pre-medical course by means of Kendall's τ . Results follow in Table 8.S (page 270).

Table 8.S yields twelve comparisons between the validities of rankings on Matriculation Total and by the Screening Committee. In seven cases, the Committee's opinion correlates more highly than does Matriculation Total with promotion on schedule to the Second Year. While the difference is small, it is gratifying to find that it is in the Committee's favour, particularly in the case of the special selection procedure of 1956. It is also interesting that for four of the six African groups the Committee's ranking correlates more highly with results than does Matriculation Total; this is in line with the findings of the previous section for interviewers' ratings. For the Indians, each predictor yields the higher correlation in three comparisons of the six.

Table 8.S
Screening Committee's Ranking:
Matriculation Total and Pre-Medical Result
Kendall's Tau_b

Class	Africans (N = 13 to 18)		Indians (N = 9 to 13)	
	Committee's Ranking	Matriculation Total	Committee's Ranking	Matriculation Total
1952	.25	.08	.31	.63
1953	.11	.39	.72	.68
1954	.26	.20	.11	.33
1955	.29	.08	.47	.44
1956	.21	.18	.42	.27
1957	.19	.24	.23	.30

It will be recalled that in 1960 there were two assessment teams, and that the members of one team (the 'Interviewers') interviewed the candidates while the members of the other team, known as the 'Reviewers', did not. Each team recorded independently an assessment of the candidates. For the 17 Africans neither of these assessments correlated significantly with pass versus failure at the end of the Preliminary Year, though the Reviewers ($\phi = 0.41$) were a little more successful than the Interviewers ($\phi = 0.31$). ϕ for Matriculation Total (Table 8.L) was 0.37. For the Indians, unfortunately, the Interviewers did not record a ranking and their ratings cannot be dichotomised satisfactorily since they rated simply as 'Acceptable' fifteen of the sixteen Indians who were admitted. The Reviewers' assessment, plotting pass-failure against 'Good' or 'Fair' and 'Doubtful' or 'Poor' in a two-by-two table, correlates approximately zero with Preliminary Year result. It must be added, however, that 1960, in view of the general emergency of March-April that year and an extremely tense situation in the pre-medical school during October, was probably an exceptionally unfavourable year for predictions of any kind.

8.16 School Principals' Reports

A repetition in 1961 of the experiment with scaled school principals' ratings described in Section 7.22 yielded rather low correlations (r) with Pre-Medical Criterion Score: for Africans 0.26 (N = 35) and for Indians 0.35 (N = 35). The Indian correlation, however, is higher than that of Matriculation Total for the same group (0.27) and just significant at the 0.05 level; for the Africans, Matriculation Total correlated 0.32 with the criterion. Candidates rank positions in class at school, scaled by the same procedure as that adopted for School Principals' Ratings, yielded even lower correlations with criterion score: 0.20 for both groups.

Comparing these results with those of the earlier experiment (Section 7.22) for Africans only suggests either that scaled principals' ratings predict African Preliminary Year results, but not the results of the Pre-medical course as a whole, or that the principals rating Africans in 1958 and after predicted results less accurately than those who rated

in earlier years. (It will be recalled that in 1958 a number of new signatures began to appear on principals' rating forms).

8.17 Results of Special Selection Procedures

Of the classes for which at least two years' follow-up data are available, seven have been selected on the relatively conventional basis of matriculation marks, application papers and school principals' reports, and two, those of 1956 and 1959, by special procedures entailing interviews and tests. (The class of 1960, for which special selection data were also available, has as yet completed only the Preliminary Year). Results of ordinary and special selection procedures are compared in Table 8.T.

Table 8.T

Results of Ordinary and Special Selection Procedures 1951-1959

(a) Students admitted to the Preliminary Year only.

	Ordinary Procedures		Special Procedures		Chi-squared Ordinary v. Special
	P2	F/R	P2	F/R	
Africans (143)	37 (35%)	68	16 (42%)	22	-
Indians (125)	36 (40%)	55	21 (62%)	13	<u>4.07</u>
Coloureds (18)	9 (60%)	6	2 (67%)	1	-
All Races (286)	82 (39%)	129	39 (52%)	36	3.39

(b) All Students admitted to Pre-Medical Courses

	Ordinary Procedures		Special Procedures		Chi-Squared Ordinary v. Special
	P	F/R	P	F/R	
All Races (312)	96 (41%)	136	44 (55%)	36	<u>3.93</u>

'P2' denotes : 'Completed pre-medical course in two years' and indicates successful candidates admitted to the Preliminary Year.

'P' denotes : 'Passed on Schedule': i.e. in two years if admitted to the Preliminary Year or in one year if admitted to the First Year.

F/R denotes : 'Failed or Retarded'. Underlining marks a value of chi-squared significant at the 0.05 level.

Table 8.T. shows that there was a higher percentage of passes in the two classes selected by special procedures than in the seven other classes of 1951-9; this is true of Africans, Indians and Coloureds separately as well as of all races counted together. Among Africans, however, there are only 7% more passes in the specially selected Preliminary Year classes than in the others: for Indians, the difference is 22%. Counting only students first admitted to the Preliminary Year, the difference between 'ordinary' and 'special' selection procedures is significant for the Indians only, but if we count all students admitted to Pre-Medical courses, i.e. recruits to the First Year as well as to Year 0, a difference significant at the 0.05 level is obtained for the records of all races.

There is thus little evidence of improvement in African results as a result of special selection techniques, but at the same time the policy of awarding as many Union Government bursary-loans as possible and of admitting virtually all qualified Africans for whom private or Federation financial support could be found, has meant the admission of many Africans who were obviously poor risks.

A second consideration in the case of the Africans is that experiment has identified certain combinations of tests, and at least one interviewer, that have regularly improved upon predictions from Matriculation Total alone.

Amongst Indians, the steady rise from year to year in the number of qualified candidates for admission (Section 6.9, Table 6.J) is likely to have affected results more than would any refinements in selection, and the validity of matriculation marks is greater than that of any of the 'special' predictions considered so far.

The principal value of the special procedures is reflected in the significantly higher proportion of promotions, for all races counted together, in the classes of 1956 and 1959 as against those selected by conventional methods. In the very difficult task of arbitrating between the claims of Indian, African and Coloured candidates, the choice for the Faculty appears to lie between a strict interpretation of matriculation marks (on which only two or three African candidates would have gained admission in 1961) and a comprehensive study whose point of departure may be a ranking on Matriculation Total, but which seeks to identify the best candidates over a wider range of criteria.

8.18 Summary of Chapter VIII

(1) Age. Amongst the Africans, the youngest and oldest students tend to fail more often than the others. In a restricted group with Matriculation Total held constant, age and Pre-Medical Criterion Score correlated -0.02; this suggests that in such a group age and attainment are unrelated. In a very mixed group, on the other hand, age yielded a significant negative relationship with a pass-fail criterion to which Matriculation Total was not significantly related.

Amongst Indians (1951-9) with Matriculation Total partialled out, Age and Pre-Medical Criterion Score correlate approximately zero; in the most recent groups, however, (1957-1959), a partial r of +0.17 indicates a positive relationship. This is interpreted as an effect of selection. (Sections 8.3 and 8.5).

Students aged nineteen on enrolment, both Africans and Indians, are a particularly unsuccessful group.

(2) Men and Women. At the pre-medical level the men fail less often than the women, though the difference approaches significance only for the Indian group. Comparisons of matched pairs indicate that this cannot be attributed to differences between the sexes on Matriculation Total.

Women who reach the pre-clinical course very seldom fail to complete it, though they may be retarded on the way. (Sections 8.4 and 8.6).

(3) Over- and under-achievers. Over- or under-achievement at school tends to be repeated at the university, and selection tests can identify a substantial number of potential under-achievers.

(4) Matriculation Total Mark. For African groups this correlates from 0.09 to 0.53 with pre-medical criterion score: for Indian groups from 0.27 to 0.77. The higher correlations are for more heterogeneous groups. (Section 8.7). For both Africans and Indians Matriculation Total appears on the whole a better predictor than any other matriculation mark (Sections 8.9 and 8.10); its validity as a predictor of overall pre-medical result for unselected groups of qualified applicants is estimated at about 0.6 (Section 8.7). For mixed groups correlations tend to approximate to the higher of the two correlations for Africans and Indians separately (Section 8.8). This suggests that the best starting-point for discussions by the Screening Committee is a ranking of candidates on Matriculation Total.

In the three most recent classes for which Pre-Medical Criterion Scores are available, those of 1957-1959, only one out of 15 African matriculants with Matriculation Total Standard Score of 11 or under (i.e., under 55% raw score) has completed the two-year pre-medical course on schedule.

(5) Other Matriculation Marks. Latin and Biology are promising predictors for both groups: these are available for most Indians but unfortunately for only a handful of Africans. Total plus Latin or Total plus Biology in Standard Score Form yield high correlations for certain Indian groups; for Africans Total plus English plus Mathematics has yielded a slightly higher correlation with pre-medical criterion score than did Total alone. (Sections 8.9 and 8.10).

(6) Tests. The Index of Accuracy and tests A2, Verbal Reasoning and Scientific Information correlate fairly consistently with African results in three or four independent groups. For Africans, two combinations of test and matriculation Standard Scores correlate more highly with Pre-Medical Criterion Scores in four trials each than does Matriculation Total alone. (Section 8.11).

For Indians, standardised tests do not as a rule correlate significantly with criterion scores, but further trials are desirable.

(7) Interviewers' Ratings. Considerable differences appear between interviewers and between the results obtained by the same interviewer for different groups. One interviewer's ratings correlate consistently and significantly with African results, but not with Indian. The validity of this interviewer's assessments of Africans was greater than that of Matriculation Total (8.13).

(8) Group Assessments. A group, however, who had not interviewed African candidates predicted their results a little more accurately than a group of interviewers. (Section 8.14).

(9) Impressionistic Judgments. For Africans, the validities of the best impressionistic judgments by members of the Faculty are surprisingly high: this is perhaps because of the wide range of personal histories and circumstances in African applicant groups.

(10) School Principals' Ratings. For Africans, despite a promising pilot experiment (Section 7.22), these have not correlated significantly with pre-medical criterion score. For Indians, a just significant correlation was obtained (Section 8.16)

(11) Special Selection Procedures. There has been a higher proportion of passes in classes entering by special selection procedures which included interviews and standardised tests than there has been in classes selected by conventional criteria. (Section 8.17). But this finding is based on limited follow-up data; it would be inadvisable to pass judgement on 'special' selection methods until full pre-medical criterion data have accumulated for at least two more classes selected by these means.

CHAPTER IX

THE PRE-MEDICAL COURSE: A CRITICAL REVIEW

Perhaps the main interest of this research lies in the evidence which it brings together for a critical review of the ten-year experiment by the University of Natal in the preliminary training of non-Europeans for medical studies.

Such a review, however, cannot be based entirely upon statistical findings, and is accordingly separated from the main conclusions which are summarised in Chapter X.

The Faculty's selection procedure, and its two-year course of pre-medical training, represent a bridge, as it were, from the secondary school to the anatomy laboratory. While there are many criteria for such a bridge, the simplest will be the number who succeed in crossing it. It has been shown in Section 5.12 that the general rate of failure in the pre-medical course compares quite favourably with that of non-Europeans in science courses at Fort Hare, and of Europeans in the Faculties of Science and Agriculture of the University of Natal. Such a comparison, however, obscures the contrast within the Faculty between African and Indian records, particularly in recent years. It may be convenient at this point to reproduce the data of Table 5.Q (Section 5.14) in the following form:

Overall Pre-Medical Result, 1951-1959
(South African Matriculants Only)

	<u>Africans</u> (106)	<u>Indians</u> (98)
Passed in two years:	28	45
Passed in three or four years:	25	18
Retarded, still trying:	7	4
Excluded or withdrawn:	46	31

A rather stronger African-Indian contrast would appear if the data were limited to the three most recent classes who have had time to finish the course.

As over 40% of the African matriculants entering the Preliminary Year fail to reach the Second Year at all, and a further 30% are retarded by a year or more, it is clear that the pre-medical course is highly selective. This, however, does not prevent a high rate of failure in the pre-clinical years. (Of 57 African "U.N. pre-medicals" proceeding to the pre-clinical examinations from 1953 to 1959, 24 passed the two-year pre-clinical course on schedule and 23 failed or were retarded. Thus half this already highly selected group were either retarded or excluded during the pre-clinical phase of study.)

The Faculty has the choice of using the pre-medical course either as a selection procedure for pre-clinical classes or as a training period to meet the special needs of the non-European, and particularly the African, matriculant.

If the course, however, is to be treated as a selection procedure, it should be open to all qualified candidates, as are the pre-medical courses of the Universities of Stellenbosch and Pretoria. It does select after a fashion, since a substantial proportion of the African matriculants entering the Faculty are excluded on the results of pre-medical examinations, but even as a selection procedure the course is somewhat ineffective, because about half of the Africans who complete it are retarded or excluded during their pre-clinical years.

From Table 5.G it may be recalled that the students of all races who took three years or four to complete the Faculty's pre-medical course, are the least successful of all groups in pre-clinical studies. Of 27 such students admitted to the Anatomy-Physiology class, only seven passed the pre-clinical course on schedule, and ten others (Table 5.F) have already been excluded from the Faculty.

As a training period, the course was initially conceived, as has been shown in Section 4.5, as a means of compensating the non-European matriculant for the deficiencies of his schooling, i.e. as the kind of course which would equip the poorly trained but potentially able candidate for medical studies proper. Reference to the expectancy tables for Matriculation Total Marks (Table 8.D), however, will show that it is only the relatively well-qualified candidate who is likely to pass the pre-medical course on schedule. From Table 8.E it may be recalled that in the classes of 1957-1959, out of 15 African matriculant entrants with a Matriculation Total Standard Score of 11 or under, only one completed the pre-medical course in the regulation two years.

(In passing, it may be noted that the idea of a 'poorly trained but potentially able' candidate may involve a self-contradiction. Possibly the effect of environmental and other forces is such that by the time the schools have finished with the African matriculant there is little that a course of remedial education could do to equip him for university studies.)

The proportion of African freshmen completing pre-medical studies on schedule was never very high, and, as demonstrated in Table 6.M (1) in Section 6.10, has fallen sharply since 1956. The reasons for this fall are probably complex, but one conspicuous fact is that in recent years the African freshmen in pre-medical classes have been in competition with a much abler Indian group (measured by Indian pre-medical results as well as by matriculation marks) than was the case before 1955. It is these highly qualified students who are likely to set the standard against which their weaker colleagues are measured and found wanting.

The first basic weakness of the present pre-medical course is probably that it attempts to put a very varied group of students through a uniform curriculum. In the Preliminary Year class of 1960, for instance, there were about a dozen students whose matriculation records were well up to the standards for admission to the Faculties of Medicine of the Universities of Cape Town and the Witwatersrand, and a large number of others who were clearly in need of remedial training of the most basic kind. To attempt to move these groups through the same curriculum was to court disaster for both, as is clear from the 1960 examination results (Section 5.17).

Any re-appraisal of the pre-medical course must take into account the very great range of ability in the student body. A number of candidates, including some Africans, are capable, judging by matriculation records, of mastering the basic pre-medical curriculum of the South African Medical and Dental Council in one year. A large number of

others, in the opinion of their teachers, need further training in reading, writing, computation and the elements of science before going any further. If the Faculty is to meet its responsibilities to both groups, it should admit them to different levels of pre-medical training. A scheme for this is briefly sketched later in this Chapter.

A questionable feature of the present curriculum is the presence of the three Arts subjects, English, History and Sociology, in their present form. For this, of course, there is the precedent of the requirements of many American Medical colleges, and the many arguments for 'some grounding in the humanities' (Section 4.5) as a part of pre-medical education. It is difficult to assess the contribution of the Arts courses to the students' pre-medical experience, but when failures in the basic science examinations are as heavy as they are, there are also strong arguments for a greater concentration on the teaching of science.

These arguments, of course, do not rest on the failure of the marks of any of the Arts subjects to correlate significantly with attainment in the pre-clinical course (Table 5.L in Section 5.11). A correlation coefficient is not a measure of the educational value of a subject. It does, however, seem improbable that courses in English Literature, History and Sociology can contribute much to an understanding of science, which our students have difficulty in mastering, and it is in a sense unfair that Arts examinations, which European students are not required to pass, should operate as they sometimes do to exclude an African or an Indian from training in medicine. These evils may be counterbalanced by the contribution of the Arts subjects to the general culture of the students, but this contribution is likely to be reduced by their being seen as one more mode of discrimination against the non-European and their lack of prestige in comparison with the medical training that comes later.

This is not, however, an argument for abandoning the humanities altogether. This would come perilously near to assuming that technical skill is quite distinct from cultural experience, and, for non-European medical students, more valuable. It has, however, been suggested (Section 4.7) that normal first courses in English Literature, History and Sociology are inappropriate, in that they are not addressed to the most important deficiencies in the students' experience and skill.

These deficiencies, it is felt, call for remedial training in English and Mathematics which could be broadened into an introduction to Western values as reflected in selected English novels and plays, and, if the scientists so desired, into some consideration of elementary logic and the methods of science. An English course in this scheme would provide intensive exercises in speech, writing and comprehension, but material for these would be drawn not only from scientific prose and the students' daily experience, but also from the novels and plays that would form part of the syllabus. The mathematics course, similarly, would include numerous exercises in the type of computation involved in physics, biochemistry and elementary statistical analysis of biological data; but might extend also into a discussion of the historical evolution of certain mathematical principles (Branford, 1921) and of the role of mathematics and statistics in experiment and scientific proof.

The following outline is only illustrative, but indicates the sort of form that such a curriculum might take:

PRELIMINARY YEAR

Entrance Qualification: Matriculation, with a pass in mathematics.

Curriculum: English, Mathematics, Elementary Biological and Physical Science. (See also Section 10.3).

FIRST YEAR

Entrance Qualification: Either: Matriculation with aggregate of 60% or more, with passes in mathematics and English (Higher Grade) or Afrikaans (Higher Grade),

Or: Passes in the Preliminary Year examinations.

Curriculum: Science courses in terms of the minimum pre-medical curriculum of the South African Medical and Dental Council.

It will be seen that English or Afrikaans (Higher Grade) would not under this scheme be stipulated as a qualification for admission to the Preliminary Year, which would thus be open to Africans matriculating under the new regulations. (Section 3.14).

