technical education for indians

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TECHNICAL EDUCATION FOR INDIANS

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P R E F A C E

It is a well-known fact that the economic development of any country depends to a great extent on the utilization of capital, raw material and manpower. To allow rapid development, all available manpower must be chanelled into an efficient qualified labour force with an assortment of skills which is exploited to its maximum potential. To ensure the existence of such a labour force and to ensure that its needs are constantly catered for, training and education must be as effective as possible and must also cope with any development in the field of manpower.

In South Africa the labour force consists of Whites, Indians, Coloureds and Blacks. It may be assumed that to be able to live in harmony with each other, each group according to its potential must make a contribution to the economy of the country. This they can do by making full use of, inter alia, the technical education and training provided for them.

In this report, requested by the Department of Indian Affairs, particular attention is paid to job opportunities and technical education for Indians in South Africa and it is hoped that this report will not only serve as a source of information on these two aspects but that it will also make a contribution towards the improvement of relations or connections between them and that it will go a long way towards solving the problems related to these two aspects.

Furthermore, a cordial word of thanks is hereby extended to the various educational institutions for Indians and the Division of Education of the Department of Indian Affairs which rendered assistance in the completion of this report. The evaluation and approval of this report by the Department of Indian Affairs is appreciated.

J. G. Garbers.

PRESIDENT

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OPSOMMING

In hierdie verslag word eerstens 'n aanduiding gegee van die werksgeleenthede vir Indiërs in die RSA en die rol wat hulle in die breë beroepsveld speel. Wat hierdie aangeleentheid betref, is hoofsaaklik gebruik gemaak van toepaslike gegewens soos verkry by wyse van ondersoeke wat deur ander institute van die RGN uitgevoer is.

Soos in die verslag aangetoon, word verwag dat die vraag na Indiërarbeid steeds sal toeneem en dat van al die verskillende arbeidsektore, die nywerheidsektor na verwagting teen 1980 die grootste verskaffer van arbeid aan Indiërs sal wees. Daar word verwag dat daar inderdaad 'n tekort aan Indiërarbeiders sal ontstaan, en dit is veral in hierdie opsig dat tegniese onderwys vir Indiërs 'n belangrike rol vervul ter oplossing van die probleem. In die lig hiervan moet tegniese onderwys tred hou met die toenemende aanvraag na opgeleide werkers. Spesifieke aandag word in die verslag gegee aan beroepsgeleenthede vir tegnici van al die bevolkingsgroepe wat na verwagting teen 1980 'n aansienlike deel van alle werksgeleenthede vir veral mans sal uitmaak. 'n Sterk moontlikheid bestaan dat 'n nypende tekort aan opgeleide tegnici ondervind kan word. Die tekort aan opgeleide vakmanne (alle bevolkingsgroepe) neem ook steeds toe en na raming kan dit teen 1980 ernstige afmetings aanneem.

Enkele grondslae van doeltreffende tegniese onderwys, te wete persoonsvormende faktore, beroepsgerigtheid en inagneming van die land se mannekragbehoeftes word in 'n afsonderlike hoofstuk bespreek. Hierdie grondslae is ook ontwerp om as kriteria te dien ter evaluering van die huidige stelsel van tegniese onderwys vir Indiërs.

Op grond van besoeke aan die verskillende instansies wat met tegniese onderwys vir Indiërs gemoeid is en aan die hand van inligting uit verskillende literatuurbronne, word vervolgens 'n oorsig van tegniese onderwys vir Indiërs in die RSA gegee. Vir die doeleindes van dié studie word onderskei tussen sekondêre tegniese onderwys, wat dan tegniese onderwys behels soos aangebied aan die 4 erkende tegniese hoërskole vir Indiërs en gevorderde tegniese onderwys vir Indiërs soos aangebied deur die M.L. Sultan Tegniese Kollege. Soos in die verslag aangedui, word heelwat ernstige probleme in veral sekondêre tegniese onderwys vir Indiërs ondervind, waarvan die groot getal vroeë skoolverlaters en die ernstige tekort aan opgeleide onderwysers in die tegniese vakke seker die heel belangrikste is. 'n Evaluering van die huidige stelsel van tegniese onderwys aan die

hand van gestelde grondslae het ook enkele ander leemtes aan die lig gebring. Na aanleiding van alle gegewens vervat in die studie word ten slotte sekere aanbevelings gemaak met betrek= king tot tegniese onderwys vir Indiërs in die RSA.

SUMMARY

In this report an indication is firstly given of the job oppor= tunities for Indians in the RSA (and the role played by them) and their place in the general occupational field. In this regard, use has mainly been made of appropriate information obtained by means of research carried out by other institutes of the HSRC.

As indicated in this report, it is expected that the demand for Indian labour will continue to increase and that of all the various sectors of labour, the industrial sector will, according to expectations, be the largest Indian labour source by 1980. It is also expected that there will in actual fact be a shortage of Indian labourers and it is especially in this respect that technical education for Indians plays an impor= tant role in solving this problem. In the light of this, technical education must keep pace with the increasing demand for qualified workers. Specific attention is given in the report to job opportunities for technicians of all population groups which, according to expectations, will constitute a con= siderable part of all job opportunities, especially those for men. There is a strong possibility that a serious shortage of qualified technicians may be experienced. The shortage of qualified artisans (all population groups) is also increasing and according to calculations it may assume serious propor= tions by 1980. It would therefore also appear as if there will be a considerable demand for qualified Indian technicians and artisans by 1980.

Some foundations for efficient technical education, namely person-forming factors, vocational directedness and conside= ration of the manpower requirements of the country are dis= cussed in a separate chapter. These fundamentals are also designed to serve as criteria for evaluating the present sys= tem of technical education for Indians.

Based on visits to the various institutions concerned with technical education for Indians and information obtained from various literary sources, a review of technical education for Indians in the RSA is subsequently given. For the purposes of this study, a distinction is made between secondary technical education, which includes technical education as provided at the 4 acknowledged technical high schools for Indians, and ad= vanced technical education for Indians as provided by the M.L. Sultan Technical College. As indicated in the report, some serious problems are being experienced, especially in secondary technical education for Indians, the most important

being the high number of early school-leavers and the serious shortage of qualified teachers for the technical subjects. An evaluation of the present system of technical education, based on the given foundations, has also brought several other deficiencies to light. With reference to all information disclosed in the study, certain recommendations are finally made regarding technical education for Indians in the RSA.

CHAPTER 1

PROBLEM SETTING, AIM AND METHOD OF RESEARCH

1.1 PROBLEM SETTING

It is a well-known fact that the economic development of any country depends on the utilization of capital, raw materials and manpower. To achieve rapid development, all the available manpower must be incorporated into an efficient, qualified labour force with various skills which is exploited to its maximum potential. To ensure the existence of such a labour force and to ensure that its needs are constantly catered for, training and education must always be as effective as possible and must also cope with all the developments in the field of manpower.

In South Africa the labour force consists of members of various ethnic groups, each with its own culture and interests. It can be assumed that to be able to live in prosperity and harmony with one another, each ethnic group must, according to its manpower resources and every individual's potential, inter alia, make a contribution to the national economy. To aid them in doing so, training and education are given to every ethnic group in South Africa today.

Cultural differences, however, play a significant role in training and education. Where two or more ethnic groups come into contact with one another, acculturation takes place in most cases, sometimes very slowly and with great difficulty. In South Africa, as elsewhere in the Western world, the European cultures are regarded as the most advanced (or as the ideal norm) in the technological field, because of their high standard of technological achievements. Where any other culture thus comes into contact with a European culture, it may be expected that the other culture will at least strive to attain the same technological standard as that of the European culture, because of the fact that a high technological standard is essential for economic development today.

In South Africa it is found that in the process of acculturation some cultures are more advanced (with the European cultures as the norm) in the technological field than others. Because man is the bearer of culture, it is this "state of advance" of his culture which also plays a vital role in the education and training of any ethnic group today. In the technological field the pupil must be guided to achieve the ideal norm, but at the same time the "state of advance" of his

cultural background must always be taken into consideration, that is, the pupil must be able to interpret what he is being taught while gradually proceeding to the ideal norm.

According to facts recently disclosed in research carried out by the HSRC (41), 35 per cent of all job opportunities for Whites in 1969 were for technicians and technical assistants. It has been estimated that by 1980, approximately 41 per cent of all job opportunities for Whites will be for technicians and technical assistants. If the norm for Whites in the technological field is taken into consideration and considered applicable to all the ethnic groups, it would appear that a promising career in the technological field awaits the member of any ethnic group in South Africa, provided he is not only given the opportunity but also that he reaches the standard set for a technological career. This he can achieve by making full use of the technical education and training at his disposal.

1.2 WHAT IS TECHNICAL EDUCATION?

Rosenberg comments as follows on technical education: "The term 'technical education' carries the connotation of specific knowledge and understanding of the theory of 'know-how' as compared to manipulative skill". The definitions-of-terms bulletin of the American Vocational Association defines technical education as: "..... education to earn a living in an occupation in which success is dependent largely upon technical information and understanding the laws of science and technology as applied to modern designs, production and service. From this definition, it can readily be seen that technical education has no particular bounds and that all vocational education (trade and industrial education, distributive, home economics, business, agriculture, and even professional education) constitutes technical education. Technical education must therefore be defined in terms of the job or occupation" (31, p. 9).

Venn has the following view on the origin of technical education: "Both vocational and technical education were products of essentially the same societal forces : they were designed to meet new educational needs of the industrial classes and had a common philosophy of education : they were comrades in arms in the heady push for the acceptance of vocational forms of education" (52, p. 67).