A defect of the design is, of course, the arbitrary line of division between candidates qualified for admission to the Preliminary Year, and candidates qualified for admission to the First Year. This would undoubtedly meet with criticism from candidates relegated to a two-year course, particularly in the present atmosphere of non-European higher education in the Republic. It is felt, however, to be preferable to the present equally arbitrary practice of moving all candidates through the same pre-medical course, irrespective of the level of their attainment. The present system is already discriminatory in that it requires non-Europeans to do two years of pre-medical work and Europeans only one; the scheme tentatively proposed has the advantage of using attainment rather than colour as a means of deciding who shall be required to do two years' work and who shall be allowed to do one.

The social sciences do not figure in this design because their place, in terms of the memorandum by the Professor of Sociology quoted in Section 4.8, does appear to be at a later stage of the curriculum. Psychology is already provided in the Second and Third Years, and in terms of a recent arrangement is to be examined in the same papers as Anatomy and Physiology. It is in this kind of intimate relationship to the students' medical experience that the social sciences are most likely to be effectively taught, and the logical position for Sociology would appear to be in a similar relationship to Social, Preventive and Family Medicine and Public Health.

There are, of course, an unlimited number of possible designs for pre-medical studies, but there seem at present to be four major factors to be taken into account:

(1) The first of these is the schools. It is possible that the Department of Bantu Education will be able to provide larger numbers of reasonably well qualified African matriculants as the years go by. The number of Africans attempting the Junior Certificate has risen from 6,763 (48% passes) in 1953 to 10,562 (52% passes) in 1960 (Hansard, 7th

February, 1961), and if this increase is repeated at the Senior Certificate level it will produce a far larger body of qualified African applicants than ever before. This is perhaps an argument for maintaining the present pre-medical curriculum without substantial change.

(2) The second consideration is the size of the pre-medical class. This might conceivably be increased so as to make it possible to admit all qualified candidates, as do the Faculties of Medicine of the Universities of Pretoria and Stellenbosch, selecting, if necessary, at the point of admission to pre-clinical studies. This assumes that enlargements could be financed, which in view of State expenditure on the non-European colleges is perhaps unlikely.

(3) The third is the output of the new or reconstituted non-European colleges. A large supply of B.Sc. graduates from these would alter the Faculty's recruitment problems considerably, but preliminary reports of enrolments in their Faculties of Science suggest that relatively few African science graduates are to be expected for the next three or four years. On the other hand, if the Faculty's own pre-medical curriculum were re-designed, it would be possible to reduce the qualification for admission to the Anatomy-Physiology class to the minimum requirements of the South African Medical and Dental Council, which would enable a candidate to qualify for admission to Anatomy-Physiology after one year of study at a non-European college.

(4) Finally, the Faculty's own pre-medical curriculum and admission requirements may be re-designed, and the Board has in fact recently established a committee to draft proposals for this.

The schools, African, Indian and Coloured, the Faculty's own pre-medical establishment, and the non-European colleges, provide a very wide range of institutions training potential medical students. It is important to bear in mind that even the university levels of pre-medical training are no longer the exclusive province of the Faculty. Amidst the present diversity of institutions and opportunities, the best policy for selection and preliminary training is likely to be the most flexible that is consistent with professional standards. Such a policy, in line with British university practice, would provide different points of entry and levels of preliminary training for candidates holding different types of entrance qualification.

CHAPTER X

SUMMARY OF FINDINGS

10.1 Background

The conclusions summarised in this chapter are limited to those presented in Part II of this thesis, but it must be stressed that they should be seen and interpreted against the background of Part I, particularly that of Chapters III and IV. These Chapters sketched:

(i) The generally inferior provision for non-European education in the Republic and in the Union before it, as compared with the provision for European education (Sections 3.2—3.6).

(ii) The conspicuously better financial provision for Indian pupils than African.(Section 3.2).

(iii) The far-reaching changes, both in policy and enrolments, that have taken place in the non-European school systems of South Africa over the past ten years.(Section 3.11).

(iv) The extension of the 'mother-tongue principle', which is bringing African vernaculars into use as the media of instruction in African secondary schools.(Section 3.14).

(v) Other differences between the curricula followed in African and in Indian schools.(Section 3.13).

(vi) The Extension of University Education Act of 1959, the establishment of the new non-European university colleges and the Government's earlier attempts to separate the Faculty of Medicine from the University of Natal.(Section 3.15).

(vii) The unrest in African schools and university institutions—often resulting in mass suspensions or withdrawals of students—during the period under review.(Sections 3.16 and 4.1).

(viii) The repeated changes in the Faculty's own pre-medical curriculum.(Sections 4.5—4.8).

(ix) The gradual development of the admissions programme and of the present research.(Section 4.11).

Since earlier chapters are heavily loaded with statistical detail, conclusions will here be presented in broad outline only.

10.2 Applicants for Admission to the Faculty

Counting only African candidates in schools under the inspection of the Bantu Education Department, and Indian candidates in the Natal Senior Certificate Examination, the numbers who obtained the minimum qualifications for admission to the Faculty in the examinations of 1958, 1959 and 1960 were:

1958: 52 Africans, 102 Indians.
1959: 27 Africans, 95 Indians.
1960: 26 Africans, 130 Indians.

(Sections 6.5 and 6.6; Tables 6.B and 6.G)

These figures do not reflect all the candidates in South Africa who obtained the minimum entrance qualifications in these years, but they probably do reflect most of the African candidates. The present system of African secondary education is clearly inadequate, both to the limited needs of the Faculty and the general needs of an African population of nine million.

While the numbers of Indians obtaining the minimum entrance qualification are increasing from year to year, the corresponding numbers of Africans are growing smaller (Section 6.4, Table 6.A; Section 6.5, Table 6.B; Section 6.6, Table 6.G). While a full explanation of this lies beyond the scope of the present study, it may be noted that:

(i) At present African candidates in the 'independent' schools appear to have a significantly better chance of matriculating than have candidates in State and State-aided schools (Section 6.5.f).

(ii) During the period 1951—1961, four Mission schools supplied fifty-three of the 122 qualified African 'Direct' matriculant candidates for admission to the Faculty (Section 6.15).

(iii) The numbers of Africans qualifying for admission to the Faculty are limited by:-

(a) The relatively small number of candidates who offer mathematics. This suggests that there is a shortage of mathematics teachers in African secondary schools.

(b) The high rate of failure in English Higher in the Joint Matriculation Board Examination (Section 6.5.b). Failure in English Higher prevented a quarter of the top 55 African candidates for admission to the Faculty in 1959—1961 from qualifying for admission (Section 6.13). There is substantial evidence, however, of the ability of African candidates to pass English Higher in examinations other than that of the Joint Board (Section 6.5.e).

The numbers of Indians qualifying are not limited in the same way as are the numbers of Africans by failures in English or the shortage of pupils offering mathematics (Section 6.6.b).

The years 1957 and 1958, during which the Government was proposing to remove the Faculty from its association with the University of Natal, show a significant fall in the numbers of African applicants for admission to pre-medical courses, as compared with the periods 1955-1956 and 1959-1960 (Section 6.9).

10.3 Examinations

(a) In the matriculation examinations, highly significant differences appear between the results of different examining bodies in the same year, and those of the same examining body in different years (Sections 6.5 and 6.6). There is need for inquiry into the standard and reliability of public examinations in South Africa, although rough estimates of the reliability of

Matriculation Total for groups of candidates for admission to the Faculty yield fairly satisfactory figures (Section 7.14).

(b) The rather low intercorrelations of marks in Preliminary Year subjects (Section 5.17) are a matter for some concern, particularly in view of the provisions for the exclusion of students who fail sub-minima.

(c) At the pre-clinical level, results in Physiology (but not in Anatomy) show significant differences between one period and another (Section 5.5).

Note. A composite examination in Anatomy, Physiology and Psychology was introduced for the Second Year class in 1961, and the extension of the principle of pooled assessment in the examination of pre-medical subjects appears strongly desirable.

10.4 Admissions Policy

While since 1958 there have been in each year at least three qualified Indian candidates for every place in the pre-medical school awarded to an Indian, up to and including 1960 the selection ratio for qualified African candidates has been of the order of 1:1.5 (Section 6.9).

The African selection ratio has varied, however, and the more stringently selected classes show a significantly higher proportion of promotions on schedule to the Second Year than do the others (Section 6.10).

For the pre-medical students of 1951-1959, the results of classes selected by special procedures showed a significantly higher proportion of promotions on schedule to the Second Year than do those of classes selected by conventional methods (Section 8.17).

Expectancy Tables presented in Section 8.7 (Table 8.D) indicate that about 60% of African 'Direct' and 'Lapsed' matriculants admitted to the Faculty have had a less than 50% chance of completing pre-medical studies on schedule.

10.5 Student Attainment

The Pre-Medical Phase. Of candidates first examined in the Preliminary Year, about two in five complete the two-year pre-medical course on schedule, and one in three fails to complete pre-medical studies at all (Section 5.8). Less than one-third of those who reach the pre-clinical courses have no previous failures (Section 5.6). Statistics of promotions in the Faculty's pre-medical course compare favourably with those of promotions from introductory science courses in other Faculties (Section 5.12).

The Pre-Clinical Phase. This (the Second and Third Years of study) is completed on schedule by forty to fifty per cent of students entering the pre-clinical class. About twenty per cent are eliminated by pre-clinical examinations, and the remainder retarded by a year or more (Section 5.5).

The size of correlations of the pre-clinical criterion with measures of pre-medical attainment, and the rate of failure in pre-clinical groups, indicates that students proceeding to pre-clinical studies from the Faculty's pre-medical course are a group of very varied ability (Section 5.11).

The Clinical Phase. Virtually all students reaching the clinical phase of study (Fourth to Sixth Years) eventually graduate (Section 5.4).

Variations from Year to Year. The proportions of Africans completing the two-year pre-medical course on schedule vary significantly for the three periods 1951-1953 (low), 1954-1956 (high) and 1957-1959 (low). For the Indians, an important but not technically significant difference appears between the periods 1951-1954 (37% promoted on schedule) and 1955-1959 (55% promoted on schedule).

10.6 Prediction of Pre-Clinical from Pre-Medical Results

Significant differences appear between the pre-clinical records of students entering the pre-clinical course with no previous failures, and of those whose pre-medical records include supplementary examinations or outright failures (Section 5.6).

A number of different measures of pre-medical attainment are significantly related to pre-clinical result. Composite predictors are generally more accurate than the marks of individual pre-medical subjects; among different composites there is perhaps not much to choose. However, the N2-N2S-N3 classification is selected as an overall criterion of pre-medical attainment, because when compared with seven other predictors in two independent groups of 50 and 51 it yields the highest value of τ when correlated with overall pre-clinical result (Section 5.11).

The biological sciences of the pre-medical course appear to predict overall pre-clinical result better than the physical sciences, but there are variations between the two groups studied. Botany I, for these two groups, predicted more consistently than Zoology I. None of the three Arts examinations was significantly related to the pre-clinical criterion in either group (Section 5.11).

A staff committee's assessments of pre-medical students at the end of one year's pre-medical training correlated highly with the overall result of the two-year pre-medical course: assessments after two years correlated almost equally highly with the overall pre-clinical result. Correlations compare favourably with those yielded by the best 'statistical' predictors: staff assessments are evidently potentially useful criteria of academic attainment in the Faculty (Section 5.11).

10.7 African-Indian Differences

Among qualified applicants for admission to the Faculty, the Africans tend to be older, and to have lower matriculation marks than the Indians (Section 6.12 and Appendix H). The Africans are significantly more varied in age, and the Indians significantly more varied in attainment as measured by Matriculation Total Mark (Section 6.12).

On all the objectively-marked tests for which scores were collected, the Indian mean is higher than the African, and this difference was usually found to be significant. The variance of African scores was larger for six of the eight tests of the final battery, and significantly larger for two (Section 7.12).

The proportion of Indian passes is higher at all levels of the M.B., Ch.B. course and in all pre-medical subjects except Sociology. Significant African-Indian differences, however, seldom appear on

overall pass-fail dichotomies at the clinical and pre-clinical levels, though differences have of recent years been more acute. At the pre-medical level a significant difference between Africans and Indians in general emerges only for the classes of 1950 and 1959.

African-Indian differences at the pre-medical level, however, are masked to some extent by differences within the African group. If our criterion is the completion of pre-medical studies on schedule, African candidates from the Federation are significantly more successful than African candidates from the Republic.

If we leave out of account the Federation group, and students holding previous university credits, we are left with South African matriculants. Confining the African-Indian comparison to these, reveals a significant difference in the Indians' favour for the total number of cases under study.

These differences necessitate separate African and Indian validation studies.

10.8 Prediction of Pre-Medical Results

Age. The formal correlation of age with pre-medical criterion score is considerably influenced by selection. For both Indians and Africans, there is a particularly high rate of failure among students aged nineteen on enrolment (Sections 8.3 and 8.5).

Men and Women. At the pre-medical level the men fail less often than the women, though the difference approaches significance only for the Indian group. Women who reach the pre-clinical course, however, very seldom fail to complete it (Sections 8.4 and 8.6).

Over- and Under-Achievers. Comparison of test with matriculation records during selection procedure will identify substantial proportions of these (Section 8.13).

Matriculation Marks. For African groups Matriculation Total correlates from 0.09 to 0.53 with Pre-Medical Criterion Score; for Indians from 0.27 to 0.77. For the hypothetical case of prediction for an unselected group of qualified candidates, its validity is estimated at 0.6 for both groups (Section 8.7). For mixed groups, correlations tend to approximate to the higher of the two correlations for Africans and for Indians separately. Latin and Biology marks are promising predictors for both groups, and for some classes certain combinations of Standard Scores yielded higher correlations than did Matriculation Total alone.

Tests. The Index of Accuracy and Tests A2, Verbal Reasoning and Scientific Information correlate fairly consistently with African results in three or four independent groups. Two combinations of African test and matriculation Standard Scores correlate more highly with Pre-Medical Criterion Scores in four trials each than does Matriculation Total alone (Section 8.11). For Indians, standardised tests do not as a rule correlate significantly with criterion scores.

Impressionistic Judgments. For Africans the validities of the best impressionistic judgments by members of the Faculty are surprisingly high: this is perhaps because of the wide range of personal history and circumstances among African applicants. But considerable differences appear between interviewers and the results of the same interviewer for different groups (Sections 8.13 and 8.14). For Indians, interviewers' ratings fail to correlate significantly with pre-medical criteria.

The Selection Process as a Whole. While limited improvements can be achieved by adjustments of selection technique, it must be stressed that the most crucial phase of 'selection' in the fullest sense — the period from birth to matriculation — lies beyond the influence of the Faculty. Here, particularly in the special circumstances of Africans and Indians in the Republic, is a most important field for further study.

Biographical Studies

All names in these brief accounts of individuals are fictitious. The purpose of this Appendix is to present, not clinical analysis, which would require many pages for each case, but brief sketches of some of the individuals figuring in the statistical tables in the text. A brief comment follows each, and the group as a whole illustrates the range of individual circumstances and problems among the students of the Faculty.

(1) Zungu

African, Enrolled 1952.

Entrance Age: 21.

Matriculation Total Standard Score: 13.

ZUNGU, a tall and powerfully built African who seldom smiled, entered the Preliminary Year in 1952. His family's conversion to Christianity dated back to the 1880's. His father was a school principal; Zungu was the fourth child of eight and his elder brothers and sisters were already teachers or themselves at a university at the time of his enrolment.

His father reported that as a child he had been helpful in cases of illness and interested in herbs.

He had been first in his class in a superior school, and class monitor, though he took little part in sport. He matriculated at the first attempt and in the first class with a distinction in Zoology, though with Standard Scores of 8 in English and 7 in Mathematics, which suggest weakness in these fields. His referees, including school principals and a school inspector, described him as gifted and conscientious.

In the Preliminary Year examinations of 1952 he failed English, Sociology, Chemistry and Physics—i.e. every subject except Botany and Zoology. His Union Government Bursary-Loan was cancelled and he withdrew from the course to read for the B.Sc. at Fort Hare, though the Board was willing to offer him re-admission to the Preliminary Year in 1953.

An administrative officer of the Faculty, summarising lecturers' reports, informed the Department of Education that Zungu "was good at purely repetitive work, but did not show originality and independence of thought..... It is possible that the poor result was due to a failure to adjust himself to university conditions of life and work, and that he will improve with experience of these conditions..... He may succeed in completing the B.Sc. degree although it is not likely he will do so in the minimum time."

Zungu entered Fort Hare in 1953 and graduated in the minimum three years without failing a single examination, majoring in Chemistry and Zoology.

In 1956 he applied for re-admission to the Faculty and was interviewed and tested as were all candidates for admission in that year. In Test A2 his Standard Score was 8; his Progressive Matrices score was also in the lower half of the distribution. His interview threw no real light on the reasons for his failure in 1952, though it was sensed that he had had difficulty in relations with one of his teachers that year, who happened to be his interviewer in 1956.

He was offered admission as a B.Sc. graduate to the Second Year of study in 1956, but declined it to accept a scholarship in the Faculty of

Medicine of the University of the Witwatersrand, where he graduated on schedule in November 1960.

Comment: Zungu matriculated in an exceptionally highly organised boarding school, in which the pupils appear to be under some kind of supervision nearly every minute of the day. Probably the transition from this environment to the Faculty hostel upset him considerably. His test scores, for what they are worth, indicate ability rather below the average of the African students of the Faculty, and his matriculation English and Mathematics marks suggest that his basic training in language and computation may have been deficient. He is clearly a man who can pass examinations, and tutorial guidance of the right kind might have saved him the humiliation of failure in 1952 and the two years' delay of his graduation to which that failure led.

A somewhat similar case is that of an Indian Preliminary Year student of 1955, who was excluded after failing English and History. In 1956 he passed the four Pre-medical courses at Fort Hare, and in 1957 passed English, History and Sociology in the Faculty of Arts of the University of Natal. He was thus qualified for admission to the Second Year of medical studies, and in 1958 re-entered the Faculty of Medicine and passed Anatomy and Physiology at the end of the year. He has not failed a single course since.

The recoveries of both these students may well have been stimulated by a fresh start in a new environment. They illustrate, however, the difference between ad hoc administrative decisions, which may or may not be correct in the light of the available evidence, and final judgments about a student's real quality.

(2) Xaba

African, Enrolled 1952.

Entrance Age: 21

Matriculation Total Standard Score: 13.

XABA, whose mother was a widow at the time of his enrolment, was the second of a family of six. His elder brother, a hospital attendant earning £174 per annum, was married with two children of his own, but undertook to support Xaba's mother and her younger children during Xaba's years at the University.

At a Church of Scotland Mission school Xaba was first in his class, took a leading part in debating and the Students' Christian Association, and became head prefect. His principal reported: "He carries responsibility well..... This boy has won the confidence of both staff and students to an unusual degree." In 1951 Xaba matriculated in the first class at the first attempt, with high marks in English, Zulu and Afrikaans and passes in Mathematics and Additional Mathematics.

In 1952 he entered the Preliminary Year with a Union Government Bursary-Loan. One of his first English compositions, on a subject of his own choice, described the death of a child run over by a motor lorry. He appeared at this time under stress, but did not reveal the cause.

At the end of the first quarter he disappeared for some weeks and returned in time to fail all the mid-year tests except English. In August he withdrew from the course with a debt to the University of £75. His brother had decided that he could no longer maintain their mother and the younger children, for whom Xaba had now to take responsibility.

He spent some time looking for work. A European friend eventually

found him a post as a clerk in the local Health Commission and in February 1953 he began paying off his debt to the University at £4 per month. At the end of 1953, after he had paid £45 which covered cash advances and his hostel fees, the University agreed to remit the sum of £30 owing for tuition. His further history is not known.

Comment: Very few Africans hold Xaba's qualifications. If he is still a clerk in the local Health Commission, the State is making a very poor use of his talents. It is just possible that consultation with his family before his enrolment might have revealed some means of enabling him to proceed with his studies, perhaps with the help of some such body as the Institute of Race Relations, but the Faculty has never been staffed for an investigation of this kind.

Xaba entered in the same year as Zungu, at the same age and with the same Matriculation Total Standard Score. Zungu's advantage clearly lay in a family that could help him.

(3) Krishna

Indian, Enrolled 1951.
Matriculation Total Standard Score: 5.
Test G.L.2C./46 Standard Score: 10.

Entrance Age: 20.

Krishna's father, a Hindu, had two wives who lived in separate houses on his farm and a number of children by each. Krishna, the eldest, was at first the only one to be sent to a university, and his younger brothers, on leaving school, went into employment.

Krishna was sent first to a country secondary school where he became Head Prefect and passed the Junior Certificate examination in the first class, and then to a city school at which he matriculated with rather low marks. Alert and attractive, he was a soccer player and took leading parts in debates and plays. While at this school he fell in love with a girl of his own age; they exchanged letters which fell into the hands of their families, and their parents proceeded to plan their marriage.

In 1951 Krishna began Pre-medical studies. His family circumstances were not known to any member of the Faculty until about three years later. He took an active part in student affairs and quickly became a leader in the struggle for the establishment of a separate Students' Representative Council for the Faculty of Medicine, and against segregation in the University. Meanwhile he was losing interest in the girl whom his family regarded as his betrothed. At the end of the year he failed every subject except English and Physics.

He was re-admitted in 1952. Early that year his fees, which were being paid by his father, fell into arrear, and from then onwards he was in constant financial difficulties. He took four years from the date of his first enrolment to qualify for admission to the Anatomy/Physiology class, and during this period was forced to go through a Hindu form of marriage with the girl already mentioned, though they never lived together and he did not regard her as his wife. At this point he broke more or less completely with his father (who later sent another son to Fort Hare) and had to finance himself as best he could by borrowing. He also lost his following as a student leader, partly, perhaps, because of his withdrawal into his personal affairs, partly because some of the measures for which he stood no longer commanded support. He was able, however, to discuss his difficulties at great length and over a period of years with a sympathetic member of staff, though he is not known to have

consulted, or to have received help from any officially appointed adviser.

In the Anatomy/Physiology class he met and fell in love with Radha, a Hindu girl who had herself a fairly extensive record of previous failures. At the end of 1955 they both failed the Second Year, he in both subjects and she in Physiology only. After that, though his financial and family difficulties continued, they passed all examinations on schedule and both graduated in November 1960, Krishna with the Faculty prize in Paediatrics. They are now married and have a child. What has become of the other girl is not known.

Comment: If Krishna's standard score of 10 for Test G.L., which he took as a volunteer in 1956, can be relied on as an index of his intelligence, his record up to the time of the beginning of his relationship with Radha presents a classical pattern of under-achievement. Under the present regulations he would have been excluded at the end of 1952, and it is unlikely, incidentally, that Radha would have gained admission to the Faculty on her record of previous failures had she been an applicant in a recent year.

There is little doubt that it was primarily Radha who was responsible for Krishna's transformation, but he was also fortunate in being able to talk out his problems with his friend on the staff and with others, and in the forbearance of the financial officers of the University. In many situations he showed ability and determination, but he was also lucky, as others were not, in finding help when he needed it.

(4) Bhisma

Indian, Enrolled 1953.

Entrance Age: 21

Matriculation Total Standard Score: 5.

Verbal Reasoning Standard Score: 8.

The difficulties of BHISMA parallel those of Krishna to some extent. His father was also a farmer, and wished, when Bhisma left school, to marry him to his cousin who had grown up in the same house with him. Bhisma refused to comply. His own account of the matter is that his father then told him to leave home and never to return, adding that he would call the police if Bhisma so much as dared to visit his own mother.

Bhisma went to live with his grandmother, by his own account a formidable matriarch, and continued at times to visit his mother by stealth. In 1951 he worked as an uncertificated teacher, and in 1952 as a clerk in the office of the Protector of Indian Immigrants.

He had matriculated in March 1951 at a country school at the age of nineteen, having had to write supplementary examinations in English and Latin. At school he had taken an active part in games and debates.

In his application for admission to the Faculty he made a special plea for the award of a Union Government Bursary-Loan, pointing out that without such an award he would have to borrow from an uncle "at the rate of 8% per annum calculated from the date he makes his first payment." The Board granted him admission but did not award him a bursary.

He entered the Preliminary Year in 1953, took part in the work of the Drama Group and other societies, and passed all subjects except English at the end of the year. In a letter from the Dean dated 31st December 1953 he was informed "You cannot be promoted to the First Year until you have passed in English"; accordingly, instead of proceeding with one or two

science subjects as well as repeating English in 1954, he took English only and failed it at the end of the year, owing partly to a long gastric illness. At this time he was trying, with indifferent success, to persuade his grandmother to finance his further studies. He was re-admitted, however, in 1955 to read the subjects then prescribed for the Preliminary Year—English I, History I, Botany I and Introductory Chemistry and Physics. At the end of the year he passed all five, though it took him two more years to qualify for admission to the Anatomy/Physiology class owing to his failing Physics I at the end of 1956.

Though he was enrolled in the Second Year of Study in 1957, his gastric ulcers and his financial difficulties continued. Early in 1959 he failed to report for an aegrotat examination. He was, nevertheless, re-admitted, but in October that year he withdrew, because, as he put it in a letter to the Dean, "My health is not good". In a letter to the Registrar of the same date he requested a transcript for submission in support of an application for a Government of India Cultural Scholarship. This he either did not receive or did not take up. In 1960 he was teaching again. In 1961 he applied for re-admission to the Faculty but was not accepted.

Bhisma, incidentally, took the full battery of Differential Abilities Tests as a volunteer in 1956. Among his Standard Scores were: A2: 9; Non-Verbal Reasoning: 10; Mechanical Comprehension: 12; Vocabulary: 10; and Verbal Reasoning: 8.

Comment: Bhisma's difficulties began in his family situation: his breakdown can be attributed partly to this, partly to the money difficulties to which it gave rise and partly to the illness which may be associated with both. On the comparison of tests with Matriculation Standard Scores he is an under-achiever, but the tests were taken five years after he matriculated, so that this reading is unreliable. It seems unfortunate that in 1954 he was not permitted to take some first-year subjects as well as English, but it is difficult to estimate the effects of this decision of the Board.

Bhisma's failure, of course, was to be expected from his matriculation performance alone, though in 1953 the records of the Faculty were too scanty for a proper interpretation of this and the mere fact that he had failed to matriculate at the first attempt at an Indian country school in 1951 is perhaps not very significant.

His record resembles Krishna's in certain points: their country upbringing, low matriculation marks, family conflicts and financial difficulties. But Krishna's good health, experience of leadership and matriculation at a city school mark some of the differences between them. It may be particularly significant that Bhisma in his difficulties appears to have turned for support to the older women of his own family, while Krishna turned to Radha.

(5) Bambata

African, Enrolled 1953.
Matriculation Total Standard Score: 11.
Test G.L. Standard Score: 11.

Entrance Age: 23.

BAMBATA was a powerful bearded man with a slightly bewildered look. He reached the Faculty in 1953 with an already rather complicated academic record, which may be summarised as follows:-

<u>Matriculation (1949).</u>	<u>University College of Fort Hare (1950-1951).</u>	
<u>Standard Scores.</u>	<u>1950</u>	<u>1951</u>
Total: 11	Botany I: Pass.	Chemistry II: Fail.
English: 12	Chemistry I: Pass.	Physiology I: Fail.
Mathematics: 11	Physics I: Pass.	Hygiene I: Pass.
Science: 10	Zoology I: Pass.	

His school Principal stated: "We found Bambata ambitious, showing a wide interest, very popular with his fellow students, also very interested in reading. He has definitely more than average qualities of leadership, which one day he will use either for good or evil." Another teacher described him as a "student of good ability who with greater industry would probably have obtained a first class pass". It will be seen, however, that Bambata's scores are generally above the average for students of the Faculty, presumably a superior group. The teacher adds: "At the time he was my pupil he did not show that tenacity of purpose and devotion to duty that would have indicated a real vocation. His character was as yet unsettled. Since he left school, I have lost touch with him, and cannot say whether or not he has developed favourably in the meantime. He certainly has gifts of leadership, but whether they have been and will be used to good advantage I cannot say. His social background is poor."

No report on Bambata's attainment except the official transcript was either sought or received from Fort Hare. His own explanation of his failure in 1951 was: "I should have done my second year satisfactorily but for the fact that I overworked myself during the last four weeks; as a result I was mentally fatigued and blankness followed that strain. With a fair amount of self application I am convinced I should do satisfactorily in the science subjects I so much love." What happened before "the last four weeks" is not known.

Bambata spent 1952 as a taxi driver. In 1953 he was admitted to the pre-medical course and passed English and Sociology (also Zoology which he had already passed at Fort Hare) to qualify for admission to the Second Year. In the Drama Group's first production (of an African play) he drew thunderous applause in a tribal dance of his own creation.

In the same year he married a nurse, who went to live with his parents. His father, for whom he had a strong traditional respect, was a shopkeeper and is said to have been an enterprising business man, but had no formal education. Bambata's brother and sister, incidentally, appear to have had very little.

In the following year Bambata took the leading part—that of the defeated chief Dingana—in the Drama Group's next production. He missed a few rehearsals through such accidents as getting arrested on the suspicion of being an 'Agitator', but was again vigorously applauded at every performance. He began a friendship with Kreli, a slightly younger man, whose school principal had written of him "I believe sex was his downfall" and who was later expelled from the Faculty after conviction on a criminal charge. These two became known as the Lawyer and the Client, Bambata being the Client. In this year his son Kwame was born; Mrs. Bambata, incidentally, sent the telegram announcing the birth to a wife of a member of the Faculty and not to her husband. At the end of the year, Bambata failed Anatomy and Physiology.

In 1955 he repeated his success in the Drama Group and settled a serious dispute in that society after months of negotiation. He became Chairman of the Group and again failed Anatomy and Physiology at the end of the year, whereupon he was notified that he was excluded from the Faculty under Regulation M3 (See Section 5.1). It was pointed out to the Board, however, that notice of the promulgation of M3 had not been given, and that Bambata's exclusion was thus ultra vires. He was offered re-admission, with a warning that some members of the Board considered this to be against his own best interests.

In 1956 he passed both Anatomy and Physiology and in 1957 was elected Chairman of the House Committee of the Alan Taylor Residence. He began about this time to fall asleep in lectures; night expeditions with the Lawyer were probably frequent, a strong antipathy was developing between Bambata and one of his teachers, and there were difficulties at home: his father needed help with the business and Bambata's sister divorced her husband. A member of the staff, incidentally, to whom Bambata had sometimes turned for advice, was on leave this year. A physician investigated the tendency to fall asleep, but it did not respond to treatment. Bambata failed at the end of 1957 and again at the end of 1958 and was excluded from the Faculty.

In 1956 he had taken tests A2 and G.L., and made Standard Scores of 11 on each.

Comment: Though Bambata had a strong sense of his own powers, particularly perhaps with women, he had also a strong respect for authority in certain others, especially his father. He appears, indeed, to have been in search of authority in himself and in others: he was sometimes unexpectedly to be found in church, and another kind of authority was represented by the Lawyer. Some of the comments of Bambata's teachers may indicate the European fear of the African leader, but Bambata's failure as Chairman of the House Committee stands in contrast to his success as a stage king.

In a letter early in 1958 to a member of staff in whom he sometimes confided, Bambata wrote "Had you not left I might have been able to put on a better performance and perhaps passed one or both of my courses. I had no-one to empty my troubles to and get some advice from." It is remarkable that during the eight years of his University career he does not appear ever to have been referred to a qualified counsellor.

Note: The Lawyer, incidentally, about three years after his expulsion from the Faculty, arrived one night at one of the teaching hospitals in a white coat. He explained that he was a medical student and that he had been sent to do a ward-round.

(6) Thabanchu

African, Enrolled 1952
Matriculation Total Standard Score: 12

Entrance Age: 23

Like Bambata, THABANCHU was admitted to the First Year of Study with a complicated previous record. This is summarised below:-

Matriculation (1950)

Total Standard Score:	12
English Standard Score:	13
Mathematics Standard Score:	10
Science Standard Score:	11

University College of Fort Hare (1951-1953)

Chemistry	I Pass	Zoology	I (Supplementary) Pass
Physics	I Pass	Physiology	I Pass
Zoology	I Fail	Mathematics	I Fail
Mathematics	I Fail	Chemistry	I Fail
	Chemistry	II (Supplementary) Pass	
	Mathematics	I (Supplementary) Pass	
	Botany	I Pass	
	Zoology	II Fail	

Thabanchu applied for admission in 1954. As his record of failures at Fort Hare was even more extensive than Bambata's, the Screening Committee recommended that he be not admitted, but were over-ruled by the Board, and Thabanchu was admitted to the First Year to read English, History and Psychology.

He was a small dry man of very few words but an inquiring eye. He was sponsored by one of the Protectorate Governments, in whose Secretariat his father held a senior post. His mother, a woman of presence and education, was active in womens' organisations and travelled extensively. Thabanchu, according to one of his sponsors, had been brought up "as an honest and God-fearing child."

Thabanchu's school principal described him as "able, alert and diligent". He had matriculated at the relatively early age, for an African, of eighteen. His failures at Fort Hare were never fully explained; he had intended to take a B.Sc. degree, majoring in Physiology, before proceeding to medical studies, but his course was upset by the resignation of the Professor of Physiology at Fort Hare, who was not replaced.

Thabanchu, like Bambata, took part in the Drama Group productions of 1954 and 1955. Though he would take only small parts himself, he could step into the role of anybody absent from rehearsal and parody his style. As an exceptionally reliable member of the company, he was put in charge of continuity, and later became Secretary of the Group.

He passed his Arts subjects in 1954 with very high marks in English. He was still a man who usually said very little, at any rate in the presence of Europeans, and was described by a member of the Department of Social, Preventive and Family Medicine as exceptionally "enclosed".

However, he passed all further examinations on schedule (in the third class) and graduated at the end of 1959.

Shortly after graduating he became engaged to a gifted and attractive girl who is now a graduate of the Faculty.

COMMENT: Thabanchu probably had no romantic illusions about himself, and his parents were better equipped to help him after his failures at Fort Hare than were Bambata's. His betrothed, incidentally, was his equal in status and education; there is not the same distance between himself and the people most important to him as there was in Bambata's case.

Unfortunately he took no tests. His case is interesting as one of 'recovery' after repeated failures, of which there are several instances in the records of the Faculty. A fresh start in a new institution may have helped him, but his main advantages seem to have lain in himself and in the support of his family.

(7) Strandlooper

Coloured, Enrolled 1955 Entrance Age; 16½
Matriculation Total Standard Score (Indian Norms): 9
Test A2 Standard Score: 12

Strandlooper entered the Preliminary Year while he was still under seventeen, and though on the day of his arrival he kicked a football through one of the Residence windows, he behaved much of the time as if he wished he were older.

His home was about a thousand miles away in one of the country towns of the Cape. He was the only son of a widow, described as "a very keen social worker" who had also four daughters. His father had held the rank in the police of Sergeant (First Class) and for many years had been a station commander, a position to which very few Coloured policemen had risen at that time.

Strandlooper had matriculated at the first attempt at a school in his home town. His Biology master, writing in support of his application for admission to the Faculty, spoke of the "leadership, a keen sense of duty and a love to help the poor" that Strandlooper had "inherited from his parents" and added: "He has been especially helpful with the dissecting work, where he revealed his initiative with the way in which he displayed the specimens....He has been a very ardent helping hand in the Biology Laboratory. He has dissected and mounted several different systems of the cat."

Although Strandlooper had taken Afrikaans Higher and English Lower at school, at the university he elected to read English I rather than Afrikaans I. "Afrikaans," he remarked, "het ek al geloop". (I've done Afrikaans"). He passed all pre-medical courses on schedule, but not with very high marks.

He held a Union Government Bursary-Loan, but his mother also provided him with pocket money on a very generous scale, and his sisters and aunt also appear to have contributed towards his expenses. In the Drama Group production of 1955 he took a small part, which happened to be that of a policeman, and he had plans, which did not materialise, for producing a musical show himself the following year.

In 1956, incidentally, he took the full battery of Differential Abilities tests as a volunteer. Among his Standard Scores (Indian Norms) were: A2, 12; Non-Verbal Reasoning, 15; Mechanical Comprehension, 14; Vocabulary, 7 and Verbal Reasoning, 6. His Index of Accuracy score (89.7%) was among the highest in the group and his low scores in the verbal tests may be associated with his having taken Afrikaans rather than English Higher at school, though he had completed and passed his university English I course before he took the tests.

Early in 1957 the Government announced its intention of separating the Faculty from the University of Natal (See Sections 3.15 and 4.1). In a letter to the Dean dated 28th March 1957, Strandlooper resigned from the Faculty "in view of the implementations included in the Separate University Bill." He then went home. He had not consulted his mother, who after a few days, with the help of a European woman doctor, persuaded him to withdraw his resignation and return to Durban.