Although there are various definitions for technical education, certain facts are common in most of them, as is the case in the two views given above. The most important fact is that technical education and vocational education are virtually inseparable, that is, technical education is always in some way connected to or directed at a certain vocation or group of vocations. It must, however, be stressed that vocational education is not necessarily technical education.

1.3 WHAT IS A TECHNICIAN, AN ARTISAN AND AN APPRENTICE?

a. A Technician

What does the work of a technician entail, and can every person who has undergone some form of technical education be regarded as a technician? Warren supplies an acceptable answer when he says: "The term 'technician' applies to persons working in occupations requiring a knowledge of technology and related sciences between that of a skilled worker and that of an engi= neer or technologist; occupations at the technician's level may call for inspection and maintenance, detailed development plans, supervision of production work, detail construction. Collaboration with the engineer is an essential part of the work of a technician. Though the term 'technical education' is at least a hundred years old, the use of the word 'technician' is relatively recent. Its precise occupational meaning is still not well defined but the fact that occupational levels exist between that of professional engineer (technolo= gist) and that of skilled worker is obvious. In fact, the gap is so wide that two intermediate levels are called for, which will be referred to as 'technician' and 'higher technician'. The meaning of the word 'technician', originating in the in= dustrial field, is now extended to denote a certain academic and social level between 'skilled worker' and 'engineer'. Although not all industries need such a category, there are but few at present who have not taken some action to utilize a level of training below that of university or full professional qualification, if only because university graduates are scarce and expensive to produce. Whilst persons with this level of training are in great demand especially in developing countries, the number being trained is never sufficient to meet the demand. The prestige value of university studies and the increasing financial assistance governments will provide for university students have caused the volume of technician training to remain quite inadequate for national needs" (55, pp. 104-105).

b. An Artisan

The following short but precise definition of an artisan which can be regarded as acceptable for the purposes of this study, is given in Careers guide to the metal and engineering industries: "The artisan or craftsman or journeyman is the person skilled in the practical processes attached to a particular trade. He is the man who does the job" (40, p. 30).

c. An Apprentice

An equally acceptable definition of an apprentice is the following: "An apprentice is a young worker who is indentured by an employer who undertakes to teach him a certain trade and to pay him a certain fixed wage while he is undergoing training" (26, p. 4). The precise nature of apprenticeship training is discussed in Chapter 4.

1.4 AIM OF THE INVESTIGATION

In the previous paragraph (1.3.1), Warren makes a few interesting statements which have a direct bearing on the aim of this study. In South Africa, which can also be regarded as one of the "developing countries" mentioned by Warren, the Indians constitute one of the many ethnic groups making a valuable contribution to the national economy. In the light of what has been said so far, the aim of this study is:

a. To give an indication of the demand for and supply of labour in South Africa, with specific reference to, inter alia, technicians and artisans and the position as regards the Indians in this connection.

b. To assess technical education as presently provided for the Indian and to ascertain what developments are needed in technical education for the Indian in relation to job opportunities and the national economy.

1.5 METHOD

Information disclosed in this study as regards:

a. job opportunities in South Africa, was obtained mainly through a study of relevant literature (see bibliography), and

b. technical education for the Indian was obtained mainly through correspondence and interviews with persons at

institutions and departments concerned with technical education for Indians, such as the Division of Education of the Department of Indian Affairs, the M.L. Sultan Technical College* and the following Indian secondary schools: M.H. Joosub High, M.L. Sultan Stanger High, M.L. Sultan Pietermaritzburg High and Loram State Indian High.

Information thus obtained was then studied and comparisons were made which eventually led to various conclusions and recommendations.

In brief the study proceeds as follows:

Because the aim of this study may mainly be regarded as twofold, attention is also given, in Chapter 2, to the various job opportunities in the technological field in the Republic. This gives an indication of the job opportunities in this field available to Indians and of the subsequent role that they play in the economy of the country.

Chapter 3 is devoted to an exposition of some foundations for efficient technical education including the aim(s) thereof, i.e. an indication is given of what the ideal norm in technical education is supposed to be, so that comparisons with contemporary forms and aspects of technical education (especially as regards the Indian) can be made, and, in so doing, also the shortcomings (if any) could be determined. Closely connected to the previous chapters, Chapter 4 deals with the second aspect of the aim of this study, namely to give an assessment of technical education as provided for the Indian, and some of the aspects highlighted are for instance the various technical institutions, courses and subjects.

Finally, in the light of the information disclosed, a conclusion is reached and recommendations are made as to what developments are needed in technical education for Indians in relation to job opportunities and the national economy.

*ACCORDING TO ACT NO. 40 OF 1979, THE M.L. SULTAN TECHNICAL COLLEGE IS TO BE OFFICIALLY KNOWN AS THE M.L. SULTAN TECHNIKON. THE RESEARCH WAS, HOWEVER, CARRIED OUT BEFORE THE PASSING OF THIS ACT AND SUBSEQUENTLY THROUGHOUT THIS REPORT REFERENCE IS MADE TO THE M.L. SULTAN TECHNICAL COLLEGE.

CHAPTER 2

DEMAND FOR AND SUPPLY OF LABOUR IN THE RSA

2.1 INTRODUCTION

In Chapter 3 it is stated that effective technical education must be able to cope with the manpower requirements of a country in the technical field, that is, technical education must ensure that sufficient, fully qualified personnel are available whenever and wherever the need for them arises. What are the manpower requirements of South Africa, especially in the technical field, and what is the position of the Indian in this respect? The answers to these questions, which are highlighted in this chapter, will also serve as an aid in the assessment of technical education for the Indian, because it can then be determined whether technical education for the Indian is keeping track with developments in the technical field and how it can be utilized to be of even more or better use to the Indian in fulfilling an even more important role in the economy of South Africa. Should it be found, however, that according to manpower requirements and opportunities for Indians in the technical field, technical education for the Indian is ineffective, it must also be determined which improvements are needed as well as what the results of such improvements would be.

Job opportunities for a specific occupation can be estimated in a variety of ways. For an estimate of the totality of job opportunities, the anticipated economic and accompanying technological changes, as generators of job opportunities, probably constitute the best norm. However, when estimates for occupations or occupational groups are made, economic growth is not necessarily the best norm. For example, for an occupation such as teaching, the number of children in the population would be a far more realistic basis. Interviews with employers of technicians overseas indicate that the demand for technicians is to a large extent determined by the employment of technicians by medical practitioners, architects, engineers, natural scientists, et cetera (9, p. 45).

However, the relationship is by no means a simple one and is linked to the field of specialization of the particular professional group. Not all engineers can make use of the services of technicians; it depends on the nature of the engineer's work. The general practitioner's and specialist-pathologist's needs for technicians cannot be compared. To estimate the job

opportunities for technicians on these grounds one would to a large extent be dependent on the scope and detail of available information, and the data available are not sufficient.

The data available require a far simpler type of estimate. It is known that the occupational composition of the labour force changes over the years as a result of the effect of a variety of factors such as technological development, innovation and rise in the standard of living. These changes are often not big in terms of percentages, since it takes time to train people for new occupations, and although there might be a fair number of alternatives, these are nevertheless limited, as reflected by the simultaneous occurrence of unemployment and manpower shortages.

2.2 GENERAL DEMAND FOR AND SUPPLY OF LABOUR IN THE RSA

2.2.1 Introductory remarks

To appreciate the role of the Indian in the economy of South Africa, it is imperative that an indication is given of the whole aspect of labour demand and supply in which, as mentioned in Chapter 1 of this study, every population group must participate. All facts and figures given in this chapter, were obtained through research carried out by the HSRC (3, 9, 19, 39, 40, 41, 53, 56).

It should be emphasised that the figures contained in the tables should by no means be regarded as a definite prediction, i.e. the figures do not denote what the manpower situation will definitely be in 1980, they are merely an attempt to indicate what may happen if the trends of the 1960-1971 period should continue. Any changes in the economic climate, government policy, pressure brought to bear on certain sectors of the economy and changes in the demand for certain population groups and sexes, will naturally tend to influence these trends.

Although the term "Asians" is used in the studies quoted, it may be safely assumed that both the terms "Asians" and "Indians" (as used in this study) refer to the same population group living in South Africa.

2.2.2 All population groups

The global demand for labour in South Africa according to population group and economic sector in 1980 as estimated by the Office of the Economical Advisor of the Prime Minister is

given in Table 2.1, while an indication is also given in Table 2.2 of what the global demand for labour according to sex and economical sector will be in 1980.

From Tables 2.1 and 2.2 it is deduced that there will be a global demand for 10 867 500 labourers in the RSA in the year 1980. This figure comprises a demand for 1 929 900 Whites, 1 240 300 Coloureds and Indians and 7 697 300 Blacks. While the total demand for male labourers (immaterial of population group) amounts to 7 370 264, the corresponding figure for female labourers is 3 497 236. The greatest need for male labourers will be in the agricultural sector (29,3%), the manufacturing sector (18,2%) and the services and financial sector (17,2%). Most female labourers will be needed in the economic sectors of services and finance (52,7%) and of agriculture (29,5%). No division of the sexes according to population group is given in the estimate of the future demand for labour in the year 1980 by the Economic Development Program, as illustrated in Tables 2.1 and 2.2. However, for the purpose of this study such a division is deemed necessary. Therefore the trends of change in each sector during the period 1960 and 1970, as derived from the population census, were used to project the division of the sexes according to population group for 1980. The results of these conversions are given in Table 2.3 for each population group separately (53, p. 9). It appears that with the exception of the economic sector of electricity, gas and water a labour demand will exist in the RSA for both sexes of all population groups in 1980. As regards Coloureds and Indians, it is deduced from Table 2.3 that in the above-mentioned economic sector there will be a demand for male labourers only in the target year. The biggest demand for female Indian labourers in comparison with men will occur in the manufacturing sector (22,35%). A closer look at the latter situation is presented in section 2.2.3.

No discussion on the manpower situation will be complete without a comparison between the demand for and the supply of labour. Such a comparison is necessary especially where future development and planning are concerned. Table 2.4 gives an indication of the expected labour demand and supply figures for 1980. It appears that there will be a shortage of slightly more than a quarter of a million labourers by 1980. As far as the situation for the different population groups according to sex is concerned, a shortage of White, Indian and Black male labourers as well as White and Coloured female labourers will occur. However, a surplus is predicted for Coloured male labourers and Indian and Black female workers.

With regard to the expected labour situation as presented in the aforementioned Tables, and in view of the scope of this study, it may be concluded at this stage that the economic situation in the RSA will be of such a nature in 1980 that the Indians will definitely have a part to play in satisfying the overall need for labourers.

2.2.3 Indians

In Table 2.1 the demand for Coloured and Indian labour is shown as a single figure.

TABLE 2.1 (53, p. 6)

AN ESTIMATE OF THE DEMAND FOR LABOUR IN THE RSA IN THE YEAR 1980

ACCORDING TO POPULATION GROUP AND ECONOMIC SECTOR (1 000 PERSONS)

Sector of the economy	Population group			Total
	White	Coloureds and Indians	Bantu	
Agriculture	101,9	142,8	2 950,0	3 194,7
Mining	67,2	11,4	725,3	803,9
Factory system	325,3	382,3	986,9	1 694,5
Construction	76,6	77,4	407,6	561,6
Electricity, gas and water	22,0	4,8	52,2	79,0
Commerce (including motor trade and repair)	316,7	120,8	417,1	854,6
Transport and communication	218,0	58,5	294,1	570,6
Services	802,2	442,3	1 864,1	3 108,6
TOTAL	1 929,9	1 240,3	7 697,3	10 867,5

TABLE 2.2 (53, p. 12)

COMPOSITION OF THE DEMAND FOR LABOUR ACCORDING TO ECONOMIC SECTOR OF THE TOTAL POPULATION IN THE RSA IN THE YEAR 1980

Economic sector	Male		Female		Total	
	N	%	N	%	N	%
Agriculture	2 161 762	29,3	1 032 938	29,5	3 194 700	29,4
Mining	797 264	10,8	6 636	0,2	803 900	7,4
Factory System	1 339 788	18,2	354 712	10,1	1 694 500	15,6
Electricity, gas and water	76 528	1,0	2 472	0,1	79 000	0,7
Building and construction	552 200	7,5	9 400	0,3	561 600	5,2
Commerce	643 946	8,8	210 654	6,0	854 600	7,9
Transport and communication	531 931	7,2	38 669	1,1	570 600	5,2
Services and financing	1 266 845	17,2	1 841 755	52,7	3 108 600	28,6
TOTAL	7 370 264	100,0	3 497 236	100,0	10 867 500	100,0

TABLE 2.3 (53, p. 9)

PERCENTAGE COMPOSITION OF THE DEMAND FOR LABOUR IN THE RSA ACCORDING TO POPULATION GROUP AND SEX IN 1960 AND 1970 AND PROJEC= TION OF THE SEX COMPOSITION IN 1980 THROUGH DIRECT AND INDIRECT EXTRAPOLATION

Economical sector	Sex	Whites			Coloureds			Indians			Bantu		
		1960	1970	1980	1960	1970	1980	1960	1970	1980	1960	1970	1980
		%	%	%	%	%	%	%	%	%	%	%	%
Agriculture	M	96,81	95,48	95,39	94,98	90,61	90,32	91,11	95,31	95,85	86,64	67,14	65,60
	F	3,19	4,52	4,61	5,02	9,39	9,68	8,89	4,69	4,15	13,36	32,86	34,40
	T	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00
Mining and quarries	M	95,81	93,22	93,05	97,35	98,12	98,83	100,00	96,77	96,44	99,77	99,75	99,75
	F	4,19	6,78	6,95	2,65	1,88	1,17		3,23	3,56	0,23	0,25	0,25
	T	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00
Factory system	M	81,00	79,16	78,92	65,34	57,56	57,00	91,04	78,69	77,65	94,79	86,31	85,45
	F	19,00	20,84	21,08	34,66	42,44	43,00	8,96	21,31	22,35	5,21	13,69	14,55
	T	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00
Electricity, gas and water	M	93,85	90,72	90,52	99,69	100,00	100,00	100,00	100,00	100,00	99,77	99,32	99,26
	F	6,15	9,28	9,48	0,31						0,23	0,68	0,74
	T	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00
Building and con= struction	M	97,05	93,31	92,98	99,58	99,10	99,06	99,73	98,86	98,66	99,80	99,29	99,20
	F	2,95	6,69	7,02	0,42	0,90	0,94	0,27	1,14	1,34	0,20	0,71	0,80
	T	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00
Commerce	M	54,89	56,87	57,45	85,15	74,81	74,17	92,48	88,34	88,07	94,67	88,23	87,68
	F	45,11	43,13	42,55	14,85	25,19	25,83	7,52	11,66	11,93	5,33	11,77	12,32
	T	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00
Transport and communication	M	85,92	84,52	84,34	98,81	97,75	97,67	99,22	97,35	97,05	99,36	98,98	98,95
	F	14,08	15,48	15,66	1,19	2,25	2,33	0,78	2,65	2,95	0,64	1,02	1,05
	T	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00
Service and financing	M	57,45	55,08	54,60	32,07	33,62	33,98	83,32	79,21	78,90	39,16	35,27	34,62
	F	42,55	44,92	45,40	67,93	66,38	66,02	16,68	20,79	21,10	60,84	64,73	65,38
	T	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00

TABLE 2.4 (53, p. 77)

COMPARISON BETWEEN DEMAND FOR AND SUPPLY OF THE LABOUR FORCE IN THE RSA IN THE YEAR 1980 ACCORDING TO POPULATION GROUP AND SEX

Population group		Supply (a)	Demand (b)	Shortages/ Surpluses		% of the total labour force according to population group
				Supply–Demand (a)	(b)	
		N	N	N	N	
Whites	M	1 290 275	1 311 402	– 21 127	– 1,6	–0,2
	F	588 921	618 498	– 59 577	–10,7	–0,6
	T	1 849 196	1 929 900	– 80 704	– 4,4	–0,8
Coloureds	M	663 861	586 894	+ 76 967	+11,6	+0,7
	F	350 248	395 869	– 45 621	–13,0	–0,4
	T	1 014 109	982 763	+ 31 346	+ 3,1	+0,3
Asians	M	197 220	211 745	– 14 525	– 7,4	–0,1
	F	45 857	45 792	+ 65	+ 0,1	0,0
	T	243 077	257 537	– 14 460	– 5,9	–0,1
Bantu	M	4 940 503	5 260 222	–319 719	– 6,5	–3,0
	F	2 565 315	2 437 078	+128 237	+ 5,0	+1,2
	T	7 505 818	7 697 300	–191 482	– 2,6	–1,8
TOTAL	M	7 091 859	7 370 263	–278 404	– 3,9	–2,6
	F	3 520 341	3 497 237	+ 23 104	+ 0,6	+0,2
	T	10 612 200	10 867 500	–255 300	– 2,4	–2,4

The percentages for Coloureds and Indians in each economic sector were calculated from the information obtained by the 1960 and 1970 population census and a projection was made of the percentage composition of Coloureds and Indians according to economic sector for the year 1980. Because no significant changes in the population composition of the above-mentioned groups have been observed in the past, a conservative projection of change has been used. In every instance of an increase in the percentage composition in the basis period (1960-1970), the method of direct extrapolation was used, and whenever a decline took place, the method of indirect extrapolation was used. These projected percentages were applied on the collective demand for Coloureds and Indians for each sector as shown in Table 2.1. The result of this application is given in Table 2.5 where the demand for Coloureds and Indians according to sector is shown separately.

A comparison of the total demand for labour for each of the two population groups as given in Table 2.5 reveals that although the demand for Coloured labourers in 1980 will remain bigger than for Indians, this finding alone does not reflect the whole situation for the future. It appears that while the demand for Coloured labourers in 1980 will be less than it was in 1960 and in 1971, more Indian labourers will be needed in 1980 than in the past. This trend is reflected in six of the eight economic sectors. In the sectors of agriculture and of mining and quarries the trend will be reversed for the two population groups.

A closer look at the demand for Indian labourers according to sex is reflected in Table 2.6. It is predicted that the biggest demand for male and female Indian labourers in 1980 will be in the manufacturing sector (38,9% and 51,6% respectively). Other future demands for male labourers worth mentioning are those in the services and financial sectors (27,6%) as well as commerce (20,0%). In the services and financial sector the demand for female Indian labourers will form 34,1 per cent of the total demand for female Indian labour. Interesting to note is that no demand for female Indian labourers is predicted for the electricity, gas and water sectors in 1980.