Strandlooper, however, neglected his work and began to withdraw into a world of fantasy. He remained in Durban for the July vacation. At the end of July the head of one of the pre-clinical departments wrote to inform him that "unless your results in the August class test are well above the class average, I will not find it possible to grant you a Duly Performed Certificate for the 1957 course."

Meanwhile Strandlooper's tutor, one of the pre-medical scientists, who had been on leave for the first half of the year, had returned to Durban and began to press for his condition to be investigated. On 6th September he put in a written report to the Acting Dean which deserves to be quoted in full:

"When this student came to Medical School 2½ years ago he had a pleasing personality, a quick wit and was fairly popular with both staff and students. Last year, as his tutor, I had a number of interviews with him and he told me many stories of his youth and background. Occasionally he would be carried away with his story and start exaggerating but there was nothing particularly unusual about this. He probably did not put as much work into his studies last year as he might have done, nevertheless, he just passed in all his subjects.

"I was away for the 1st 6 months of this year so that I did not see him again until the end of July. It was clear to me that he had changed considerably. He looks ill, he has sunken cheeks, dark rings below his eyes and has lost weight, he is listless and it is difficult to have a straightforward conversation with him. I know he has had a bad bout of 'flu but a number of students and friends outside the University have come to me because they are worried by his behaviour particularly the incredible stories he tells. I have had to listen to many of them myself. Those that I have checked have turned out to be complete phantasies. Here are a number of themes that keep recurring:-

"(1) His mother has rejected him. He tells a number of versions but the gist is that his mother visited Durban in July, passed as a White, knew he was here but would not see him.

"(2) He has considerable wealth. He tells of large farms his family owns, new motor cars, the expensive life his sisters live, etc. yet he is always borrowing money with the story that a telegram will come from home.

"(3) He makes imaginary journeys. He will tell of an air trip to Cape Town last week or a car trip to Johannesburg the day before when in actual fact he has not even left Wentworth.

"(4) He has been accepted in an overseas Medical School. The school, the conditions of acceptance and when he will leave the country varies from time to time. As far as I know he has not even made any applications.

"By the half smile on his face and his widened eyes it is easy to tell when he is speaking from his phantasy world. Whenever I spoke to him about going back to classes, or going to see the Dean, or pulling himself together, he answered by telling a story of how he is persecuted, or why his life is not worth living or that my life was not worth much. As soon as I realised what was going on I reported the matter, but there seems to be no mechanism for initiating action so in the meantime I, and his friends, have adopted the policy of trying to bring him back to reality whenever he starts drifting into his dream world. It has not helped much as he just strolls about the campus, sleeps, aimlessly goes to town, plays billiards or just does nothing."

The Head of the Department who had threatened to withhold Strandlooper's Duly Performed Certificate now referred him to the Department of Medicine, by who he was sent on to a psychiatrist who reported as follows:

"I examined Mr. Strandlooper and found that he was frank and anxious to cooperate fully with me in all respects.

"My opinion is that Mr. Strandlooper appears to have reached his academical peak and having spent his all is now mentally and physically fatigued and is totally incapable of further concentration. In consequence he is "running away" from further effort and is finding pleasure in wine, woman and worldliness. He is given to phantasy or the building of castles in the air as a compensation for his hurt, which is the STOP Signal.

"I have had him examined physically by Prof. X and his staff and the report signifies that physically all is well with Mr. Strandlooper.

"My diagnosis is one of NEURASTHENIA—due to over-effort mentally.

"My recommendation is for Mr. Strandlooper to rest for at least 12 months before making a comeback, in fact I agree with him when he says:-

'I thought that I could do the work but as soon as I tried I just could not go on until I decided to just give up trying'

and

'I have decided to try and find a job to try to support my own self and try to keep on existing in that way.'

"I cannot help feeling that Mr. Strandlooper has reached the end of his tether academically and that he should not make a further effort and that he should 'find a job' in the commercial world."

The two quotations in the psychiatrist's report are from a long letter which Strandlooper had written his mother about 10th September (though it is undated), and which she had sent on to the Acting Dean. Significant passages in this letter of Strandlooper's are:

"I often think of how undeserving I am to have a wonderful mother like you who have done so much for me and then I'll feel miserable inside me but then again

I'll escape in my world of dreams and life there to try to console myself that I have done nothing wrong....."

"I am undeserving of any further help from you"—words not quoted, it will be seen, by the psychiatrist, though he quotes what immediately follows:- "I have thus decided to try to support my own self and try to keep on existing in that way."

"For too long I have depended on you and my sisters whom I am sure would have liked to live their own life and would have liked to be free from supporting me. They haven't lived their life because of me because I was always there to be thought of first....."

"I dont think it is advisable for me to come home because I will most certainly cause just for misery by being near you I think I am big enough to look after myself and I hope you will pray for me to the Lord ... I have enjoyed my life because of your effort. Now I will try to find my own way out. I might be hard at first, but I am sure I will be able to make headway some way or other. I will never be able to repay what you have done, but I'll try to send you what I can spare."

Early in October, however, Strandlooper did go home. After his departure it was claimed that he had lost £15 of House Committee funds and a microscope lens valued at £12 belonging to one of the pre-clinical science departments. He did not, however, reply to letters from the Administration about these matters, and evidently did not tell his mother.

In 1958, however, he wrote from his mother's address asking for an academic transcript. The Assistant Registrar replied reminding him that his account had not been closed, and received a reply from his mother which reads:

"My son has left home and left no address. But if you will please send me a copy of your two previous letters I will see what I can do about his outstanding fees."

She then paid off the account in instalments.

The last heard of Strandlooper is that he found a job in 1958 and entered the University of Cape Town the following year as a part-time student.

Comment: Strandlooper's behaviour suggests that he was trying, perhaps without knowing it, to break away from his mother. His most significant fantasy is the first on his tutor's list:

"His mother has rejected him,"

which suggests the fulfilment of a wish, as perhaps does the reference to "the expensive life his sisters live." The key sentences of his letter to his mother are:

"For too long I have depended on you and on my sisters ... I dont think its advisable for me to come home.... I think I am big enough to look after myself."

His finally leaving home and leaving no address points the same way.

It is clear at the same time that Strandlooper greatly valued his mother and sisters and that their high expectations and sacrifices for him built up a feeling of guilt from which, as his letter also indicates, fantasy was at the time the only escape. His return to university in 1959 suggests that he continues to try to "better himself", but on his own terms.

Strandlooper appears initially to have projected his personal crisis into the political crisis of the Faculty in 1957, but the Government's intentions regarding the Faculty do not figure either in the psychiatrist's report or in Strandlooper's letter to his mother.

It is interesting that the psychiatrist makes no reference to Strandlooper's relations with his mother, and no assessment of his intelligence unless one is implicit in the statement that Strandlooper had "spent his all." Most of Strandlooper's test scores are well above the average for Indian students of the Faculty: the psychiatrist does not appear to have applied any test of his own and did not have access to those of the writer, who was on leave during the whole of 1957. In any case, the research tests which Strandlooper wrote were not standardised for the students of the Faculty until long after Strandlooper's departure, though his scores on some would be superior in a European high school group.

It was perhaps specially unfortunate for Strandlooper that at the beginning of the serious symptoms of his trouble his tutor was on long leave, though it is arguable that troubles as serious as Strandlooper's could not in any case have been "talked out." At the same time, Strandlooper and his family are obviously exceptionally people who wished each other well, and who, with intelligent help, might well have found a way out of the frustration and waste of effort and feeling that has had to be recorded here.

(8) Nyama

African, Enrolled 1956.
Matriculation Total Standard Score: 7.

Entrance Age: 26½.

NYAMA, at the date of his application for admission to the Faculty, was a school principal of some years' experience. His father and mother had both been teachers, and he had one younger brother still at school. His mother, after her marriage, had spent some time as a field-worker in a social survey of the rural area in which the family lived.

According to the principal of the high school at which he had been a pupil, Nyama had taken eight years to complete a five-year secondary course, and had failed the matriculation examination at the end of it. "I could not recommend him academically," said the principal in his report, but adds that "as head prefect he was helpful and responsible."

On leaving school Nyama became a teacher, without taking any further qualification. Within fifteen months of his first appointment, at the age of twenty-one, he became the principal of a country school which at that time, to quote one of his referees, "was very much disorganised owing to the incompetence of his predecessor. Very soon he was able to raise the standard and tone of the school so that it was granted Standard VI and became a Higher Mission School." He married a qualified teacher—they had one son at the time of his application—and proceeded to matriculate by private study, taking two or three subjects each year.

He strongly impressed his interviewers in 1956. However, his standard score in Test A2, which he took as part of selection procedure, was only 8; he made a similarly low score in Progressive Matrices and in most of the tests which he took later on registration.

He succeeded in convincing the interviewers, however, that he had made suitable arrangements for the care of his wife and child in the event of his being admitted to the Faculty. He had wide interests, and his experience and apparent skill in human relations were likely to carry him far as a doctor if he could pass the necessary examinations.

This he proceeded to do. He completed the pre-medical course on schedule and happens to be one of the two Africans who, in the classification of Table 8.P is an "under-achiever" on his school record and an "over-achiever" on his pre-medical results. He succeeded Bambata as Chairman of the House Committee and has now been appointed sub-warden of the students' residence. Though he took three years instead of two for the pre-clinical courses, he has now reached the clinical years and it seems highly probable that he will graduate.

Comment: Nyama's record, on three or four statistical classifications, places him in groups that tend to fail. His interview considerably improved his chances of admission. His success might in the terms of Meehl be said to score a point for the clinician against the regression equation, though a selected and isolated case can never, of course, establish that for a group of candidates one method of selection is preferable to another.

(9) Amina

Indian Girl, Enrolled 1960.
Matriculation Total Standard Score: 9.

Entrance Age:18.

AMINA was the third of a Muslim family of eleven and both her elder sisters were married at the time of her application for admission to the Faculty. Her father, a dealer in second-hand goods, made about £540 per annum. He had only gone as far as Standard III at school and her mother, who had been fifteen years old at the time of the birth of her first child, had not been to school at all.

At her secondary school, Amina became Head Prefect and House Captain. The writer first saw her the day she took part in the annual speech contest on the lives of the Prophet and the Righteous Caliphs. Her topic was "Muhammad the Perfect Man," and her rather gentle voice was not quite equal to the occasion. She is said to have been the first woman to take part in this contest.

She wrote all letters in connection with her application herself, but missed the screening tests as she did not receive the instructions posted to every short-listed candidate. On discovering this, she made a special plea to be interviewed, which was granted. Both her interviewers thought highly of her as a candidate, though one, in response to Item 6 of the rating form: "During this candidate's medical studies, what is the role of his parents likely to be? Please circle the appropriate rating," circled "Neutral, i.e. unlikely to offer much support even if they formally approve."

Relatives and Muslim charitable bodies provided some assistance, and in 1959 Amina was enrolled in the Preliminary Year. Among her Standard

Scores in tests taken on registration were GL: 13, Verbal Reasoning 10, Mechanical Comprehension 8. The last is an unusually high score for a girl.

Towards the end of 1960 Amina's fees fell into arrear, but she passed all pre-medical examinations on schedule. She did not, however, register for the Anatomy-Physiology classes in 1961, but wrote as follows three days after classes had begun:

"I'm sorry to have to tell you that I shall not be able to attend university this year, due to financial and other reasons. I hope to come back in a year or two to continue medicine."

Her marriage had been arranged, and not long after it, she began work as an uncertificated teacher.

Comment: This can be only conjectural, but Amina is unlikely to have fallen a victim to romantic feelings. Marriage, in the eyes of her family, presumably confers an assured status, while as a teacher she is able to contribute to her own support and perhaps that of others. Poverty, orthodox Muslim tradition, and group family policy are all likely to have played a part in the interruption of her studies which, it is to be hoped, will be only temporary.

APPENDIX B

BIOGRAPHICAL QUESTIONNAIRE

Note: The form in actual use of course leaves room for the candidate to record his answers.

APPLICATION FOR ADMISSION IN 19..

Please answer all items by writing legibly in the spaces provided. You must answer in words or figures: do not tick any items. All information will be treated as confidential.

SECTION 1

Yourself.

1.1 SURNAME: _____

PERSONAL NAMES: _____

1.2 Age on 31st December, 19 .. _____ Years _____ Months.

1.3 Sex _____ 1.4 Married or Single _____

1.5 (a) Number of Children _____

(b) Number of other dependents _____

1.6 Present occupation: _____

1.7 Place of Birth: _____

1.8 Nationality: _____

1.9 Race: _____ 1.10 Religion _____

1.11 Language. Please state:

(a) The language in which you and your parents usually converse _____

(b) The language of instruction at your schools.
Primary School: _____ High School: _____

(c) The language in which you usually converse with your friends: _____

(d) Other languages which you speak or read: _____

1.12 Indicate where you have lived from birth onwards. Write "Rural Area", "Small Town" or "City" as the case may be, and add the name of the district, town or city.

From Age.

- 1. 0 to _____ Years: _____
- 2. _____ to _____ years: _____
- 3. _____ to _____ years: _____
- 4. _____ to _____ years: _____
- 5. _____ to _____ years: _____
- 6. _____ to _____ years: _____
- 7. _____ to _____ years: _____

1.12 Contd.

- 8. _____ to _____ years: _____
- 9. _____ to _____ years: _____
- 10. _____ to _____ years: _____

SECTION 2

Your Family.

- 2.1 Your father. (a) Name: _____
 (b) Your father's age (if living) _____
 (c) Your father's age at death (if deceased) _____
 (d) Place of his birth _____
 (e) His education (Fill in e.g. "Not at school", "Standard 4", "University" as the case may be): _____
 (f) Your father's occupation: _____

- 2.2 Your Mother. (a) Name: _____
 (b) Your mother's age (if living) _____
 (c) Your mother's age at death (if deceased) _____
 (d) Place of her birth _____
 (e) Her education (Fill in e.g. "Not at school", "Standard 4", "University" as the case may be): _____
 (f) Your mother's occupation: _____

- 2.3 Brothers and Sisters. Fill in the names, ages, standards of education and occupations of your brothers and sisters.

<u>Brothers</u>	Name	Age	Education	Occupation
1.	_____	_____	_____	_____
2.	_____	_____	_____	_____
3.	_____	_____	_____	_____
4.	_____	_____	_____	_____
5.	_____	_____	_____	_____

<u>Sisters</u>	Name	Age	Education	Occupation
1.	_____	_____	_____	_____
2.	_____	_____	_____	_____
3.	_____	_____	_____	_____
4.	_____	_____	_____	_____
5.	_____	_____	_____	_____

- 2.4 Who took care of you most of the time from birth onwards? Fill in the spaces below. (Write, e.g. "Age 0-18: Parents", or "Age 0-3 : Parents, "Age 3-6 : Grandmother", etc., as the case may be).

<u>Ages</u>	Person(s) chiefly responsible for your upbringing
0 to _____ years	_____
_____ to _____ years	_____
_____ to _____ years	_____
_____ to _____ years	_____
_____ to _____ years	_____

SECTION 3

Your Education.

- 3.1 At what age did you first go to school? _____

3.2 List all schools attended, with dates (e.g. "1956-1958"), indicating in each case whether you were a boarder or went daily, and the approximate distance of the schools from your home at that time.

	<u>School</u>	<u>Dates</u>	<u>Boarder or Day Scholar</u>	<u>Distance from your home</u>
1.	_____	_____	_____	_____
2.	_____	_____	_____	_____
3.	_____	_____	_____	_____
4.	_____	_____	_____	_____
5.	_____	_____	_____	_____

3.3 How many pupils were there -

- (a) At your high school? _____
- (b) In your matriculation form? _____

3.4 Subjects taken for Matriculation:

- | | |
|----------|----------|
| 1. _____ | 5. _____ |
| 2. _____ | 6. _____ |
| 3. _____ | 7. _____ |
| 4. _____ | 8. _____ |

3.5 What other subjects would you have liked, if possible, to study?

- 1. _____
- 2. _____
- 3. _____

3.6 What school subjects did you like most?

- 1. _____
- 2. _____

3.7 What school subjects did you like least?

- 1. _____
- 2. _____

3.8 List any positions of responsibility, e.g. Prefect, that you held at school:

- 1. _____
- 2. _____
- 3. _____

3.9 List the games that you played, e.g. cricket, indicating whether you were a member of any high school team, e.g. Rugby 1st XV.

<u>Games Played</u>	<u>Teams of which you were a member</u>
_____	_____
_____	_____
_____	_____

3.10 List any other school activities, e.g. debating, in which you took part:

3.11 University training.

(a) University attended: _____ (b) Dates: _____
(c) Courses taken: Fill in the details below:

	<u>Year</u>	<u>Courses Passed</u>	<u>Courses Failed</u>	<u>Supplementary Examination</u>
1.	<u>19</u>	_____	_____	_____
		_____	_____	_____
		_____	_____	_____
2.	<u>19</u>	_____	_____	_____
		_____	_____	_____
		_____	_____	_____
3.	<u>19</u>	_____	_____	_____
		_____	_____	_____
		_____	_____	_____
4.	<u>19</u>	_____	_____	_____
		_____	_____	_____
		_____	_____	_____

3.12 Other training.

After leaving school, did you attend any course of training, e.g., apprenticeship, or Dale Carnegie, other than University studies, and if so, how long was the course,

Course: _____
Institution: _____
Dates: _____

SECTION 4

Leisure:

4.1 Indicate very briefly how you spent your school holidays during the past three years:

4.2 List any clubs or societies (other than political organisations and school societies) of which you are or have been a member. Give dates. (Note: School societies should be listed under 3.10. Your politics are not the University's concern and should not be mentioned).

	<u>Dates</u>
1. Social: _____	_____
2. Cultural: _____	_____
3. Sporting: _____	_____
4. Religious: _____	_____

4.2 (Cont.)

Dates

5. Welfare: _____

4.3 List any official positions, e.g. Secretary, Committee Member, to which you have been elected in any of the bodies which you have listed in 4.2.

Position

Society

- 1. _____
- 2. _____
- 3. _____
- 4. _____

4.4 Do you intend to continue your membership if you become a medical student?

4.5 List up to four books, other than books prescribed for school or university studies, which you have read during the past six months.

Author

Title

- 1. _____
- 2. _____
- 3. _____
- 4. _____

4.6 Indicate briefly what your main reading interests are.

4.7 (a) Are you able to dance? _____
(b) Do you enjoy dances? _____

4.8 List any of your spare-time hobbies or pursuits which you have not already mentioned:

Section 5

Employment: List positions held, with dates:

5.1 Employer Kind of Work Dates

- 1. _____
- 2. _____
- 3. _____
- 4. _____
- 5. _____

SIGNATURE: _____

DATE: _____

APPENDIX C

Occupations of Fathers
of Students Enrolled in Preliminary Year Classes
1959-1961

(See Section 7.21)

	. Africans .	Indians
<hr/>		
1. <u>Teaching and other Professions (31).</u> <u>(Africans, 20; Indians, 11).</u>		
University Research Fellow.	-	1
Teachers (Graduate).	3	4
Teachers (Non-Graduate).	8	5
Lecturer in Agricultural School.	1	-
Supervisor of Schools.	1	1
Ministers of Religion.	7	-
<hr/>		
2. <u>Commerce (28).</u> <u>(Africans, 1; Indians, 27).</u>		
'Merchant'.	-	3
'Director of Companies'.	-	2
'Businessman'.	-	4
'Contractor and Businessman'.	-	1
'Shopkeeper', 'Dealer', 'Store Owner'.	-	10
'Shop Manager'.	-	2
'Shop Assistant'.	-	1
'Salesman'.	1	1
'Commercial Traveller'.	-	2
'Bookkeeper and Accountant'.	-	1
<hr/>		
3. <u>Government Service and Clerks (11).</u> <u>(Africans, 8; Indians, 3).</u>		
Chiefs.	2	-
Headman.	1	-
Policeman.	2	-
Clerk in Law Court.	-	1
Other Clerks.	3	2
<hr/>		
4. <u>Craftsmen and Skilled Workers (9).</u> <u>(Africans, 0; Indians, 9).</u>		
Jewellers.	-	2
Tailors.	-	4
Hairdressers.	-	2
'Builder and Contractor'.	-	1
<hr/>		
5. <u>Farming, other than "Farm Labourer" (8).</u> <u>(Africans, 6; Indians, 2).</u>		
Farmers.	3	2
'Gardener'.	1	-
Agricultural Demonstrator.	1	-
Dipping Tank Assistant.	1	-
<hr/>		

	. Africans .	Indians
<hr/>		
6. <u>Labourers (7).</u> <u>(Africans, 5; Indians, 2).</u>		
'Labourer'.	4	-
'Factory Worker'.	1	1
'Farm Labourer'.	-	1
<hr/>		
7. <u>Other Occupations (4).</u> <u>(Africans, 2; Indians, 2).</u>		
Butcher.	-	1
Wine Steward.	-	1
Drivers.	2	-
<hr/>		
8. <u>Uncertain or Not Stated (16).</u> <u>(Africans, 10; Indians, 6).</u>	10	6
(Including deceased fathers for whom no occupation was recorded).		
<hr/>		
TOTALS (Including cases listed on page 306):	52	62
<hr/>		

APPENDIX D

Request for Staff Rankings. (See Section 5.11.b)

Section 5.11.b describes the validation against attainment in the pre-clinical course of rankings of students drawn up by the lecturers in charge of pre-medical classes. The request for these rankings was worded as follows:

7th November, 1957.

"Dear

Order of Merit

"I should be very grateful for the help of the Wentworth staff in one of the problems of the research into the selection of students for the Faculty of Medicine, on which I would like to report shortly to the Admissions Committee.

"My request is that the Wentworth lecturers, sitting if possible as a committee, should kindly rank three groups of students in approximate orders of merit according to their suitability for the M.B. Ch.B. course.

"Such orders of merit, agreed upon by the staff, would be of considerable research value. The formulation of criteria of attainment is the most important problem of selection research. A number of criteria of performance in the M.B., Ch.B. course, such as examination marks or speed of promotion, can be taken from official records, but such measures are incomplete and difficult to apply to the exceptional case. Lecturers' assessments, on the other hand, can take into account a number of factors which mark sheets fail to reflect or present in a distorted fashion.

"Examination marks represent a student's performance on a particular occasion, which may or may not correspond to his general level of work. Teachers are able to base their judgments on observation of work over a long period. Again, if the performance of a group of students is to be assessed over a number of years, there are difficulties in the case of those students who have been held back for a year or more, if the assessment is to be based on marks alone. The cases of students with incomplete or unusual academic records have often to be dropped from statistical analyses, although such students are often of great interest to the selectors. Teachers' assessments, finally, can take into account qualities which examinations do not.

"Three lists of students are enclosed. It is suggested that each member of staff should first rank the students (taking each list separately) in the light of his own experience, and that the staff should then agree upon an order of merit for each list which reflects, as far as possible, a combination of their rankings. Tied rankings, e.g. bracketing two or more students together in, say, the fifth position, are of course in order.

"It will be very helpful if lecturers' original lists could be made available as well as the list agreed upon in discussion.

"I do not think that I ought to suggest terms of reference for the rankings, other than the general criterion of suitability for the M.B. Ch.B. course in the light of one's experience of the student. It does, however, seem that examination performance ought not by any means

to be the sole criterion. In the case, however, of students who have already been promoted to the Second Year, I would suggest that the assessment be based on their general records up to the time of promotion.

"Assessments will be treated as strictly confidential, and no student's position will in any circumstances be divulged to the Admissions Committee or any other person or body, except the director of my research.

"I shall be most grateful for the assistance of members of staff in this matter.

"Yours sincerely,

....."

Note: The "students who have already been promoted to the Second Year", referred to in the last paragraph but two above, formed part of the third group mentioned in Section 5.11.b, whose ranking the staff were unable to complete. As already explained, no correlations were run for this ranking; the two rankings for which correlations were run were predictions in the proper sense of the word.

APPENDIX E

School Principal's Rating Form

Dear Sir/Madam,

Report on :
(Present address:)
Candidate for admission to Durban Medical School.

I should be grateful if you would report on the attached form on the above candidate from your institution, who is seeking admission to the Faculty of Medicine of the University of Natal.

Naturally, your report will be treated as confidential.

Since the number of applicants for admission to the Faculty of Medicine greatly exceeds the number of vacancies, the Admissions Committee of the Faculty has to select the most promising candidates for admission. In fairness to the candidates and because of the heavy responsibility to the public which a doctor must bear, it is most important that our selection should be as effective as possible. Your report would be of considerable help to the Committee.

Some notes explaining the ratings for which we are asking appear on the back of this letter.*

Would you please return your report so as to reach this office by:
.....
since all applications for admission to the Faculty of Medicine must be completed by that date.

I should greatly appreciate your assistance. We are most grateful to the many School Principals and members of university staffs who have helped us in this matter in the past and I know we can rely on your co-operation.

Yours faithfully,

Dean - Faculty of Medicine.

* These notes (drafted by Professor W.H.O.Schmidt) follow below:

GUIDE TO RATINGS
OF CANDIDATES FOR MEDICAL TRAINING
AT THE UNIVERSITY OF NATAL

In the second part of your report on a candidate, you are asked to select ratings of certain aspects of his character such as intelligence and reliability. In deciding upon your ratings, please compare the candidate with other matriculants, not with the general school population. Matriculants are already a selected group as far as general intelligence is concerned; you are requested to grade the candidates within this selected group.

As the words used to indicate interests, abilities, and character traits may mean different things to different people, we list in this

"Guide" some typical situations and forms of behaviour that will illustrate what we are thinking of when asking you for a rating. We would like you to look at each list before deciding on your rating and add on any comments which you may wish to add. The lists are not exhaustive and further situations and forms of behaviour will no doubt occur to you. We would be grateful if after each rating you would add, in the space provided, any comments that will amplify your rating. For instance, an incident which you have observed may shed more light on the "reliability" of the candidate than the actual rating on a five-point scale. Please do not feel under an obligation to make a comment when the comment cannot add much to the bare rating; however, we shall greatly appreciate any additional information which will give us a more reliable and vivid picture of the kind of candidate we have before us as indicated in the following:

Item 7 : Intelligence.

When new work is introduced in class, is he usually quicker than the rest of the class in understanding it? Does he sometimes surprise you by finding the answers to difficult problems when nobody else does? Does he seem to be in his element when difficult work is being done rather than when ordinary work, requiring more diligence than insight, is being done? Can he cope with very difficult intellectual tasks even though he may be somewhat slow? Does he have to work very hard in order to achieve in his school work what he is achieving?

Item 8 : Industry.

Does he always do his homework? Does he do it as well as he can or does he merely do enough not to get into trouble with the teachers? Does he work consistently? Does he work hard at any task, even if he does not find it very interesting and even when there is no pressure from teachers? Does he work very hard only at tasks that interest him, neglecting completely those which do not interest him? Does he work hard only sporadically? Does he stop exerting himself when there is no pressure from teachers? Does he perhaps spend a great deal of time on his work without really concentrating or setting about his work in a systematic way?

Item 10 : Reliability.

In organising a school concert or on a trip or in any situation in which the teachers cannot be present, is it possible to give him authority over others without fear of being let down? If he is requested to do some work on his own, without constant supervision or help, can one rely on him to do it? Is he inclined to take advantage of the teacher's absence, more so than most pupils would? If he has not done his homework or has not done it properly, is he inclined to make a lot of excuses or does he face up to it?

Confidential

REPORT BY SCHOOL PRINCIPAL

or his authorised representative on the suitability of

.....

for medical training at the University of Natal.

University lecturers completing this form are requested kindly to answer Items 3, 6, 7 and 8, and as many others as possible.

ATTAINMENT AND INTERESTS

1. Matriculation

If this candidate has not yet matriculated, please indicate your estimate of his or her chances of passing the Matriculation examination this year by underlining one of the ratings below :-

- A. Will very probably pass matriculation.
- B. Is more likely to pass matriculation than to fail.
- C. Has a 50/50 chance of passing.
- D. Is rather more likely to fail matriculation than to pass.
- E. Will very probably fail matriculation.

2. Number of Attempts at Matriculation Examination

--

Please write ONE or FIRST in the box above if the candidate passed matriculation at the first attempt or is writing the matriculation examination this year for the first time. If the candidate passed the examination after more than one attempt, or is attempting it this year for the second or third time, please indicate this.

3. (a) Rank Position in Class

- (i) Number of pupils in the candidate's class this year.
- (ii) Quality of Class - please underline the appropriate rating of the general ability and attainment of the class of which the candidate was a member.
- (iii) Candidate's rank position in class (3rd, 17th, etc.).

Good
Average
Below Avg.

For ranking, please use the best available estimate of the candidate's work, e.g. the order for the year's work, mid-year examination marks, or a combination of these criteria. If exact rank positions cannot be calculated, please write TOP QUARTER, SECOND QUARTER, THIRD QUARTER or BOTTOM QUARTER, to indicate the candidate's approximate rank position.

(b) Progress at School

Has this candidate ever, to your knowledge, for any reason missed a year at school or failed to be promoted at the end of a course from one standard to the next? For example, has he or she ever taken eighteen months or two years to pass

a standard normally passed in one year by his or her fellow-pupils?

(i) Please write YES or NO in this box.

(ii) If you have written YES, please give brief details below, for example : 'Failed and had to repeat Standard VIII', or 'Missed a year (19) owing to illness of father'.

.....

4. English and Mathematics

Please complete this section in the same way as you have completed Section 3(a) above.

- (a) Number of pupils in the candidate's class or set.
- (b) Quality of class
- (c) Candidate's rank position in class or set.

English	Maths

5. Special Subjects

- (a) In which subject does this candidate do best?
- (b) Which is this candidate's weakest subject?

.....
.....

6. School Activities

Please mention any posts of responsibility, such as prefect or patrol leader, which this candidate has held, and any school activities other than formal study, such as debating or athletics, in which he or she has taken an active part.

.....
.....

ABILITIES AND CHARACTER

7. Intelligence

(a) Rating

Five ratings of intelligence are listed below. Please underline the one which is most applicable to this candidate. Compared with other matriculants, he or she is :

- A. Markedly superior in intelligence.
- B. Above the average in intelligence.
- C. About as intelligent as the average matriculant.
- D. Rather below the average in intelligence.
- E. Markedly below the average.

(b) Intelligence Test

If an Intelligence Test score is available, please fill in the following details :

Name of Test (e.g. S.A. Group Test, 1956 Form)

Candidate's Score Date of Testing: Month Year

(c) Comments

8. Industry

(a) Rating

Please underline the appropriate rating. Compared with other matriculants this candidate :

- A. Is exceptionally hard-working.
- B. Works appreciably harder than the average matriculant.
- C. Is an average worker.
- D. Is rather less industrious than the average matriculant.
- E. Is inclined to 'get by' with a minimum of work.

(b) Comments

9. Reliability

(a) Rating

To what extent can this person be relied upon to do the right thing with the minimum of supervision? Five ratings of reliability or trustworthiness are given below. Please underline the one which best describes this candidate compared with other matriculants:

- A. Very reliable, can safely be given authority.
- B. Generally dependable when acting on his own.
- C. Requires very little supervision.
- D. Requires fairly frequent supervision.
- E. Of doubtful reliability.

(b) Comments

10. Indications of Leadership

(a) Rating

Please underline the appropriate rating of this candidate's capacities for leadership, compared with those of other matriculants :

- A. Outstanding.
- B. Good.
- C. Fair.
- D. Has not as yet shown any capacity for leadership.
- E. Poor.

(b) Comments

11. Determination and Strength of Purpose

(a) Rating

Please underline the appropriate rating :

- A. A very determined and strong-willed person.
- B. More than average determination.
- C. Average determination and staying power.
- D. Indifferent.
- E. Easily discouraged.

(b) Comments

12. Probable quality of Candidate's Academic Work

(a) Rating

Please underline the statement that best reflects your estimate of the kind of academic work that this candidate is likely to do if he or she is admitted to the Faculty of Medicine of the University of Natal :

- A. Probably will do clearly outstanding work.
- B. Probably will do better work than the average student.
- C. Probably will do work of average quality.
- D. Probably will have some academic difficulty.
- E. Would probably fail if admitted.

(b) Comments

Signature

Official Designation

Date

APPENDIX F

INTERVIEWERS' RATING FORMS

(i) Candidates of 1956.

Candidate

Interviewed at on the of 1956.

The first two ratings or remarks under each heading except 'Appearance', are those given by the two interviewers independently; the third rating is that agreed upon after discussion. (See Note below.*)

1. APPEARANCE. Correct Neat Untidy

2. MOTIVE AND INTEREST (Inner- vs. other-directed)

Personal	Mainly Personal	Mixed	Mainly Others	Others

3. INTELLIGENCE

Very Superior	Superior	Average	Below Average	Dull or Inferior

4. LANGUAGE AND SELF-EXPRESSION

Excellent	Good	Satisfactory	Erratic	Clearly Inadequate

5. COMMENTS ON MANNER

.....
.....
.....

6. GENERAL IMPRESSION

Very Good	Good	Acceptable	Doubtful	Not Acceptable

* Note : In practice, the two interviewers recorded their ratings separately and the proposed agreed rating was not attempted.

INTERVIEWERS' RATINGS

(ii) Candidates of 1959 and 1960.

Mr./Mrs./Miss

CANDIDATE FOR ADMISSION TO PRE-MEDICAL COURSES IN 1959.

Please rate this candidate on a five point scale for the qualities listed below. It will be helpful if your ratings are distributed roughly as follows:-

- 5 : Top 5% of candidates.
- 4 : Next 25% of candidates
- 3 : Next 40% of candidates.
- 2 : Next 25% of candidates.
- 1 : Lowest 5% of candidates

but there is no need to conform to this pattern if it goes against your inclination.

1. LIKING: How much do you like this Candidate as a human being?

2. SELF-EXPRESSION: How effectively does he or she communicate with another person? (Do not consider the formal correctness of his/her English, which is being rated separately.)

3. RAPPORT: How well in touch with this candidate have you felt during this interview?

4. MOTIVATION: (a) Inner - or other directed. Does he appear to make his own decisions or be influenced by others? Please mark the appropriate space:-

8	7	6	5	4	3	2	1
Mainly Personal				Mainly Others			

5. MOTIVATION: (b) Briefly describe, if possible, this candidate's reasons for wishing to study medicine.

6. PARENTAL ENCOURAGEMENT: During this candidate's medical studies, what is the role of his parents likely to be? Please circle the appropriate rating.

- a. Active support and encouragement.
- b. Approval.
- c. Neutral, i.e. unlikely to offer much real support even if they formally approve.
- d. Disapproval.

7. TRUSTWORTHINESS: How far would you feel inclined to rely upon this candidate if he/she were a subordinate or colleague?

8. ACADEMIC PERFORMANCE: How good are his/her chances of graduating M.B., Ch.B. in this Faculty?

9. GENERAL IMPRESSION: In general, how suitable for the profession of Medicine does this candidate appear to be?

APPENDIX G

CUMULATIVE RECORD CARD

NAME		Entr. Age	Sex	Race	
Serial No.	Faculty	Bursary	Years		
MATRICULATION		INTERVIEW	TESTS		COURSES
Year	Ex-Bdy.	Suitability	<input type="checkbox"/>		
Total	Max.				
TOTAL %	<input type="checkbox"/>				
English					
Afrikaans					
Latin					
Geog.		SCHOOL REPORT			
Hist.					
		Suitability	<input type="checkbox"/>		
Maths.					
Phys. Sci.					
Chem.					
Biology					

The card is printed identically on both sides.

APPENDIX H

Appendix to Chapter VII

Distribution of Matriculation Marks

(Condensed from Admissions Research Report No. 5)

The analyses of the Matriculation Total, English and Mathematics marks (expressed in each case as percentages of the possible maximum) reported in Sections 7.18 - 7.20 are conducted as follows:

(A) Applicants.

(i) Among applicants qualified at the first attempt, for each examining body yielding sufficient data, variations of marks from year to year were tested by means of analysis of variance. (These analyses involved African Joint Board and Cape Senior Certificate marks, and Indian Natal Senior Certificate marks).

(ii) One examining body was then compared with another by means of variance-ratio and t-tests.

(B) Freshmen.

(iii) In certain cases, a further check on the marks of different authorities was then undertaken by scaling freshmen's marks on scores in a suitable objectively marked test, for those cases for which such scores were available.

(iv) Variations from year to year in the marks of pre-medical freshmen were tested by means of analysis of variance.

(v) If there was no significant variation from year to year in the marks of pre-medical freshmen, the provisional standardisation was regarded as satisfactory. If significant variation appeared, re-standardisation was undertaken and the consistency of marks from year to year in the reconstituted reference group was tested by means of analysis of variance.