Table 2.7 gives an indication of what the demand for Indian labour will be in comparison with the supply in 1980. This comparison, according to educational level, is given separately as well as jointly for the two sexes. The division of educational levels used in this study is as follows (53, p. 22):

Educational level 1	= no training
Educational level 2	= primary school education
Educational level 3	= Standards 6 and 7
Educational level 4	= Standards 8 and 9
Educational level 5	= Standard 10
Educational level 6	= Standard 10 plus diploma
Educational level 7	= University graduates

Although a total shortage of approximately 14 500 Indian labourers will probably exist in 1980, Table 2.7 shows that this adverse situation will mainly be ascribed to a shortage of male Indian labourers (14 525). For female Indian labourers a surplus of 65 is predicted. The shortage of males will manifest itself on all the educational levels. It must, however, be mentioned that although a surplus for female Indian labourers as a whole is predicted, shortages are expected to occur on the higher educational levels (4 to 7).

The shortage of Indian labourers which is predicted for 1980, may to a large extent be ascribed to the fast economic development in Natal up to 1971. This development caused a relative increase in the demand for Indian workers in comparison with Coloured workers during the projection period, a trend which has been projected further (53, p. 84).

TABLE 2.5 (53, p. 7)

COMPOSITION OF THE DEMAND FOR COLOURED AND INDIAN LABOUR ACCORDING TO ECONOMIC SECTOR IN 1960 AND 1970 AND PROJECTION OF THE POPULATION DIVISION IN 1980 THROUGH DIRECT AND INDIRECT EXTRAPOLATION

Economic sector	Population group	1960	1970	1980	
		%	%	%	N
Agriculture	Coloureds	90,30	94,57	95,15	135 874
	Indians	9,70	5,43	4,85	6 926
	Total	100,00	100,00	100,00	142 800
Mining and quarries	Coloureds	77,93	92,31	92,75	10 574
	Indians	22,07	7,69	7,25	826
	Total	100,00	100,00	100,00	11 400
Factory system	Coloureds	74,20	72,63	72,33	276 518
	Indians	25,80	27,37	27,67	105 782
	Total	100,00	100,00	100,00	382 300
Electricity, gas and water	Coloureds	96,41	94,32	94,18	4 521
	Indians	3, 59	5,68	5,82	279
	Total	100,00	100,00	100,00	4 800
Building and construction	Coloureds	94,27	88,84	88,44	68 453
	Indians	5,73	11,16	11,56	8 947
	Total	100,00	100,00	100,00	77 400
Commerce	Coloureds	65,28	60,62	60,15	72 661
	Indians	34,72	39,38	39,85	48 139
	Total	100,00	100,00	100,00	120 800
Transport and communication	Coloureds	81,22	78,51	78,24	45 770
	Indians	18,78	21,49	21,76	12 730
	Total	100,00	100,00	100,00	58 500
Services and financing	Coloureds	85,68	83,50	83,29	368 392
	Indians	14,32	16,50	16,71	73 908
	Total	100,00	100,00	100,00	442 300
TOTAL	Coloureds	82,56	79,52	79,25	982 763
	Indians	17,44	20,48	20,75	257 537
	Total	100,00	100,00	100,00	1 240 300

TABLE 2.6 (53, p. 11)

COMPOSITION OF THE DEMAND FOR LABOUR ACCORDING TO ECONOMIC SECTOR FOR THE INDIAN POPULATION IN THE YEAR 1980

Sector of the economy	Males		Females		Total	
	N	%	N	%	N	%
Agriculture	6 639	3,1	287	0,6	6 926	2,7
Mining	797	0,4	29	0,1	826	0,3
Factory system	82 140	38,8	23 642	51,6	105 782	41,1
Electricity, gas and water	279	0,1	-	-	279	0,1
Building and construction	8 827	4,2	120	0,3	8 947	3,5
Commerce	42 396	20,0	5 743	12,5	48 139	18,7
Transport and communication	12 354	5,8	376	0,8	12 730	4,9
Services and financing	58 313	27,6	15 595	34,1	73 908	28,7
TOTAL	211 745	100,0	45 792	100,0	257 537	100,0

TABLE 2.7 (53, p. 86)

COMPARISON OF THE DEMAND FOR AND SUPPLY OF INDIAN LABOUR IN THE RSA ACCORDING TO EDUCATIONAL LEVEL IN THE YEAR 1980

Educational level	Supply	Demand according to		Difference			
		Manpower	Manpower and Census	Manpower		Manpower and Census	
			(a) Men	N	%	N	%
1	680	2 209	2 598	- 1 529	-225,8	- 1 918	-282,0
2	39 500	46 346	46 380	- 6 846	- 17,3	- 6 880	- 17,4
3	84 465	85 715	85 199	- 1 250	- 1,5	- 734	- 0,9
4	45 359	46 318	45 966	- 959	- 2,1	- 607	- 1,3
5	16 767	18 780	18 540	- 2 013	- 12,0	- 1 773	- 10,6
6	6 584	8 040	8 437	- 1 456	- 22,1	- 1 853	- 28,1
7	3 865	4 337	4 625	- 472	- 12,2	- 760	- 19,7
TOTAL	197 220	211 745	211 745	-14 525	- 7,4	-14 525	- 7,4
			(b) Women				
1	1 409	612	660	+ 797	+ 56,6	+ 749	+ 53,2
2	19 704	18 861	18 263	+ 843	+ 4,3	+ 1 441	+ 7,3
3	13 457	12 158	12 265	+ 1 299	+ 9,6	+ 1 192	+ 8,8
4	6 848	8 250	8 110	- 1 402	- 20,5	- 1 262	- 18,4
5	2 627	3 527	3 545	- 900	- 34,3	- 918	- 34,9
6	1 254	1 637	2 095	- 383	- 30,5	- 841	- 67,1
7	558	747	854	- 189	- 33,9	- 296	- 53,0
TOTAL	45 792	45 792	45 792	+ 65	+ 0,1	+ 65	+ 0,1
			(c) Jointly				
1	2 098	2 821	3 258	- 732	- 35,0	- 1 169	- 56,0
2	59 134	65 207	64 643	- 6 073	- 10,3	- 5 509	- 9,3
3	97 968	97 873	97 464	+ 95	+ 0,1	+ 504	+ 0,5
4	52 231	54 568	54 076	- 2 337	- 4,5	- 1 845	- 3,5
5	19 394	22 307	22 085	- 2 913	-15,0	- 2 691	- 13,9
6	7 838	9 677	10 532	- 1 839	-23,5	- 2 694	- 34,4
7	4 423	5 084	5 479	- 661	-14,9	- 1 056	- 23,9
TOTAL	243 007	257 537	257 537	-14 460	- 5,9	-14 460	- 5,9

The statistical data of Table 2.7 regarding Indians become even more significant when one bears in mind that men with an educational qualification of Standard eight and/or higher will form almost one third of the shortage of male Indian labourers that will most probably exist in 1980. According to the new system of differentiated education it is especially on the above-mentioned educational level that technical education should fully come into its own. In view of the aforementioned it is therefore most likely that the predicted shortage of males on the educational levels 4 to 7 will also apply to persons who have undergone training in the technical field. This may also be true of female Indians of whom a shortage of labourers is predicted on the same educational levels as those of the men. If it is accepted that the anticipated shortages will actually materialize, then it is imperative that technical education should function on a sound footing to cope with the increasing demand.

In order to satisfy the demand for labour it is also necessary to take note of conspicuous changes that have occured in the past and are expected to continue in the near future in the occupational structure of the labour force of the particular country. Such information is of great value where planning of appropriate training and education is concerned. This is also true when further planning of technical education for Indians is to be considered.

In Table 2.8 (a) and 2.8 (b) changes in the occupational structure of the Indian labour force for the period 1960 to 1971 is given, as well as an estimate of the demand in 1980. With regard to the situation in the different occupational groups, the following general statements worth mentioning may be applied to Indian men:

(a) The percentage of artisans and operators has increased and although a slight decrease is predicted for 1980, this figure will still be more than that of 1960.

(b) The percentage of administrative and clerical workers has increased and this increase is expected to continue.

(c) The percentage of teachers has decreased slightly but a reverse in this trend is predicted for 1980.

(d) Percentage-wise, decrease in the number of salesmen is expected to continue.

(e) No noteworthy change in the number of technicians and other related workers was experienced in the past or is predicted for the near future.

As far as Indian women are concerned, the following findings seem to apply in general:

(a) The decrease in the percentage of teachers has continued, but this situation is expected to improve slightly.

(b) The same situation as that for the teaching professions applies to the medical and paramedical professions.

(c) As is the case with Indian men the percentage of female administrative and clerical workers has increased considerably. A continued increase is also predicted for the near future.

(d) Although a sharp increase in the number of artisans, operators and semi-skilled workers was experienced in the past, a slight decrease in this respect is predicted for 1980.

(e) The decrease in the percentage of saleswomen that has been experienced in the immediate past is expected to continue in future.

(f) No change worth mentioning regarding the percentage of female technicians and other related workers occurred in the past or is predicted for 1980.

Although the future demand for male and female technicians does not seem to offer much scope for development in technical education, it must be remembered that this occupational sphere forms only part of the technical field of study offered by technical schools, colleges and training centres. The training and education of artisans are other important facets of technical education and training. One must further bear in mind that existing vacant job opportunities in a technical field, do not necessarily imply that too few candidates have received technical education or training at technical schools, colleges, institutes or training centres. In-service training in the technical field is common practice. The results of Tables 2.8 (a) and 2.8 (b) should be considered in the light of the above. The findings regarding technicians and artisans, operators and semi-skilled workers should therefore be viewed jointly and separately. Should this be done, then it becomes quite clear that job opportunities in the technical field will to a large extent exist for Indian males

and females and that technical education will have an important role to play in satisfying the need for trained labourers.