A note on the scaling procedure adopted for step (iii) above may be helpful. This was undertaken for African Joint Board and Cape Senior Certificate marks (Total and English only) in the pre-medical freshman group. These were scaled on scores in the N.B. Vocabulary Test, which were chosen for this purpose because a vocabulary test may be regarded as a measure both of English and of general cultural level (Raven, 1948) and because the test scores correlate fairly satisfactorily (see Chapters VII and VIII) with Preliminary Year marks.

The records of candidates over the age of 22 on enrolment were dropped from the groups taken for scaling. This was in order to eliminate a few candidates who had taken the test several years after matriculation and who might perhaps have increased their vocabulary out of all proportion to their matriculation marks in that space of time.

After the elimination of the records of these students test scores and total matriculation marks were available for a total of 39 Joint Board African candidates and 25 Cape Senior Certificate African candidates.

The marks of each group were now scaled upon their test scores. The scaling method was that used by the National Foundation for Educational Research in the investigation reported in Admission to Grammar Schools (Yates and Pidgeon, 1957, p. 88). For each of the two groups, the students' matriculation marks were ranked in one column, and their Vocabulary Test scores were ranked alongside in another. There were thus two parallel orders of merit. The vocabulary score opposite each matriculation mark was now read off as the scaled equivalent. In order to break as many ties as possible, the matriculation percentages were calculated correct to two decimal places.

Vernon (1957) has pointed out that the scaling method of Yates and Pidgeon may, in a small group with an irregular distribution of test scores, give an inaccurate picture of the distribution of attainments, but the method was considered suitable for the present experiment because the two groups are not very small, and because it was not intended to run correlations with the scaled scores.

Readings from the scales thus constructed were obtained by taking every fifth score in the ranking of Cape Senior Certificate marks, and finding the Joint Board mark most nearly equal to this.

Table 7AA

Total Matriculation Marks: African Candidates
qualified at the first attempt, 1951 - 1960

(i) Joint Matriculation Board:
Variations from year to year

Nine Groups, 1951 - 1959				
Analysis of Variance				
	D.f.	S.S.	M.S.	V.R.
Between groups	8	351	43.88	1.232
Within groups	93	3312	35.61	
TOTAL	101	3663		

The variance-ratio shown is not significant: for D.f. 8/100, the 5% point is 2.03. Hence the marks of Joint Board African candidates qualified at the first attempt do not vary significantly from year to year.

(ii) Cape Senior Certificate:
Variations from year to year

Eight Groups, 1951 - 1958				
Only one African candidate for admission to the Faculty wrote the Cape Senior Certificate in 1959.				
Analysis of Variance				
	D.f.	S.S.	M.S.	V.R.
Between groups	7	165	23.57	1.599
Within groups	54	2035	37.69	
TOTAL VARIATION	61	2200		

For D.f 60/7 the 5% point is at 3.30 so that the obtained variance-ratio is not significant. Hence the marks of Cape Senior Certificate candidates qualified at the first attempt do not vary significantly from year to year.

(iii) Comparison of Examining Bodies

Examination	N	Mean	Variance
Joint Board Matriculation	102	49.80	36.27
Cape Senior Certificate	62	50.19	36.07
Pooled estimate of variance : 36.64			
Variance-ratio = 1.006 $\underline{t} = 0.39/0.974 = 0.4004$			
Variance-ratio and \underline{t} not significant.			

Table 7.BB

Total Matriculation Marks: African pre-medical freshmen

Joint Board and Cape Senior Certificate

(i) Variance-ratio and t-tests

Examination	N	Mean	Variance
Joint Board Matriculation	75	51.52	28.91
Cape Senior Certificate	35	51.83	39.32
Variance-ratio = 1.36 $t = 0.31/1.173 = 0.264$			
Variance-ratio and t not significant			

(ii) Scaling on Vocabulary Test Scores

(Obtained by taking every fifth mark from the ranking of Cape Senior Certificate marks, and finding the Joint Board mark most nearly equivalent to this, and reading off their scaled equivalents).

Cape Senior Certificate			Joint Matriculation Board		
Matriculation Mark	Rank (N = 25)	Scaled Score	Matriculation Mark	Rank (N = 39)	Scaled Score
57.6	5	43	57.04	9	43
53.35	10	40	53.24	19	39
49.5	15	37	49.04	25	38
47.15	20	33	47.07	30	34
43.0	25	27	43.04	39	27

Table 7.CC

Total Matriculation Marks of African Pre-Medical
Freshmen, 1951 - 1960

(i) Variations from year to year

Ten groups, 1951 - 1960				
Analysis of Variance				
	D.f.	S.S.	M.S.	V.R.
Between groups	9	324	36.00	1.141
Within groups	100	3154	31.54	
TOTAL	109	3478		
For D.f 9/100 the 5% confidence point is 1.97 (Quenouille, 1950, Table III). The obtained ratio is not significant.				

(ii) Freshmen 1951-1960 and the Standardisation Group (1951-1957)

	N	Mean	Variance
Standardisation Group (1951-1957)	72	51.73	30.35
Freshmen, 1951-1960	110	51.33	32.10

Note: Since the Standardisation Group overlaps with Freshmen 1951-1960, statistical tests were not undertaken, but means and variances for the two groups are almost identical.

Table 7.DD

Total Matriculation Marks: Indian Candidates
qualified at the first attempt

(i) Comparison of Examining Bodies

Examination	N	Mean	Variance
Cape Senior Certificate	15	49.60	32.14
Joint Board Matriculation	45	51.36	39.23
Natal Senior Certificate	194	51.98	54.12
National Senior Certificate	19	50.21	39.17
Transvaal Senior Certificate	35	49.11	37.47

<u>Analysis of Variance</u>				
	D.f.	S.S.	M.S.	V.R.
Between groups	4	323	80.75	1.68
Within groups	303	14,600	48.18	
TOTAL	307	14,923		

For D.f 4/100, the 5% point is 2.37: the obtained ratio is not significant.

(ii) Natal Senior Certificate Candidates Only.

Variations from year to year

Seven groups, 1953 - 1959				
<u>Analysis of Variance</u>				
	D.f.	S.S.	M.S.	V.R.
Between groups	6	202	33.67	1.63
Within groups	187	10,243	54.78	
TOTAL	193	10,445		

For D.f 00/6, the 5% point is 3.67: the obtained variance-ratio is not significant.

Table 7.DD(i) shows a considerably greater variance between groups than within groups, though the overall variance-ratio is not significant. But if the marks of Indian candidates who wrote the Cape, Joint Board, National and Transvaal examinations are pooled for comparison with Natal Senior Certificate marks, a difference significant at the 1% level appears. (Variance-ratio = $54.12/37.25 = 1.452$. Df. 193/113. For Df. 00/100, the 1% confidence point lies at 1.43).

It is to be expected, however, that the Natal Senior Certificate group, being so much larger than any of the others, should present a correspondingly greater dispersion of marks. A selection factor may also operate to make Indian applicant groups from outside Natal more homogeneous than a Natal group. It is easier for Natal Indian candidates to seek admission to the Faculty than it is for Indian candidates in other provinces, who will have to contend with immigration restrictions and with the difficulties of establishing themselves to live as students at a great distance from their homes. Thus, applications from Indians living in provinces other than Natal may tend to come mainly from the limited group of those who believe that they have the means or the abilities to enter the course. At the same time, the difference observed will have to be taken into account in the Screening Committee's assessments, and calls for further investigation when more cases for analysis are available. Indian candidates who have written the Joint Board examination are now rare, but the Transvaal Senior Certificate group is increasing in number and may in the future call for numerous comparisons with Natal Senior Certificate marks. Cape Senior Certificate and National Senior Certificate cases are relatively few.

Table 7.EE

Total Matriculation Marks: Indian Pre-Medical
Freshmen: 1951-1960

(i) Variations from year to year (1951-1960)

(Ten groups)				
Analysis of Variance				
	D.f.	S.S.	M.S.	V.R.
Between groups	9	916	101.78	2.479
Within groups	108	4434	41.06	
TOTAL	117	5350		

For df. 9/100, the 5% point lies at 1.97 and the 1% point at 2.59. The obtained variance-ratio is significant beyond the 5% level and approaches the 1% point. It thus appears inadvisable to standardise over all years, and the classes of 1955-1959 were selected as the reference group for standard scores.

(ii) Analysis of Variance: 1955-1959. (Standardisation Group)

	D.f.	S.S.	M.S.	V.R.
Between groups	4	216	54.00	1.529
Within groups	63	2225	35.32	
TOTAL	67	2441		

For df. 4/70 the 5% point lies at 2.50, so that the obtained ratio is not significant. The pooled 1955-1959 marks, however, differ significantly from those of 1951-1954, as shown below:

(iii) Comparison of Groups of 1951-1954 and 1955-1959

	N	Mean	Variance
1951 - 1954	34	52.56	57.94
1955 - 1959	68	56.88	36.43

For the data of 7.EE(iii) the variance-ratio, 1.59 with 33 and 67 degrees of freedom, approaches the 5% significance level. The difference between the means of the two groups, 4.32, is over three times its own standard error (1.399) and is therefore highly significant. (For the purposes of the t -test which yielded this result, it seemed legitimate to assume that the variances of the two groups were equivalent. The pooled estimate of variance for the t -test was 44.47).

Table 7.FF

Total Matriculation Marks: African-Indian Comparisons

(i) Candidates Qualified at the First Attempt:
Joint Board Examination

Group	N	Mean	Variance
Africans	102	49.80	36.27
Indians	45	51.36	39.23
Variance-ratio: 1.08 (Not significant)			
\underline{t} : 1.56/1.099 = 1.42 (Not significant)			

(ii) Candidates Qualified at the First Attempt:
Cape Senior Certificate Examination

Group	N	Mean	Variance
Africans	61	50.19	36.07
Indians	15	49.60	32.14
Variance-ratio: 1.12 (Not significant)			
\underline{t} : 0.59/1.732 = 0.34 (Not significant)			

(iii) Qualified Candidates
Africans (Joint Board)
Indians (Natal Senior Certificate)

Group	N	Mean	Variance
Indians (Natal Senior)	194	51.98	54.12
Africans (Joint Board)	102	49.80	36.27
Variance-ratio = 1.49. This ratio is significant at the 5% level: for df. 100/100 the 5% point lies at 1.39.			
Pooled Estimate of Variance (for Section 8.8): 48.3			

(iv) Comparison of Indian with African Standardisation Groups

Group	N	Mean	Variance
African	72	51.73	30.35
Indian	68	56.88	36.43
Variance-ratio = 1.20 (Not significant)			
\underline{t} = 5.15/0.983 = 5.239. (Significant beyond the .01% level)			

Table 7.HH

Matriculation English Marks: Joint Board and Cape Senior Certificate: African Pre-Medical Freshmen

(i) Variance-ratio and t-tests

Examination	N	Mean	Variance
Joint Board Matriculation	75	46.15	45.47
Cape Senior Certificate	35	49.37	85.41

Variance-ratio, 1.878. For df. 30/70, the 5% point lies at 1.62, so that the obtained ratio is significant at this level. If equivalence of variances is assumed for the purpose of a t-test, the obtained t , $3.22/1.575 = 2.044$ with 108 degrees of freedom, is just significant at the 5% level. (1.98 for df. 100)

(ii) Scaling on Vocabulary Test Scores

(Obtained by taking every fifth mark from the ranking of Cape Senior Certificate marks, finding the Joint Board mark most nearly equivalent to this, and reading off its scaled equivalent.)

Cape Senior Certificate			Joint Matriculation Board		
Matriculation Mark	Rank (N = 25)	Scaled Score	Matriculation Mark	Rank (N = 39)	Scaled Score
56	5	43	56	6	45
50	10	40	50	12	41
47	14-15	37.5	47	18-21	38.5
44	20	33	44	27-28	36
39	24-5	28	39	37	30

Table 7.II

Matriculation English Marks of African
Pre-Medical Freshmen (1951-1960)

(i) Variations from year to year

Ten Groups, 1951 - 1960				
Analysis of Variance				
	D.f.	S.S.	M.S.	V.r.
Between groups	9	992	110.2	1.995
Within groups	100	5526	55.26	
TOTAL	109	6518		

For Df. 9/100, the 5% confidence point lies at 1.97, so that the obtained ratio is just significant at that level.

(ii) Freshmen 1951-1960 and the Standardisation Group
(1951-1957)

	N	Mean	Variance
Standardisation Group: 1951 - 1957	72	48.79	59.58
Freshmen: 1951 - 1960	110	47.17	59.80

Though the means differ by 1.6%, the variances are almost identical, and if the samples were independent the t-test would yield a non-significant ratio of $1.62/1.178 = 1.375$.

Table 7.JJ

Matriculation English Marks: Indian Candidates
Qualified at the First Attempt

(i) Comparison of Examining Bodies

Examination	N	Mean	Variance	
Cape Senior Certificate	15	47.33	49.14	
Joint Board Matriculation	45	47.91	25.18	
Natal Senior Certificate	194	50.24	53.99	
National Senior Certificate	19	46.74	66.95	
Transvaal Senior Certificate	35	45.23	83.24	
Analysis of Variance				
	D.f.	S.S.	M.S.	V.r.
Between groups	4	464	116.00	2.154
Within groups	303	16,318	53.85	
TOTAL	307	16,782		
For D.f. 4/00, the 5% confidence point lies at 2.37, so that the obtained ratio is not significant.				

(ii) Natal Senior Certificate Candidates only
Variations from year to year
(Seven Groups, 1953-1959)

	D.f.	S.S.	M.S.	V.r.
Between groups	6	556	92.67	1.757
Within groups	187	9,864	52.75	
TOTAL	193	10,420		
For D.f. 6/00, the 5% confidence point lies at 2.09, so that the obtained ratio is not significant.				

Table 7.KK

Matriculation English Marks: Indian Pre-Medical Freshmen

(i) Variations from year to year (1951-1960)

(Ten Groups)				
Analysis of Variance, 1951-1960				
	D.f.	S.S.	M.S.	V.R.
Between Groups	9	1,316	146.22	2.553
Within Groups	108	6,186	57.28	
TOTAL	117	7,502		
For D.f. 9/100, the 5% confidence point lies at 1.97, and the 1% point at 2.59. The obtained ratio is thus significant at the 5% level and nearly significant at the 1% level.				

(ii) Comparison of 1951-1954 and 1955-1959 groups

Group	N	Mean	Variance
1951 - 1954	54	48.53	49.24
1955 - 1959	68	52.85	52.52
$\underline{t} = 4.32/1.519 = 2.844$			
Variance-ratio not significant. \underline{t} , for df. 100, significant at the 1% level. This again supports the decision to standardise on the marks of the later group.			

Table 7.LL

Indian-African Comparisons
Matriculation English Marks

(i) Candidates Qualified at the First Attempt:
Joint Board Examination

Group	N	Mean	Variance
Africans	102	46.90	49.85
Indians	45	47.91	25.18
Variance-ratio: 1.980. For D.f. 100/40 this is significant at the 1% level. Since variances differ significantly, the \underline{t} -test was not applied.			

(ii) Candidates Qualified at the First Attempt:
Cape Senior Certificate

Group	N	Mean	Variance
Africans	62	47.89	59.25
Indians	15	47.33	49.14
Variance-ratio: 1.206. $\underline{t} = 0.56/2.197 = 0.255$ (Not significant) (Not significant)			

(iii) Qualified Candidates: Africans (Joint Board)
Indians (Natal Senior Certificate)

Group	N	Mean	Variance
Africans: (Joint Board)	102	46.90	49.85
Indians: (Natal Senior Certificate)	194	50.24	53.99
Variance-ratio = 1.083 $\underline{t} = 3.34/0.8896 = 3.754$ (Not significant) \underline{t} significant at 0.01 level.			

(iv) Comparison of Indian and African Standardisation Groups

Group	N	Mean	Variance
African (1951 - 1957)	72	48.79	59.58
Indian (1955-1959)	68	52.85	52.52
Variance-ratio: 1.134 $\underline{t} = 4.06/1.277 = 3.179$ (Not significant) \underline{t} significant at 0.01 confidence level.			

Table 7.MM

Matriculation Mathematics Marks of African Candidates qualified at the First Attempt

(i) Joint Board Matriculation: Variations from Year to Year

(Nine groups, 1951-1959)				
Analysis of Variance				
	D.f.	S.S.	M.S.	V.R.
Between groups	8	748	93.50	1.318
Within groups	93	11,460	123.22	
TOTAL	101	12,208		

For D.f. 8/100, the 5% confidence point lies at 2.03 so that the obtained ratio is not significant.

(ii) Cape Senior Certificate: Variations from Year to Year

(Eight groups, 1951-1958)				
Analysis of Variance				
	D.f.	S.S.	M.S.	V.R.
Between groups	7	666	95.14	1.096
Within groups	54	5,631	104.28	
TOTAL	61	6,297		

Variance-ratio not significant.

(iii) Comparison of Examining Bodies

Examination	N	Mean	Variance
Joint Board Examination	102	47.36	120.87
Cape Senior Certificate	62	46.23	103.23

Pooled Estimate of Variance: 115.61 (for which S.D. = 10.75).
 Variance-ratio = 1.171 $t = 1.13/1.73 = 0.653$.
 Variance-ratio and \underline{t} not significant.

Table 7.NN

Matriculation Mathematics Marks:
Joint Board and Cape Senior Certificate:
African Pre-medical Freshmen

Examination	N	Mean	Variance
Joint Board Matriculation	75	50.51	138.15
Cape Senior Certificate	35	47.74	103.09
Pooled Estimate of Variance: 129.35 (S.D. = 11.37)			
Variance-ratio : 1.34 $t = 2.77/2.33 = 1.189$ Variance-ratio and t not significant.			

Table 7.00

Matriculation Mathematics Marks of African Pre-medical Freshmen

(i) Variations from Year to Year

Ten Groups, 1951 - 1960				
Analysis of Variance				
	D.f.	S.S.	M.S.	V.r.
Between Groups	9	1,443	160.33	1.286
Within Groups	100	12,467	124.67	
TOTAL	109	13,910		
For D.f. 9/100, the 5% confidence point lies at 1.97, so that the obtained ratio is not significant.				

(ii) Comparison of Freshmen 1951-1960 and the Standardisation Group (1951-1957)

	N	Mean	Variance
Standardisation Group (1951-1957)	72	50.14	128.46
Freshmen 1951-1960	110	49.63	127.61
Variances and means are almost identical.			

Table 7.PP

Matriculation Mathematics Marks:
Indian Candidates Qualified at the First Attempt

(i) Comparison of Examining Bodies

Examination	N	Mean	Variance	
Cape Senior Certificate	15	41.27	36.50	
Joint Board Matriculation	45	48.07	135.89	
Natal Senior Certificate	194	52.31	150.16	
National Senior Certificate	19	51.84	86.83	
Transvaal Senior Certificate	35	52.83	174.00	
Analysis of Variance:				
	D.f.	S.S.	M.S.	V.r.
Between Groups	4	2,203	550.75	3.885
Within Groups	303	42,950	141.75	
TOTAL	307	45,153		
For D.f. 4/200 the 1% confidence point lies at 3.41, so that the obtained ratio is significant at this level.				

(ii) Natal Senior Certificate Candidates Only
Variations from year to year

Seven groups, 1953 - 1959				
Analysis of Variance:				
	D.f.	S.S.	M.S.	V.r.
Between Groups	6	339	56.50	2.71
Within Groups	187	28,642	153.16	
TOTAL	193	28,981		
For D.f. 00/6, the 5% confidence point = 3.67, so that the obtained ratio is not significant.				

Table 7.QQ

Matriculation Mathematics Marks:
Indian Pre-medical Freshmen
1951 - 1960

(i) Variations from year to year, 1951-1960

(Ten Groups)				
Analysis of Variance (1951-1960)				
	D.f.	S.S.	M.S.	V.r.
Between Groups	9	3,598	399.78	3.016
Within groups	108	14,317	132.56	
TOTAL	117	17,915		
For D.f. 9/100, the 1% confidence point lies at 2.59, so that the obtained ratio is significant beyond the 1% level.				

(ii) Analysis of Variance: (1955-1959) Standardisation Group

	D.f.	S.S.	M.S.	V.r.
Between Groups	4	854	213.50	1.785
Within Groups	63	7,535	119.60	
TOTAL	67	8,389		
For D.f. 4/70, the 5% confidence point lies at 2.50, so that the obtained ratio is not significant.				

Table 7.RR

Matriculation Mathematics Marks:
African - Indian Comparisons

(i) Candidates Qualified at the First Attempt: Joint Board

	N	Mean	Variance
Africans	102	47.36	120.87
Indians	45	48.07	135.89
Variance-Ratio: 1.124 (Not significant)		$t: 0.81/2.018 = 0.401$ (Not significant)	

(ii) Candidates Qualified at the First Attempt: Cape Senior Certificate

	N	Mean	Variance
Africans	62	46.23	103.23
Indians	15	41.27	36.50
Variance-ratio: 2.828. For D.f. 60/15, this is significant at the 0.05 level. As variances differ significantly, the t -test was not applied.			

(iii) Candidates Qualified at the First Attempt:
Africans: (Joint Board)
Indians: (Natal Senior Certificate)

	N	Mean	Variance
Africans: Joint Matriculation Board	102	47.36	120.87
Indians: Natal Senior Certificate	194	52.31	150.16
Pooled Estimate of Variance: 141.02			
Variance-ratio = 1.242 (Not significant)		$t = 4.95/1.454 = 3.404$ (Significant at 0.01 level)	

(iv) Comparison of Indian with African Standardisation Groups

	N	Mean	Variance
Africans	72	50.14	128.46
Indians	68	58.96	125.21
Pooled Estimate of Variance: 128.72 (S.D. 11.34).			
Variance-ratio: 1.026		$t: 8.82/1.918 = 4.599$	
Variance-ratio not significant.			
t (for D.f. 138) significant beyond the 1% level.			

Appendix I

Preliminary Year Subjects and Predictor Measures

(1960)

Chapter VIII presents predictions of overall pre-medical result. It may be of some interest to compare predictions of individual pre-medical subjects. These, for Group ON.1955, were presented in Table 7.A (Section 7.5); similar data for the African and Indian freshmen of 1960 enrolled without previous credits, follow in this Appendix. The measures of relationship—phi-coefficients and Fisher's Exact Probability Test—are the same as were used for Group ON.1955.

Freshmen of 1960

Preliminary Year Subjects and Predictor Measures

(N=30)

PREDICTORS	PRELIMINARY YEAR RESULTS					
	Botany	Chemistry	Physics	Zoology	English	History
<u>Matriculation:</u>						
Total	.20	.07	.20	.33	<u>.40</u>	<u>.40</u>
English	.27	.13	.13	.13	<u>.46</u>	.21
Mathematics	.33	.33	.20	.07	<u>.40</u>	.27
<u>Tests:</u>						
Vocabulary	<u>.47</u>	.27	.33	.20	<u>.67*</u>	<u>.40</u>
Verbal Reasoning	.00	<u>.40</u>	<u>.40</u>	.13	.34	.06
Scientific Information	<u>.40</u>	<u>.40</u>	.27	.27	<u>.61*</u>	<u>.59*</u>
Mathematics	.07	.20	.33	<u>.47</u>	<u>.53*</u>	<u>.40*</u>
A2	.13	<u>.60</u>	<u>.53*</u>	<u>.40</u>	<u>.60*</u>	.21
Non-Verbal Reasoning	.27	.27	.00	.00	.21	.33
G.L.	.27	.20	<u>.53*</u>	<u>.40</u>	.20	.21
Index of Accuracy	<u>.53*</u>	.33	.33	.20	<u>.53*</u>	<u>.53*</u>

Note: Underlined coefficients are those for which the data of the original two-by-two table yield a result significant at the 0.05 level by Fisher's Exact Probability Test (Siegel, Table I; Latscha, 1953). An asterisk and underlining denote a value significant at the 0.01 level.

The 66 two-by-two tables yielding the phi-coefficients of this table show a total of 25 relationships significant at the 0.05 level or higher: this is very considerably more than would be expected by chance. Thirteen of these significant relationships appear in the English and History criterion columns, whereas the four pre-medical sciences show only three significant correlations each. The low correlations of these science examinations with one another have already been discussed (Section 5.17). From these, the relative unpredictability of attainment in Preliminary Year Science is only to be expected, but the possibility that assessments in this field are unreliable (in the statistical sense of the term) is a matter for concern as long as a student who fails a sub-minimum in any one

of these examinations is liable to be excluded from the Faculty.

Of the eleven predictors, A2 and Scientific Information each yield four significant relationships, and Vocabulary, the Mathematics Test and the Index of Accuracy three each. Apart from Scientific Information, the 'reasoning' tests—A2, GL and Verbal Reasoning—appear to be the best predictors for Preliminary Year science subjects. This suggests that some formal training in logical reasoning (compare Notcutt, 1949, cited in Section 2.31) might be of value in the Preliminary Year.

REFERENCES

Asterisked items were consulted in citations in other works: the source of each such citation appears in brackets at the end of each asterisked reference.

- African Education (1953): A Study of Educational Policy and Practice in British Tropical Africa. The Nuffield Foundation and the Colonial Office. Crown Agents for the Colonies, London.
- Aitken, J.T. and Johnson, M.L. (1952): Selection of Medical Students: Experiences at University College, London. Lancet, 263, 409-412.
- *Alexander, W.P. (1935): Intelligence, Concrete and Abstract. Monograph supplement to the British Journal of Psychology, cited by Vernon (1950a).
- Anastasi, A. (1958): Differential Psychology. Third Edition, Macmillan, New York.
- Association of American Medical Colleges (1956 and 1960-1): Admission Requirements of American Medical Colleges, Evanston, Illinois.
- Ashby, Sir Eric (1960): Investment in Education: Report of the Commission on Post-School Certificate and Higher Education in Nigeria. St. Clement's Press, London.
- *Baard, A.D. (1956): Die Aanpassing en Intelligensie van die Eerstejaar. M.A. dissertation, University of Stellenbosch (Cilliers 1959).
- Bantu Education Journal: Official Organ of the Department of Bantu Education, Pretoria.
- Bartlett, Sir Frederick (1954): Use and Value of Intelligence and Aptitude Tests. Proceedings of the First World Conference on Medical Education, 1953. Oxford University Press.
- Bd. This abbreviation in the text, followed by a date, e.g. 'Bd. 2.9.54.' denotes the Minutes of the Board of the Faculty of Medicine of the University of Natal for the date in question.
- Berry, G.P. (1957): The Appraisal of Applicants to Medical Schools. Journal of Medical Education. 32, 10.
- Biesheuvel, S. (1943): African Intelligence. South African Institute of Race Relations, Johannesburg.
- Biesheuvel, S. (1947): The Psychologist and Selection. The Leech, 18, 2.
- Biesheuvel, S. (1948): The Selection of Medical Students. Confidential File of South African Medical and Dental Council, September 1948, but as published earlier in The Leech.
- Biesheuvel, S. (1949): The Measurement of Intelligence and Aptitudes of African Peoples. African Regional Scientific Conference, Johannesburg.
- Biesheuvel, S. (1952): The Study of African Ability. National Institute for Personnel Research, Johannesburg.

- Black, O. (1955): Memorandum on Analysis of Some Data Relating to Entrants in the Faculties of Pure Science and Agriculture for the Period 1949-1951. Office of the Student Adviser, University of Natal.
- Black, O. (1957a): Academic Success and Failure among Entrants in Science and Applied Science at the University of Natal. Office of the Student Adviser, University of Natal.
- Black, O. (1957b): Memorandum from the Student Advisory Service on Matriculation Standards. Office of the Student Adviser, University of Natal.
- Boyd, W. (1922): Measuring Devices in Composition, Spelling and Arithmetic.
- Branford, Benchara (1921): A Study of Mathematical Education. Oxford University Press. First Published, 1908.
- British Medical Association (1947): Selection of Medical Students: Confidential Memorandum by Chairman of British Medical Association for Medical Curriculum Committee, 8th October.
- Brown, E.M. and Cominsky, J.G. (1955): Ex-National Service and "Schoolboy" Undergraduates: a Comparative Study of Academic Performance. British Journal of Educational Psychology XXV, pp. 55-59.
- Bureau of Census and Statistics, Pretoria (1960): Union Statistics for Fifty Years.
- *Burt, C. (1940): The Factors of the Mind, University of London Press. Cited by Eysenck (1947).
- Burt, C. (1944): Statistical Problems in the Evaluation of Army Tests. Psychometrika, 9, 219-235
- Carothers, J.C. (1953): The African Mind in Health and Disease. World Health Organisation, Geneva.
- Carothers, J.C. (1954): The Psychology of Mau Mau. Government Printer, Nairobi.
- Cattell, R.B. (1945-1946): The Riddle of Perseveration:
I. "Creative Effort" and Disposition Rigidity.
II. Solution in terms of Personality Structure.
Journal of Personality, Vol. XIV, Sept. 1945—June 1946,
Duke University Press, Durham, North California.
- Ceithaml, Joseph J. (1957): Appraising Non-intellectual Characteristics. Journal of Medical Education, 32, 10.
- Cilliers, B.H. (1959): Research in South Africa on Malachievement of Freshmen at University. Unisa, University of South Africa.
- Civil Service Commissioners (1951): Memorandum on the Use of the Civil Service Selection Board in the Reconstruction Competitions. H.M.S.O., London.
- Civil Service Selection Board Psychological Office (1959): A Brief Description of the Civil Service Selection Board. Civil Service Commission, 6 Burlington Gardens, London, W.1.

- Commission on Post-School Certificate and Higher Education in Nigeria (1960): Report: Investment in Education. St. Clement's Press, London. (Cited in notes as Ashby, 1960).
- Committee on the Admission of Students to the Medical Schools of South Africa (1943): Report. Government Printer, Pretoria.
- Committee on Medical Training in South Africa (1939): Report. Government Printer, Pretoria. (U.G.35 of 1939).
- Commonwealth Conference on the Teaching of English as a Second Language (1961). Report. Government Printer, Entebbe, Uganda.
- Cook, P.A.W. (1939): The Native Std. VI Pupil. Van Schaik, Pretoria.
- Cooppan, S. (1948): The education of the Indian in Natal, 1860-1947. Ph.D. Thesis, University of Cape Town.
- Cowles, John T. (1957): Background of the 1956 Institute. Journal of Medical Education 32, 10, October.
- Dale, R.R. (1952): The Prognostic Value of the University Entrance Examination. British Journal of Educational Psychology, Volume XXII.
- Dale, R.R. (1954): From School to University. London. Routledge and Kegan Paul.
- Darley, John A. (1957): Overall Appraisal of the Admissions Process. Journal of Medical Education, 32, 10.
- Das, R.C. (1955): Correlates of Success and Failure among Arts and Science Students in an Indian University. Doctoral thesis, University of London.
- Das, R.C. (1956): The Selection of Medical Students. Occupational Psychology. Vol. 30, No. 1, pp. 27-42.
- Dearborn, W.F., Rothney, J.W. and others (1941): Predicting the Child's Development. Sci-Art Publishers, Cambridge, Massachusetts.
- Dent, G.R. (1949): An Investigation of Certain Aspects of Bantu Intelligence. Government Printer, Pretoria.
- Department of Native Affairs (1957): Bantu Education: Draft Syllabuses for the Junior Certificate. Government Printer, Pretoria.
- De Villiers, F.J. (1961): Bantu Education: Where the Money comes from - and where it goes. Address by the Secretary for Bantu Education to the South African Institute of Race Relations. Reprinted in Bantu, March, 1961.
- Dickie-Clark, H. (1954): A Study of Some African Senior Certificate Students and their Parents. Unpublished M.S.
- Drever, J. (1952): A Dictionary of Psychology, Penguin.
- Dyer, H.S. and King, R. (1955): College Board Scores; Their Use and Interpretation (No. 2). College Entrance Examination Board, Princeton, U.S.A.
- Edholm, O.G., and Gibson, Q.H. (1944): Examination Results and an Intelligence Test. Lancet, 247, pp. 294-296.

- Eiselen Report (1951): Report of the Commission on Native Education, 1949-1951. Government Printer, Pretoria.
- Epstein, B. (1957): The Selection of Medical Students. Presidential Address to the Northern Transvaal Branch of the Medical Association of South Africa, 12th February, 1957.
- Eysenck, H.J. (1947): Student Selection by Means of Psychological Tests: A Critical Survey. British Journal of Educational Psychology: 17, 20-39.
- Eysenck, H.J. (1953a): Uses and Abuses of Psychology. Pelican Books.
- Eysenck, H.J. (1953b): The Structure of Human Personality. Methuen, London.
- *Finlayson, D.S. (1951): The Reliability of the Marking of Essays: British Journal of Educational Psychology, 21. 126-134.
- Fleming, C.M. (1948): Adolescence: Its Social Psychology. Routledge and Kegan Paul, London.
- Fort Hare Commission (1955): Report of the Fort Hare Commission, July. Lovedale Press.
- Freud, Sigmund (1914): Psychopathology of Everyday Life. Ernest Benn, London, 1949.
- Funkenstein, D.M. (1957): Possible Contributions of Psychological Testing of the Nonintellectual Characteristics of Applicants to Medical School. Journal of Medical Education, 32, 10.
- Furneaux, W.D. (1955): The Nufferno Tests. Bulletin of the National Foundation for Educational Research, November.
- Furneaux, W.D. (1961): The Chosen Few. Oxford University Press.
- Gale, G.W. (1955): The Durban Medical School: A Progress Report. South African Medical Journal, 29, pp. 436-440.
- Gale, G.W. (1959): Medical Schools in Africa: A Short Historical and Contemporary Survey. Journal of Medical Education, 34, 8, pp. 712-719.
- *Garrett, F.H. (1949): A review and interpretation of investigations of factors related to scholastic success in colleges of arts and science and teachers' colleges. Journal of Experimental Education, XVIII, 2. (Cited by Dale, 1954).
- Garrett, H.E. (1943): The Discriminant Function and its use in Psychology. Psychometrika, 8, pp. 65-79.
- Garrett, H.E. (1953): Statistics in Psychology and Education. 4th Edition. Longmans.
- Gee, H.H. (1957): The Student View of the Medical Admissions Process. Journal of Medical Education, 32, 10.

- Gee, H.H. and Nourse, E.S. (1960): Admission Requirements of American Medical Colleges, 1960-1961. Association of American Medical Colleges, Evanston, Illinois.
- Gibson, Q.H. (1948): Intelligence Tests and University Careers of Medical Students. Lancet, 255, 323-324.
- *Glaser, R. (1951): Predicting Achievement in Medical School. Journal of Applied Psychology, 35, 272-274. Cited by Das, 1956.
- Glaser, R.J. (1957): Appraising Intellectual Characteristics. Journal of Medical Education, 32, 10.
- Gordon, I. (1957a): Report on the Government's Intended Action to Remove the Faculty of Medicine from the University of Natal. Durban, 4th March, 1957.
- Gordon, I. (1957b): Further Report on the Government's Intention to Remove the Faculty of Medicine from the University of Natal. Durban, 4th May, 1957.
- Gordon, I. (1958a): Third Report on the Government's Intention to Remove the Faculty of Medicine from the University of Natal. Durban, 25th February, 1958.
- Gordon, I. (1958b): Addendum to the Third Report on the Government's Intention to Remove the Faculty of Medicine from the University of Natal. Durban, 25th March, 1958.
- Gottheil, E., and Michael, C.M. (1957): Predictor Variables employed in Research on the Selection of Medical Students. Journal of Medical Education, 32, 2.
- Gouws, D.J. (1957): Die Akademiese Vordering en Aanpassing van Eerstejaar Universiteitstudente - 'n Statisties-Klinies Studie. Ph.D. Thesis, University of Pretoria: now published by van Schaik, Pretoria, 1961.
- Gouws, D.J. (1960): The problem of testing sequence when administering a battery of tests. Journal of the National Institute for Personnel Research. December.
- Grimsley, G. (1949): A Comparative Study of the Wherry-Doolittle and a Multiple Cutting-Score Method. Psychological Monographs, No. 297 (Vol. 63, No. 2): American Psychological Association.
- Guilford, J.P. (1947): Printed Classification Tests. U.S. Army Air Force Psychology Programme, Research Report No. 5, U.S. Government Printing Office, Washington.
- Guilford, J.P. (1950): Fundamental Statistics in Psychology and Education (2nd Edition). McGraw-Hill, New York. First published 1942.
- Guilford, J.P. (1954): Psychometric Methods. McGraw-Hill, New York.
- Guilford, J.P. (1955): The Relation of Certain Thinking Factors to Training Criteria in the U.S. Coastguard Academy. Studies of Aptitudes of High-level Personnel. Psychological Laboratory, University of Southern California.