TABLE 2.8 (53, p. 20)

THE CHANGE IN THE OCCUPATIONAL STRUCTURE OF THE INDIAN LABOUR FORCE, 1960–1971, AND AN ESTIMATE OF THE DEMAND IN 1980

(a) Males

Occupational groups	Basis period						Target Year			
	1960	1965	1967	1969	1970	1971	1980			
	Census		Manpower		Census	Manpower	Manpower		Manpower & Census	
	%	%	%	%	%	%	N	%	N	%
01 Teaching professions	3,9	3,8	3,9	3,7	3,4	3,3	8 934	4,2	9 323	4,4
02 Medical and paramedical professions	0,4	0,2	0,2	0,2	0,6	0,5	2 098	1,0	2 053	1,0
03 Technicians – other	0,3	0,3	0,3	0,3	0,2	0,4	1 390	0,6	936	0,4
04 Other professional occupations	0,8	0,2	0,4	0,3	1,0	0,4	1 320	0,6	2 640	1,2
05 Administrative and clerical workers	11,0	13,6	14,1	16,7	18,8	20,3	50 900	24,0	49 342	23,3
06 Salesmen	18,0	10,4	9,8	8,1	20,2	12,3	26 029	12,3	28 356	13,4
07 Transport and communication workers	8,9	6,5	6,7	7,6	7,9	7,6	15 192	7,2	13 964	6,6
08 Service, sports and recreation workers	14,5	12,3	12,4	10,7	9,1	8,7	19 814	9,4	20 074	9,5
09 Workers in mines and quarries	0,0	0,2	0,3	0,3	0,0	0,1	177	0,1	–	–
10 Artisans, operators and semi-skilled workers	29,3	40,6	41,3	42,5	34,2	39,5	72 755	34,4	71 734	33,9
11 Labourers	12,9	11,9	10,6	9,6	4,6	6,9	9 182	4,3	6 970	3,3
12 Farmers and farm workers							3 954	1,9	6 353	3,0
TOTAL	100,0	100,0	100,0	100,0	100,0	100,0	211 745	100,0	211 745	100,0

(b) Females

Occupational groups	Basis period						Target year			
	1960	1965	1967	1969	1970	1971	1980			
	Census		Manpower		Census	Manpower	Manpower		Manpower & Census	
	%	%	%	%	%	%	N	%	N	%
01 Teaching professions	13,6	13,0	13,6	9,1	7,9	6,8	2 112	4,6	3 190	7,0
02 Medical and paramedical professions	5,4	2,8	3,1	2,2	4,1	4,1	3 892	8,5	3 227	7,0
03 Technicians - other	0,0	0,1	0,1	0,1	0,0	0,1	173	0,4	86	0,2
04 Other professional occupations	0,1	0,0	0,4	0,1	0,3	0,2	119	0,3	214	0,5
05 Administrative and clerical workers	4,4	7,8	8,4	8,3	11,6	12,8	6 525	14,3	6 372	13,9
06 Saleswomen	17,8	6,5	11,3	8,2	16,4	13,8	3 436	7,5	4 801	10,5
07 Transport and communication workers	0,4	0,2	0,3	0,3	0,3	0,3	208	0,4	151	0,3
08 Service, sports and recreation workers	15,9	12,7	11,5	8,7	10,1	9,5	7 431	16,2	6 371	13,9
09 Workers in mines and quarries	0,0	0,0	0,0	0,0	0,0	0,0	2	0,0	1	0,0
10 Artisans, operators and semi-skilled workers	33,7	49,2	44,5	59,9	46,9	50,0	21 484	46,9	20 696	45,2
11 Labourers	8,7	7,7	6,8	3,1	2,4	2,4	180	0,4	276	0,6
12 Farmers and farm workers							230	0,5	407	0,9
TOTAL	100,0	100,0	100,0	100,0	100,0	100,0	45 792	100,0	45 792	100,0

2.3 THE GENERAL DEMAND FOR AND SUPPLY OF TECHNICIANS

2.3.1 Groups of technicians

An indication has already been given in Chapter 1 of what the term "technician" entails. It should also be noted that although most technicians share a common characteristic, namely that their work is of a technical nature, their precise functions differ completely from group to group (in the case of group classification according to the type of work, and not the qualification).

It would perhaps be of value if a brief indication is given of the major functions of the groups of technicians because the significance of their role in the economy of the country may then be more easily assessed.

a. Engineering technicians

1. Civil Engineering

This group is mainly concerned with the design and planning of roads, sewer and stormwater drainage, buildings and other civil engineering projects. Some of these technicians are involved in building management as clerks of works and building inspectors. A variety of administrative and clerical duties are involved (40, p. 5).

2. Electrical engineering

Included in this group are persons who may be described as telecommunication technicians. These persons are concerned with the installation, maintenance and testing of all sorts of electrical and electronic apparatus such as computers, radios and radar installations. In this group it is difficult to distinguish between the radio mechanic, who is legally an artisan, and the radio technician. This is a clear example of the overlapping of duties between artisan and technician and even between technician and professional engineer. Also included in this group are persons who are actively engaged in space communication and satellite-tracking as well as those whose main task is research and administration and certain aspects of administration and sales (40, p. 6).

3. Mechanical engineering

This group includes persons concerned with the installation,

testing and maintenance of machinery, aircraft and ships, as well as the planning and cost-accounting of mechanical engineering projects. Quality control is also another function which may be included (40, p. 6).

4. Instrumentation

These technicians are more specifically concerned with the installation, maintenance, design and construction of a variety of instruments, and they are difficult to distinguish from the instrument-makers who actually are artisans (40, p. 6).

5. Technicians in the Department of Defence

For reasons of security no indication may be given of the type of work done by the technicians concerned (40, p. 6).

6. Mining

This group is specifically concerned with mining activities, such as mechanical and electrical engineering.

b. Agricultural technicians

Duties performed by these technicians in the field of agriculture and forestry include the planning and surveying of agricultural earthworks, the inspection of a whole series of agricultural products, the testing of water, urine, wool and liquor and the planning and maintenance of plantations. There are also those who are responsible for administrative and clerical tasks and the control of audio-visual apparatus and library material (40, p. 7).

It is a common phenomenon that the tasks of engineering, surveying and chemical technicians overlap to some extent.

c. Paramedical technicians

The paramedical technician's duties include, inter alia, blood and urine testing, the preparation of microscope sections, and the chemical and other methods of organic materials analysis. There are also persons involved in research and development in the general field of medicine. There are those who operate heart-lung machines, artificial kidneys, electrocardiograms and EEGs. Also included are those who manufacture dentures and artificial limbs. Apparently there is an increasing tendency to call the dental mechanic a dental technician. Overlapping in the duties of chemical and agricultural technicians is a common phenomenon (40, p. 7).

d. Draughtsmen

The draughtsman's main task entails draughtsmanship of some type

or other, whether civil, electrical or pertaining to surveying (40, p. 7).

e. Land surveyors

All technicians whose main function is surveying of one kind or another are included in this group. Overlapping of functions occurs with engineering technicians as well as agricultural technicians and draughtsmen (40, p. 7).

f. Chemical technicians

Chemical and laboratory technicians are grouped together. One of the main functions of this group is the chemical analysis of a wide variety of substances. Other duties include quality control, manufacture of laboratory apparatus and control of the laboratory as such. There is a noticeable overlapping with the duties of paramedical and agricultural technicians (40, p. 8).

g. Photographic and art technicians

This group includes cameramen, colour graders, studio technicians and personnel responsible for the technical side of the film industry. Some employers also regard as technicians commercial artists and lay-out artists (40, p. 8).

h. Inspection technicians

Factory inspectors and inspectors of weights are regarded as technicians by the Public Service, while building inspectors are classified as engineering technicians (40, p. 8).

2.3.2 Job opportunities for technicians in general

Table 2.9 indicates the percentage of all job opportunities in 1960, 1965, 1967 and 1969, classified as opportunities for technicians and technical assistants. The data for 1960 were obtained from a special tabulation of the 1960 population census done by the HSRC through the agency of the Department of Statistics for the purposes of general manpower research. The data for the other years were obtained from the manpower surveys of the Department of Labour. The table also includes an estimate of the percentage in 1980, as done in previous research carried out by the HSRC (40, p. 64). According to this estimate, the percentage of technicians in 1980 does not differ a great deal from the 1969 percentages. The exception here is in respect of women, especially women in the mining sector, where the 1969 percentage differs radically from previous percentages, probably the result of a reclassification of employees by the Chamber of Mines who supplies the Department of Labour with data for all the gold mines (40, p.65).

As indicated in Table 2.9, 22,5 per cent of all job opportunities for men in industry in 1980 will be for male technicians

and technical assistants. The corresponding figure for women is estimated to be 18,8 per cent. A projection of the actual figures representing the above-mentioned percentages for men and women, is given in Table 2.10. In this respect an estimated demand for 44 846 males and 6 793 females will exist. Noteworthy is the demand for male and female technicians and technical assistants predicted for the manufacturing and commerce sector (15 492 and 1 570 respectively) and the services and financial sector (16 518 and 4 496 respectively). Also worth mentioning is the fact that 9 268 males will most probably be needed in the transport and communication sector.

Technical assistants were not included in the survey group during the HSRC research project, although they were included in the tabulations on which the estimates are based. Consequently the latter occupational group had to be withdrawn from the estimate. Table 2.11 shows the percentage of technical assistants in the occupational group "technicians", plus technical assistants according to branch of trade in 1969.