- Hailey, Lord, (1957): An African Survey. Oxford University Press.
- Handler, J.S. (1957): The Selection of Medical Students via the Psychiatric Interview. Journal of Medical Education, 32, 10.
- Harris, A.D. (1947): Methods of Selection of Medical Students. Unpublished Report, Psychological Laboratory, Cambridge.
- Harris, A.D. (1948): The Selection of Medical Students. Lancet, 255, 317-321.
- Harris, A.D. (1950): AH5 Test Norms for Medical Students. Progress Report (MSSC.10) to the Medical Research Council Advisory Committee on Methods of Selection of Medical Students. August, 1950.
- Harris, A.D. (1951): Progress Report (March 1951) to Medical Research Council Advisory Committee on Methods of Selection of Medical Students.
- Harris, A.D., and James, P.H.R. (1948): A Study of some of the Factors influencing success in the First Medical Examinations. Progress Report to the Medical Research Council Advisory Committee on Methods of Selection of Medical Students.
- Hartog, P., Rhodes, E.C., and Burt, C.L. (1936): The Marks of Examiners. MacMillan. London.
- *Haymaker (1953): The Founders of Neurology. (Cited by Nathan, 1954).
- Heim, A.W. (1954): The Appraisal of Intelligence. Methuen. London.
- Heim, A.W. (1956a): Intelligence: Quantity or Quality? Bulletin of the National Foundation for Educational Research, March 1956.
- Heim, A.W. (1956b): Some Preliminary Experiments on a Test of Concept-Formation. Unpublished MS.: Address to British Psychological Society, December, 1956.
- Heim, A.W. and Watts, K.P. (1953): An Inquiry into the Relationship between the Performance of Scholarship Candidates in their University career and on a high grade Intelligence Test. Unpublished MS. February, 1953.
- *Hellmann, E. (1940): Problems of Urban Bantu Youth. South African Institute of Race Relations, Johannesburg. Cited by Kumalo, 1955.
- Hibler, F.W. (1957): The Interview as a Selection Tool for Industry. Journal of Medical Education, 32, 10.
- Hills, J.R. (1955): The Relationship between Certain Factor-Analysed Abilities and Success in College Mathematics. (Studies of Aptitudes of High-Level Personnel: Reports from the Psychological Laboratory, The University of California), No. 15, August, 1955.
- Himmelweit, H.T. (1945): The intelligence-vocabulary ratio as a measure of temperament. Journal of Personality, 14, 93-105.
- Himmelweit, H.T. and others (1949): Student Selection: An Experimental Investigation. Unpublished MS.

- Himmelweit, H.T. (1950): Student Selection - An Experimental Investigation: I. British Journal of Sociology, Vol. I, No. 4.
- Himmelweit, H.T. and Summerfield (1951a): Student Selection: An Experimental Investigation: II. British Journal of Sociology, Vol. II, No. 1, pp. 59-75.
- Himmelweit, H.T. and Summerfield, A. (1951b): Student Selection: An Experimental Investigation: III. British Journal of Sociology, Vol. II, No. 4, pp. 340-353.
- Hippocrates: The Canon. (The Medical Works of Hippocrates, ed. Chadwick, J. and Mann, W.W. 1950). Blackwell, Oxford.
- Hobart Houghton, D. (1955): Life in the Ciskei. A summary of the findings of the Keiskammahoek Rural Survey, 1947-51. South African Institute of Race Relations, Johannesburg.
- *Hohne, H. (1951): The Prediction of Academic Success. Australian Council for Educational Research. (Cited by Dale, 1954.)
- Hopkins, J., Malleon, N. and Sarnoff, I. (1958): Some non-Intellectual Correlates of Success and Failure among University Students. British Journal of Educational Psychology, XXVIII.
- Horrell, M. (1953): Standards of Education at present attained by the Union's African population. South African Institute of Race Relations, Johannesburg.
- Horrell, M. (1961): A Survey of Race Relations in South Africa. South African Institute of Race Relations, Johannesburg.
- Horrell, M. and Skinner, J. (1960): Bantu Education: 1949-1959. Summary of information from Annual Surveys of Race Relations. S.A. Institute of Race Relations, Natal.
- Hotelling, H. (1935): Simplified Calculation of Principal Components. Psychometrika, Vol. 1, No. 1, pp. 27-35.
- Huddleston, Father T., C.R. (1953): The Indivisibility of Education. Education League, Johannesburg.
- Jacobson, C.F. (1946): Interest and Attitude as Factors in Achievement in Medical School. Journal of the Association of American Medical Colleges, 21, 152-159.
- Johnson, D.G. (1958): Improving the Selection of our Future Physicians. Report of Pre-Medical Advisers' Conference, State University of New York, November.
- Johnson, M.L. (1951): Second Interim Report of Investigations on Selection of Medical Students at University College, London.
- Johnson, M.L. (1959): Selection Procedure and Examination Performance. The Lancet, 29th August.
- Jones, T.J. Education in Africa. (Report of the Phelps-Stokes Commission 1920-1921). New York, no date.
- Joint Matriculation Board (1958): Matriculation Examination Handbook. Juta, Cape Town.

- Kamat, V.V. (1958): Measuring Intelligence of Indian Children. Oxford University Press.
- Kelly, E.L. and Fiske, D.W. (1951): The Prediction of Performance in Clinical Psychology. University of Michigan Press, Ann Arbor.
- Kelly, E.L. (1957a): A Critique of the Interview. Journal of Medical Education, 32, 10
- Kelly, E.L. (1957b): Multiple criteria of Medical Education and their implications for selection. Journal of Medical Education, 32, 10.
- Kendall, M.G. (1955): Rank Correlation Methods. 2nd Edition. Charles Griffin, London.
- Kuper, H. (1960): Indian People in Natal. University of Natal Press, Pietermaritzburg.
- *Klineberg, O. (ed., 1944): Characteristics of the American Negro, Harper, New York. (Cited by Shuey, 1958).
- Kumalo, C. (1955): Schooling - Past and Present. (Chap. 7 of The Baumannville Community. Institute for Social Research, University of Natal.
- Latscha, R. (1953): Tests of Significance in a 2 x 2 Contingency Table. Biometrika, 40, 74-86.
- Lafitte, P. (1954): Melbourne Test 90. Australian Journal of Psychology Monograph Supplement No. 1.
- Lewis, D.G. (1958): The effect of National Service on Academic Performance at the University. British Journal of Educational Psychology, XXVIII.
- Logue, G.D. (1956): The Standardisation of a Battery of Intelligence and Achievement Tests suitable for Indian Primary School Children in Durban. Ph.D. Thesis, University of Natal.
- Lumsden, J. (1955): Validity of Melbourne Test 90. Journal of Australian Psychology, 7, 1, pp. 52-55.
- MacMahon, D. (1953): Educational Selection and Allocation. (Article in Current Trends in British Psychology. Ed. C.A. Mace and P.E. Vernon. Methuen).
- Malherbe, E.G. (1937): The relationship of entrance age to academic success of university students. National Bureau of Educational and Social Research, Pretoria.
- Malherbe, E.G. (1938): Whither Matric? South African Journal of Science, XXXV, 126-53.
- Malherbe, E.G. (1956): Higher Education of non-Europeans in South Africa. Optima 6: 1, March.
- Malherbe, E.G. (1951): Medical Training for Africans: A Statement on Wentworth College Medical School, University of Natal. Race Relations News. Institute of Race Relations, Johannesburg. October.

- Malherbe, E.G. and Cook, P.A.W. (1938): The Relationship of Entrance Age of University Students to their Academic Success. J.L. van Schaik, Pretoria.
- McClelland, W. (1949): Selection for Secondary Education. University of London Press. First published, 1942.
- McConnell, T.R. (1957): Reflections on Medical Education and some of the Problems of Selection. Journal of Medical Education, 32, 10.
- McConkey, W.G. (1960): The Future of Indian Education. Theoria, No. 15. University of Natal Press.
- McFie, J. (1954): African Performance of Intelligence Tests. Uganda Journal (Uganda Society, Kampala) Vol. 18, No. 1, pp. 34-43. March.
- Meehl, P.E. (1954): Clinical versus Statistical Prediction. University of Minnesota Press, Minneapolis.
- Meiring, J.G. (1950): Naturelle-Onderwys. (A Section of Die Naturelle-vraagstuk, Suid-Afrikaanse buro vir Rasse-Aangeleentede). Pro-Ecclesia Drukkery, Stellenbosch.
- Mitchell, L. (1950): Preliminary Report on the Validation of Selection Tests for First Year Medical Students. Bulletin of the National Institute for Personnel Research, Johannesburg. Vol. II, No. 2.
- Moroney, M.J. (1953): Facts from Figures. Penguin Books. 2nd Edition.
- *Morris, D.P. and Miller, C. (1954): The Relationship between Chronological Age and Success in Medical School. Journal of Medical Education, 29, 38-43. (Cited by Das, 1956).
- Morrisby, J.R. (1955): The Differential Test Battery. National Foundation for Educational Research, London.
- Mountford, J. (1956): How They Fared. Liverpool University Press.
- *Munroe, R.L. (1945): Prediction of the adjustment and academic performance of college students by a modification of the Rorschach method. Applied Psychology Monograph No. 7. Cited by Eysenck, 1947.
- Murray, C.O. (1956): The Structure of African Intelligence: A Factorial Study of the Abilities of Africans. M.A. Thesis, University of Natal.
- Natal Provincial Administration: Finance Accounts, 1949-50. (NP.4/1952). Pietermaritzburg.
- Natal Provincial Administration: Report of the Director of Education, 1951.
- Natal Provincial Administration: Educational Statistics for the Year 1954. NP.6/1957. Pietermaritzburg.
- Natal Provincial Administration (1959): Tables of Educational Statistics, 1957. N.P.8/1959. Pietermaritzburg.
- Nathan, P.W. (1954): The Selection of Future Doctors: Lessons from the Past. Lancet, 267, pp. 407-9.

- Nisbet, J.D. (1955): English Composition in Secondary School Selection. British Journal of Educational Psychology, 25, 51-4.
- Notcutt, B. (1949): Addendum to Biesheuvel's The Measurement of Intelligence and Aptitudes of African Peoples. African Regional Scientific Conference, Johannesburg.
- Notcutt, B. (1950): The Measurement of Zulu Intelligence. Journal for Social Research, Department of Education, Arts and Science, Pretoria. Vol. I, No. 2, pp. 195-206.
- O'Dowd, M.C. (1954): The African in the Universities. 2nd Edition. National Union of South African Students.
- Oldfield, R.C. (1941): The Psychology of the Interview. Methuen.
- Parkyn, G.W. (1959): Success and Failure at the University. Wellington: New Zealand Council for Educational Research.
- Peel, E.A. and Rutter, D. (1951): The Predictive Value of the Entrance Examination as judged by the School Certificate Examination. British Journal of Educational Psychology, 21, 30-35.
- Peterson, S. (1946): Who should enter Dental School? Journal of the American Dental Association, Vol. 33, pp. 58-63.
- Peterson, S. (1947a): Dental Aptitude Testing Program: A Report of Progress. Journal of the American Dental Association, Vol. 35, pp. 175-184.
- Peterson, S. (1947b): Achievement of Freshman Dental Students on 1946-1947 Aptitude Testing Program. Journal of the American Dental Association, Vol. 35, pp. 868-872.
- Petrie, A. (1948): The Selection of Medical Students. Lancet 255, pp. 325-327.
- Priestley, R.R. (1958): The Mental Health of University Students. Melbourne Studies in Education, 1957-8, Melbourne University Press.
- Quenouille, M.H. (1950): Introductory Statistics. London. Butterworth-Springer.
- Raven, J.C. (1948): Guide to Using the Mill Hill Vocabulary Scale with Progressive Matrices (1938): H.K. Lewis and Co., London.
- Reuning, H. (1957): Pauli Test Profiles of a Group of Medical Students in Relation to their I.Q.s and First Year University Results. (Abstract).
- Richardson, S.C. (1956): Some Evidence relating to the Validity of Selection for Grammar Schools. British Journal of Educational Psychology, 26, 13-24.
- *Rubenowitz, S. (1954): Predicting Academic Success. Unpublished dissertation for Academic Postgraduate Diploma in Psychology, Birkbeck College, London University. (Cited by Das, 1956).

- *Salter, M.D. (1942): A Method of Selection of Medical Students based on Previous Academic Grades and Medical Aptitude Scores. Journal of the Association of American Medical Colleges, 17, 300-309. (Cited by Das, 1956).
- Sanders, C. (1948): Student Selection and Academic Success in Australian Universities. Education Series No. 1. Commonwealth Office of Education, Sydney.
- Sarbin, T.R. (1942): A Contribution to the Study of Actuarial and Individual Methods of Prediction. American Journal of Sociology, 48, 593-602.
- *Schlesser, G.E. and Roberts, R.C. (1941): Selecting and Predicting Success in Medical Schools. Journal of the Association of American Medical Colleges, 16. (Cited by Das, 1956.)
- Schofield, W. (1957): The Use of Objective Personality Tests in Selection of Medical Students. Journal of Medical Education, 32, 10.
- Scottish Council for Research in Education (1936): The Prognostic Value of University Entrance Examinations in Scotland. International Examination Enquiry. London University Press.
- *Scottish Council for Research in Education (1953): Social Implications of the 1947 Scottish Mental Survey. University of London Press. (Cited by Vernon, 1957).
- Schumacher, C. (1958): Contributions of the Association of American Medical Colleges to the Selection and Education of our future Physicians. Report of Pre-Medical Advisers' Conference. State University of New York. November.
- Shoemaker, H.A. and Rohrer, J.H. (1948): Relationship between Success in the Study of Medicine and Certain Psychological and Personal Data. Journal of the Association of American Medical Colleges, 23, 190-201. (Cited by Das, 1956).
- Shuey, A.M. (1958): The Testing of Negro Intelligence. J.P. Bell, Lynchburg, Virginia.
- Sichel, H.S. (1950): Note on the reliability of combinations of subtests, tests or criteria. Bulletin of the National Institute for Personnel Research, 2, 57-60.
- Sichel, H.S. (1952): The Selective Efficiency of a Test Battery. (Psychometrika, 17, 1-39).
- Siegel, S. (1956): Nonparametric Statistics for the Behavioural Sciences. McGraw-Hill, New York.
- Simons, H.J. (1958): Mental Disease in Africans: Racial Determinism. Race Relations Journal, Johannesburg.
- South African Air Force, Aptitude Tests Section (1945): An Investigation into the Score Levels (Tests A, B and M) of Occupational Groups of Recruits to the South African Air Force. (Test M is Ravens Progressive Matrices, 1943 form). A.T.S., S.A.A.F., P.O. TEH. Pretoria, 8.10.1945.

- Spearman, C. (1927): The Abilities of Man. Macmillan, London.
- Stalnaker, J.M. (1951): Is there a Science of Personnel Selection? American Journal of Public Health, Volume 41, No. 2.
- Stalnaker, J.M. (1950): Medical College Admission Test. Journal of the Association of American Medical Colleges. November.
- Stalnaker, J.M. (1954): The Medical College Admission Test. Journal of Medical Education. December.
- Strong, G.K. (1943): Vocational Interests of Men and Women. Stanford University Press.
- Strother, C.R. (1957): The Use of Projective Tests in the Assessment of Medical School Applicants. Journal of Medical Education, 32, 10.
- *Stuit, D.B. (1941): The Prediction of Scholastic Success in a College of Medicine. Educational Psychol. Measurement, I, 77-84.
- Summerfield, A. and Lubin, A. (1951a): A Square Root Method of Selecting a Minimum Set of Variables in Multiple Regression. I. The Method. Psychometrika, Vol. 16, No. 3, September.
- Summerfield, A. and Lubin, A. (1951b): A Square Root Method of Selecting a Minimum Set of Variables in Multiple Regression. II. A Worked Example. Psychometrika, Vol. 16, No. 4. December.
- Thomson, G. (1946): The Factorial Analysis of Human Ability. University of London Press, 1939. Reprinted 1946.
- Thorndike, R.L. (1949): Personnel Selection. New York: John Wiley and Sons.
- Tobias, D.V. (1951): The African in the Universities. 1st Edition. National Union of South African Students. October.
- Tozer, A.D.H., and Larwood, H.J.C. (1958): The Changes in Intelligence Test Score of Students between the beginning and end of their University Courses. British Journal of Educational Psychology, XXVIII, part II.
- Transvaal Education Department (1960): Report of the Year ended 31st December, 1958. T.P. No. 2, 1960. Government Printer, Pretoria.
- University College of Fort Hare (1959): Calendar.
- University of Cape Town (1960): Correlation of Matriculation Aggregate with the Length of Time taken to complete the Six-Year Medical Course. Dean's Office, Medical School, University of Cape Town.
- University of Natal: Calendar.
- University of Natal: Gazette.
- University of Natal (1953a): Help Your People. (Appeal for Funds for the non-European Section of the University).

- University of Natal (1953b): The New Durban Medical School Responds to the Challenge of Africa. (Appeal for Funds for the Faculty of Medicine).
- University of South Africa (1960): UNISA, Vol. 13, No. 14.
- Valentine, C.W. (1932): The Reliability of Examinations. London University Press.
- Vernon, P.E. (1950a): The Structure of Human Abilities. Methuen.
- Vernon, P.E. (1950b): The Validation of Civil Service Selection Board Procedures. Occupational Psychology, XXIV, 75-95.
- Vernon, P.E. (1956): The Measurement of Abilities. University of London Press. Second (Revised) Edition.
- Vernon, P.E. (ed.) (1957): Secondary School Selection: A British Psychological Society Inquiry. Methuen.
- Whyte, W.H. . (1954): The Fallacies of "Personality" Testing. Fortune, September.
- Wiseman, S. (1949): The Marking of English Compositions in Grammar School Selection. British Journal of Educational Psychology, 19, 200-209.
- Wolfle, D. (1957): Medicine's Share in America's Student Resources. Journal of Medical Education, 32, 10.
- Woods, C.A. (1954): The Indian Community of Natal: Their Economic Position. Oxford University Press.
- World Survey of Education (1955). Unesco, Paris.
- Yates, A. and Pidgeon, D.A. (1957): Admission to Grammar Schools. National Foundation for Educational Research in England and Wales.
- Year Books of the Union of South Africa. Government Printer, Pretoria.
- *Young, R.H. and Pierson, G.A. (1948): The Professional Aptitude Test, 1947 - A Preliminary Evaluation. Journal of the Association of American Medical Colleges, 23, 176-179. (Cited by Das, 1956).
- Yule, G.U. and Kendall, M.G. (1950): An Introduction to the Theory of Statistics (14th Edition). Charles Griffin, London.
- Zubin, J. (1957): A Brief Survey of the Interview. Journal of Medical Education, 32, 10.