These percentages were used to calculate the estimated demand for technicians only for the target year, 1980. The outcome of these calculations is presented in Table 2.12. It appears that the greatest demand for technicians will probably be in the manufacturing and commerce sector (13 339 males and 764 females), the transport and communication sector (8 907 males) and the services and financing sector (13 859 males and 2 041 females).

On the whole the job opportunities for technicians in 1980 are estimated at approximately 41 000, of which 38 500 are for men and 2 900 are for women. This implies that an annual increase of 5,5 per cent in job opportunities for technicians is estimated for the period 1970-1980. This increase is considerably higher than the estimate of 3,1 per cent per annum for engineers and 2,5 per cent for the entire labour force (39, p. 39).

2.3.3 Shortage of technicians

Thus far, an indication has been given of the opportunities or the demand for technicians. However, the question arises: How does the supply of technicians meet this demand? Research recently carried out by the HSRC (13) has shed some light on this question by giving attention to those cases in which the demand for technicians cannot be met, i.e. where a shortage of technicians is experienced.

TABLE 2.9 (40, p. 63)

JOB OPPORTUNITIES FOR TECHNICIANS AND TECHNICAL ASSISTANTS EXPRESSED AS A PERCENTAGE OF TOTAL JOB OPPORTUNITIES, ACCORDING TO SECTOR OF INDUSTRY AND SEX

Sector of industry	1960		1965		1967		1969		1980	
	M	F	M	F	M	F	M	F	M	F
Mining	2,982	5,498	2,534	5,738	2,423	6,340	2,458	0,841	2,070	3,000
Manufacturing and commerce	2,461	0,321	2,535	0,485	2,408	0,428	3,038	0,483	3,216	0,641
Building and construction	1,538	1,520	1,580	0,069	1,511	0,181	1,383	0,205	1,280	0,200
Electricity, gas and water	8,184	9,773	4,756	10,012	5,717	13,130	6,424	9,024	6,155	11,388
Transport and communication	0,187	0,196	1,106	0,145	3,668	0,704	3,955	1,284	4,779	1,666
Services and finance	2,464	0,947	3,910	1,513	4,236	1,578	4,043	1,340	5,000	1,887
TOTAL	17,816	18,255	16,421	17,962	19,963	22,361	21,301	13,177	22,500	18,782

TABLE 2.10 (40, p. 65)

ESTIMATE OF THE DEMAND FOR TECHNICIANS AND TECHNICAL ASSIS= TANTS, IN 1980, ACCORDING TO SECTOR OF INDUSTRY AND SEX

Sector of industry		Male	Female	Total
Mining		1 154	86	1 240
Manufacturing and commerce		15 492	1 570	17 062
Building and construction		1 196	17	1 213
Electricity, gas and water		1 218	159	1 377
Transport and communication		9 268	465	9 733
Services and finance		16 518	4 496	21 014
TOTAL	N	44 846	6 793	51 639
	%	86,8	13,2	100,0

TABLE 2.11 (40, p. 65)

TECHNICAL ASSISTANTS EXPRESSED AS A PERCENTAGE OF THE TECH= NICIANS PLUS TECHNICAL ASSISTANTS ACCORDING TO SECTOR OF INDUSTRY, 1969

Sector of industry	Percentages of technical assis= tants	
	Male	Female
Mining	4,5	38,5
Manufacturing and commerce	13,9	51,4
Building and construction	58,7	88,9
Electricity, gas and water	33,0	77,9
Transport and communication	3,9	99,3
Services and finance	16,1	54,6

TABLE 2.12 (40, p. 66)

ESTIMATE OF THE DEMAND FOR TECHNICIANS IN 1980, ACCORDING TO SECTOR OF INDUSTRY AND SEX

Sector of industry	Male		Female		Total	
	N	%	N	%	N	%
Mining	1 102	2,9	53	1,8	1 155	2,8
Manufacturing and commerce	13 339	34,6	764	26,4	14 103	34,1
Building and construction	494	1,3	2	0,1	496	1,2
Electricity, gas and water	816	2,1	36	1,2	852	2,1
Transport and communication	8 907	23,1	3	0,1	8 910	21,5
Services and finance	13 859	36,0	2 041	70,4	15 900	38,4
TOTAL	38 517	100	2 899	100	41 416	100

Table 2.13 gives an indication of the results thus obtained, but it must be borne in mind that the general demand for technicians was higher than depicted in Table 2.13, and as shortages are not computed on a general demand, it follows that general shortages are lower than portrayed in Table 2.13 (56, p. 16).

SEE TABLE 2.13 ON FOLLOWING PAGE

TABLE 2.13 (56, p. 16)

SHORTAGE OF TECHNICIANS ACCORDING TO TYPE IN 1973

Technician type	Demand	Shortage	
	N	N	%
1 Engineering (mechanical and civil)	239	39	16,3
2 Electrical (heavy current and electronics)	301	55	18,3
3 Instrumentation	38	23	60,5
4 Telecommunication	141	50	35,5
5 Chemical	255	23	9,0
6 Ceramics	45	3	6,7
7 Draughtsman	374	51	13,6
8 Other	151	15	9,9
TOTAL	1 544	259	16,8

According to Table 2.13, the average technician shortage for 1973 was 16,8 per cent, the major shortages being in the Instrumentation (60,5% of the total shortage) and Telecommunication (35,5% of the total shortage) sectors. A further indication of the shortage of technicians, this time specifically in the field of secondary industry, is given in Table 2.14. However, it must be mentioned that only three manufacturers of metal products were included in the HSRC's survey, and because of their consequent under-representation, it can wrongly be assumed that the secondary industry is not experiencing technician recruitment problems. Evidence does exist which shows that engineering technicians are in great demand everywhere within the metal and engineering industries as well as in the non-metallic products manufacturing industry (56, p. 16).

TABLE 2.14 (56, p. 17)

SHORTAGE OF TYPE OF TECHNICIAN IN SECONDARY INDUSTRY ACCORDING TO MAJOR INDUSTRY GROUP

M.I.G. by technician type	Demand	Shortage	
	N	N	%
1 RUBBER PRODUCTS MANUFACTURING			
Engineering (mechanical and other)	2	1	50,0
2 CHEMICALS AND CHEMICAL PRODUCTS MANUFACTURING			
Chemical	73	1	1,4
3 PETROLEUM REFINERIES			
Chemical	134	15	11,2
4 NON-METALLIC PRODUCTS MANUFACTURING (except products of petroleum and coal)			
Engineering (mechanical)	8	2	25,0
Chemical	29	5	17,2
Ceramics	45	3	6,7
Draughtsman	21	3	14,3
Sub-total	103	13	12,6
5 BASIC METAL INDUSTRY			
Engineering (mechanical and civil)	110	26	23,6
Electrical (heavy current and electronics)	167	25	15,0
Instrumentation	38	23	60,5
Chemical	15	1	6,7
Draughtsman	253	42	16,6
Technician (other)	151	15	9,9
Sub-total	734	132	18,0
6 METAL PRODUCTS MANUFACTURING (except machinery and transport equipment)			
7 MACHINERY MANUFACTURING (except electrical machinery)			
Engineering (mechanical)	30	4	13,3
Draughtsman	17	2	11,8
Sub-total	47	6	12,8
8 ELECTRICAL MACHINERY MANUFACTURING (apparatus, appliances and supplies)			
Electrical (heavy current and electronics)	134	30	22,4
Telecommunication	141	50	35,5
Chemical	4	1	25,0
Sub-total	279	81	29,0
9 TRANSPORT EQUIPMENT MANUFACTURING			
Engineering (mechanical and civil)	89	8	9,0
Draughtsman	83	4	4,8
Sub-total	172	12	7,0
TOTAL	1 544	259	16,8

A 16,3 per cent shortage of mechanical and civil engineering technicians (as indicated in Table 2.13) is high, but still slightly lower than the overall shortage of technicians of 16,8 per cent. Shortages of instrument (60,5%) and all types of electrical engineering technicians are well above the group average. As far as the electrical engineering field is concerned, the major recruitment problem is experienced with regard to electro-mechanical technicians, that is the power engineering (or heavy current) technicians and the electronics (or light current) technicians. The heavy current technicians are employed in the electrical engineering divisions of the metal and engineering industries.

With the advent of television, electronics is becoming a major concern causing tremendous expansion in the electronics industry. It is expected, however, that South Africa will not fully enter the electronics age until television has been firmly established (56, p. 18). Apart from television, it would seem that there is not a single facet of modern life not affected by electronics in all its applications such as industry, science, radio, x-ray (both medical and industrial), computers, civil and military telecommunications equipment, air, road, rail and sea traffic control and space technology. At present the electronics industry is still largely dependent on overseas-trained technicians and it is making extensive use of overseas labour, the policy being to recruit from overseas through the Department of Immigration (56, p. 18).

The top technician category today comprises instrument technicians together with mechanical technicians, whose training has mathematics as a basis. A National Diploma for Technicians (NDT) is also required. It is a known fact that electronics industries not only offer comprehensive laboratory and all-round factory training, but have also played a role in establishing and sponsoring a four-year course for electronics technicians. In some industries the electronics and telecommunication technicians are responsible for the planning and installation of telephones, two-way radios, the maintenance of subscribers' lines and the overhauling of equipment.

Systems are devised by senior electronics technicians using the manufacturing company's equipment. These technicians have been trained up to T4 level and have also received advanced training in the field of electronics (56, p. 18).

According to research carried out by the HSRC (56), petrol refineries were the largest employers of chemical technicians (52,5%). However, to meet the demand for technicians in the

petroleum industry, many technician posts are manned by unqualified assistants. The available South African technician has been trained in analytical chemistry. As many as 43 Indians are employed in the refinery and chemical laboratories of one specific refinery. These assistants are being trained to fill technician posts. Technicians from overseas are also being recruited on a two-year contract, but experience has shown that immigrant technicians often return to their country of origin immediately on completion of their contracts (56, p. 19).

Some rural cement factories find it impossible to recruit White trainee technicians and also experience the highest labour turnover among qualified chemical technicians. These organisations have been forced to resort to Coloured analysts and testers. Likewise Non-White chemistry graduates and medical student dropouts are sometimes employed as chemical technicians in the manufacturing of other non-metallic mineral products, industrial chemicals and pharmaceutical products (56, p. 19).

Qualified chemical technicians are in most cases employed in the technical services departments as research and development technicians, whereas trainee technicians are used as laboratory assistants. Specialized chemical technicians, also called "technical chemical technicians" are usually found in polythene and reinforced plastics factories where they are employed as product and production managers. Quality control of raw materials is one of the main functions of these technicians (56, p. 19).

The expansion in the pharmaceutical industry has created a demand for pharmaceutical technicians and tablet-makers. Pharmaceutical technicians are employed in production, laboratory analysis and quality control. On the production side the industry has to maintain stringent quality control which also involves manufacturing control to maintain the standard of the product. On the packaging side, control inspectors are responsible for checking that the labels for the final product are correct and that every container is properly labelled. At present qualified pharmacists, graduates or diploma'ds are being employed as control-supervisors, although the requirements are not actually for university graduates but rather for pharmaceutical technicians. However, such people are rather scarce (56, p. 19).

Table 2.15 gives an indication of the regional technician manpower position during 1973. Compared with other areas, Pretoria was in a very favourable position, experiencing a

shortage of draughtsmen only. Cape Town and surroundings also seem to have been in a favourable position where a negligible shortage of technicians existed in the Chemical and Ceramics industry. At the other extreme Natal was experiencing extensive and all-round technician shortages, partly due to the opening up of a large inland steel factory at Newcastle (56, p. 21).

The metal, engineering and motor industries in which a technician shortage is acute, are concentrated in Port Elizabeth, the Vaal Triangle and on the Reef. The greater shortage of mechanical and electrical engineering technicians as experienced in the three above-mentioned regions, thus has an influence on regional shortage distribution.

From the foregoing discussion, it appears that a shortage of technicians and of persons trained in the technical field has become a problem with which employers will increasingly have to cope in future. Such shortages seem to be more acute in some technical fields than in others and are often regional bound. However large or small these shortages may be in future, the fact remains that they must be met. It is in this respect that Indian technicians could make a contribution, thus stressing the necessity of adequate technical education for Indians.

2.4 THE SHORTAGE OF ARTISANS

2.4.1 The general shortage of artisans

Shortages in this respect are outlined in the HSRC report already mentioned (56). Nearly every type of artisan is represented in the secondary industries mentioned in this report. Although the report refers to the situation as it was in 1973, it may readily be accepted that the shortage of artisans would rather have worsened than improved since the survey year. That this is also probably true of the present, is to a great extent confirmed by the fact that there has been an ever increasing demand for artisans and that the demand in 1980 is expected to be greater than ever before. Trained people are scarce and in the large undertakings requirements are extensive (56, p. 25).

TABLE 2.15 (56, p. 21)

REGIONAL SHORTAGE OF TECHNICIANS IN SECONDARY INDUSTRY ACCORDING TO TYPE OF TECHNICIAN IN 1973

Type of technician by region	Demand	Shortage	
	N	N	%
1 CAPE TOWN AND DISTRICT			
Chemical	19	1	5,3
Ceramics	45	3	6,7
Draughtsman	12		
Sub-total	76	4	5,3
2 PORT ELIZABETH AND DISTRICT			
Engineering	55	9	16,4
Electrical	10		
Chemical	8	1	12,5
Draughtsman	54	4	7,4
Sub-total	127	14	11,0
3 NATAL			
Engineering	62	24	38,7
Electrical	55	15	27,3
Instrumentation	33	23	69,7
Chemical	79	1	1,3
Draughtsman	71	19	26,8
Technician (other)	31	10	32,3
Sub-total	331	92	27,8
4 VAAL TRIANGLE			
Engineering	14	2	14,3
Electrical	100	10	10,0
Instrumentation	5		
Chemical	94	15	16,0
Draughtsman	127	17	13,4
Technician (other)	84	4	4,8
Sub-total	424	48	11,3
5 REEF			
Engineering	30	4	13,3
Electrical	120	30	25,0
Telecommunication	141	50	35,5
Chemical	32	5	15,6
Draughtsman	54	5	9,3
Sub-total	377	94	24,9
6 PRETORIA AND DISTRICT			
Engineering	78		
Electrical	16		
Chemical	23		
Draughtsman	56	6	10,7
Technician (other)	36	1	2,8
Sub-total	209	7	3,3
TOTAL	1 544	259	16,8

As Table 2.16 indicates there were vacancies for nearly every type of artisan in 1973. It appears that fitters (1 390), electricians (752) and welders (604) were the artisans mostly in demand. These artisans are employed chiefly as maintenance staff in factories, on construction extensions or in the relocation of plants. As production workers, the artisans employed vary from one industry to another. Usually an artisan is in charge of a section of the plant. He is responsible for all production and sometimes for the maintenance of equipment within that section. Heavy equipment maintenance requirements are met by the maintenance crew who also visits the plant when machines need overhauling. For the rest the maintenance crew works in workshops (56, p. 25).

Table 2.16 reflects the demand for artisans required to work at their trades only but has no bearing on industry's requirements for trained people in lower and middle management in production. Such positions are normally filled from the ranks within the organisation, and shortages in this area mainly result from plant expansion (56, p. 25). Such shortages have not been tabulated.

Table 2.16 shows an overall shortage of 17,2 per cent which appears high by general standards, that is standards based on shortages recorded in the report of the Department of Labour Manpower Survey in respect of metal and engineering trades, electrical trades and motor trades, viz. 6,9 per cent in the same survey year, 1973. This discrepancy is due to the fact that Table 2.16 specifically presents information on shortages only where they exist in a particular industrial concern and not on demand in general. The numbers employed, i.e. the demand, are disregarded in respect of all industries and all occupations in which demand is satisfied. Shortages presented in Table 2.16 are therefore not computed on total demand as in the case of Department of Labour statistics, but on specific demand only where vacancies actually existed (56, p. 25).

Whereas the metal and engineering industries employ artisans like instrument mechanics, electricians, fitters and turners in production work as such, in the chemical, pharmaceutical and non-metallic products industries they are employed solely as maintenance staff. Accordingly Table 2.16 identifies the recruitment problem area for secondary industry indicated in the survey as pertaining particularly to maintenance staff. On the production side the scarcity of certain types of electricians, particularly electronics and telecommunication electricians, would affect the manufacturing of electrical machinery, apparatus, appliances and supplies; whereas shortages of trained roll turners, refractory bricklayers and riggers would more particularly be felt in the actual production of basic metals, and in the case of tool-makers in transport equipment manufacturing.

The relatively high percentage of shortages recorded in Table 2.16 in respect of the metal and engineering trades may partly be explained by extensive expansion in the steel industry (56, p. 27).

The scarcity of instrument mechanics is ascribed by some em= ployers to the fact that not many organisations provide training for them, and furthermore, it is alleged that not enough apprentice instrument mechanics complete their apprenticeships (56, p. 27).

TABLE 2.16 (56, p. 26)

GENERAL SHORTAGE OF ARTISANS IN 1973

Artisan type		Demand	Shortage	
		N	N	%
1	Fitter and turner	261	45	17,2
2	Fitter	1 390	155	11,2
3	Turbine fitter	33	5	15,2
4	Turner	347	38	11,0
5	Roll turner	141	49	34,8
6	Electrician	752	200	26,6
7	Instrument mechanic	167	54	32,3
8	Diesel mechanic	71	5	7,0
9	Millwright (electro-mechanical)	389	104	26,7
10	Motor mechanic	28	6	7,3
11	Toolmaker	208	58	27,9
12	Pattern-maker	23	4	17,4
13	Moulder	327	56	17,1
14	Die-maker	5	3	60,0
15	Welder (and/or boilermaker)	604	36	6,0
16	Refractory bricklayer	379	97	25,6
17	Blacksmith	34	7	20,6
18	Rigger	105	25	23,8
19	Plater	230	22	9,6
20	Other	501	71	14,2
	TOTAL	6 049	1 040	17,2

2.4.2 The sectorial shortage

Variations in the supply of qualified artisans are evident in respect of sectorial and regional distribution. Table 2.17 reflects artisan shortages by type and according to the major industrial group in 1973. Although shortages occur in all the sectors as illustrated in Table 3.25, the most conspicuous are those in the Non-Metallic Mineral Products Manufacturing sector (24,3%) and Electrical Machinery Manufacturing sector (20,7%).

According to Table 2.17, petroleum refineries and the basic metal industry are among the major employers of instrument mechanics. As maintenance staff these people are indispensable. A breakdown of instruments would inevitably bring processing to a standstill. According to some employers, the petrol refinery industry does not so much experience a shortage of any particular type of artisan as of particular skills in all types of artisans, in the sense that qualified artisans still lack the experience needed in chemical processes. Thus, it is argued, if the electrician, for instance, could be trained in basic chemical processes he could be of much greater use to the industry. There is also a very limited supply of qualified turbine fitters, though apprentices are bridging the gap. At least one large refinery is making a very commendable contribution towards artisan requirements in this industry (56, p. 27).

Fitters and turners and tool-makers are all important in precision engineering, for example in manufacturing components for the motor industry. Tool-making is a very highly skilled trade and is regarded by some as the highest of all skilled trades. It is said that not enough tool-makers are trained for the trade and that tool-makers have a reasonable turnover. Once they have the experience, they go out as representatives (reps.) for the big motor vehicle companies, or they are lost to smaller engineering shops. The scarcity and labour turnover of tool-makers are causing increasing concern to the motor manufacturing industries surveyed (56, p. 27). The demand for tool-makers may be said to be related to the demand for draughtsmen. It has been stated that if more tool-makers could be found, it would immediately cause an increased demand for draughtsmen and that more posts for tool-makers could be created, but if they could not be found the number of posts for draughtsmen would have to be reduced. The tool-maker uses the drawings and specifications of the draughtsman. Expansion of the motor industry, when it changed over from assembling to manufacturing, accounts for many of the recruiting problems experienced in this industry (56, p. 28).

TABLE 2.17 (56, p. 28)

MANPOWER SHORTAGE OF ARTISAN TYPES IN SPECIFIC SECONDARY INDUSTRIES ACCORDING TO MAJOR INDUSTRY GROUP IN 1973

MIG by artisan type	Demand	Shortage	
	N	N	%
1 RUBBER PRODUCTS MANUFACTURING			
Fitter and turner	33	5	15,2
2 CHEMICALS AND CHEMICAL PRODUCTS MANUFACTURING			
Fitter	7	2	28,6
3 PETROLEUM REFINERIES			
Fitter (general)	34	9	26,5
Turbine fitter	33	5	15,2
Electrician	42	2	4,8
Instrument mechanic	20	5	25,0
Sub-total	169	28	16,6
4 NON-METALLIC MINERAL PRODUCTS MANUFACTURING (except petroleum and coal products)			
Fitter and turner	17	1	5,9
Fitter	38	11	28,9
Turner	8	4	50,0
Electrician	16	6	37,5
Welder/Boilermaker	8	2	25,0
Pattern-maker	9	1	11,1
Die-maker	5	3	60,0
Millwright (production wright)	35	5	14,3
Sub-total	136	33	24,3
5 BASIC METAL INDUSTRY			
Fitter and turner	89	31	34,8
Fitter	1 266	123	9,7
Turner	117	5	4,3
Electrician	552	169	30,6
Instrument mechanic	147	49	33,3
Plater (Boilermaker)	230	22	9,6
Welder	170	8	4,7
Pattern-maker	14	3	21,4
Motor mechanic	23	1	4,3
Moulder	236	40	16,9
Diesel mechanic	71	5	7,0
Millwright (electro-mechanical)	354	99	28,0
Refractory bricklayer	379	97	25,6
Roll turner	141	49	34,8
Blacksmith	34	7	20,6
Rigger	105	25	23,8
Artisan (other)	329	54	16,4
Sub-total	4 257	787	18,5

NUMBERS 6-9 CONTINUE ON NEXT PAGE

6	METAL PRODUCTS MANUFACTURING (except machinery and transport equipment)			
7	MACHINERY MANUFACTURING (except electrical machinery)			
	Fitter	45	10	22,2
	Turner	212	27	12,7
	Welder/Boilermaker	426	26	6,1
	Moulder	91	16	17,6
	Sub-total	774	79	10,2
8	ELECTRICAL MACHINERY MANUFACTURING, (apparatus, appliances and supplies)			
	Electrician (heavy current)	8	2	25,0
	Electrician (telecommunication)	20	3	15,0
	Electrician (electronics)	30	7	23,3
	Sub-total	58	12	20,7
9	TRANSPORT EQUIPMENT MANUFACTURING			
	Fitter and turner	122	8	6,6
	Turner	10	2	20,0
	Electrician	84	11	13,1
	Motor mechanic	59	5	8,5
	Toolmaker	208	58	27,9
	Artisan (other)	172	17	9,9
	Sub-total	655	101	15,4
	TOTAL	6 049	1 040	17,2

The shortage of electricians who are in possession of government wiring licences is particularly felt where they are required for breakdown and maintenance services and in cases where rebuilding, relocating or the construction of new plants are undertaken. Such shortages affect the whole industrial sector. In commenting on causal factors, employers ascribe the scarcity of electricians to the fact that maintenance and breakdown staff are subjected to shift work where they are sometimes on call 24 hours a day. This causes dissatisfaction and is a major factor in the inadequate supply situation (56, p. 30).

On the production side, special skills are required in the electro-mechanical field for the manufacture of electrical machinery and apparatus. In this industry it also happens that qualified electricians have advanced to the higher ranks of erection supervisor, inspectors and process foremen. The electronics and telecommunication industry is a relatively new and specialised field, and training has lagged behind. The industry has largely taken the training of staff upon themselves and should be able to meet their own future requirements (56, p. 30).

The relatively high overall shortage of artisans in the non-metallic mineral products industry must be seen against the background of the generally isolated location of the cement plants, usually in the country or beyond town or city limits. Fitters and electricians are virtually unobtainable (56, p. 30). On account of their geographic location it is understandable that these plants are at a disadvantage in competing in the labour market. Artisan turnover is exceptionally high. The more senior staff who have settled in nearby towns are the only people who stay. One disadvantage attached to the country plants is the lack of training facilities for young men (56, p. 30).

Highly specialised skills required in the pottery and earthenware factories are those of the die-maker, pattern-maker and refractory bricklayer. They are specialised artisans, and here again industry needs the services of experienced artisans who are very scarce (56, p. 30).

Table 2.16 reveals an overall shortage of 26,7 per cent in respect of millwrights (electro-mechanical). These are highly technical people who are in great demand particularly, in the basic metal industry. According to Table 2.17 the shortage amounts to 28,0 per cent in this industry. The millwright employed in refractories is usually an upgraded artisan and known as a production wright. He serves in a supervisory production capacity and is responsible in his section for produc-

tion and maintenance. Those with years of experience and good technical knowledge are employed on quality control. They are well-informed on development in the refractory industry and on raw materials (56, p. 31).

Though the demand for pattern-makers is not very acute in the industries surveyed, there is nevertheless, evidence of a scarcity. Together with the tool-maker and die-maker they constitute the top categories among artisans. The work of the pattern-maker is more creative than that of other artisans. He makes the mould designed by a designer according to specifications. General opinion is that moulders do not really require apprenticeship training. They are required to do highly repetitive work which could be done by any semi-skilled worker. The moulder could receive adequate training on the job. He has to be taught to cast iron into the mould as well as to do machine casting. Moulding is often regarded as a dirty, unpleasant work and for the past 4 to 5 years has drawn apprentices only from the ranks of persons with sub-standard 6 qualifications (56, p. 31).

2.4.3 Regional shortages

According to Table 2.18 the shortage of tool-makers exists in the motor industry in the Port Elizabeth area (27,3%) and Pretoria area (31,3%). In the survey carried out by the HSRC (56) several large motor vehicle manufacturing industries were included as well as motor parts factories, most of which were situated in the above-mentioned areas.

The turnover of tool-makers is highest among artisans in the motor industry where they are mainly employed in production work. A predominant shortage exists in the big press plants (56, p. 31).

The motor industry is the largest training centre for tool-makers. They normally take 5 years to complete their training, then "go to the bench" where they work for 2 years at their trade; thereafter they are assigned to the design section to train as tool-designers. Thus, with the expansion in the motor manufacturing industry, qualified tool-makers have moved up out of their trade to development and design. The shortage seems to exist in actual production work.

TABLE 2.18 (56, p. 32)

REGIONAL DISTRIBUTION OF MANPOWER SHORTAGE BY ARTISAN TYPE

	Region by artisan type	Demand	Shortage	
		N	N	%
1	PORT ELIZABETH AND DISTRICT			
	Fitter and turner	155	13	8,4
	Turner	10	2	20,0
	Electrician	92	13	14,1
	Motor mechanic	59	5	8,5
	Toolmaker	176	48	27,3
	Other	172	17	9,9
	Sub-total	664	98	14,8
2	CAPE TOWN AND DISTRICT			
	Fitter	27	4	14,8
	Electrician	10	3	30,0
	Welder/Boilermaker	7	1	14,3
	Sub-total	44	8	18,2
3	NATAL (Durban, Pietermaritzburg and Newcastle)			
	Fitter	138	68	49,3
	Turner	5	5	100,0
	Electrician	81	62	76,5
	Instrument mechanic	52	31	59,6
	Plater (boilermaker)	30	10	33,3
	Welder	10	8	80,0
	Motor mechanic	7		
	Diesel mechanic	2		
	Millwright (electro-mechanical)	50	41	82,0
	Refractory bricklayer	66	57	86,4
	Roll turner	33	33	100,0
	Blacksmith	2		
	Rigger	7	1	14,3
	Other	17	8	47,1
	Sub-total	500	324	64,8

NUMBERS 4-6 CONTINUE ON NEXT PAGE

		Demand	Shortage	
		N	N	%
4	VAAL TRIANGLE			
	Fitter and turner	79	31	39,2
	Fitter	914	79	8,6
	Turbine fitter	33	5	15,2
	Turner	259	25	9,7
	Electrician	386	95	24,6
	Instrument mechanic	78	22	28,2
	Plater	87	10	11,5
	Welder/boilermaker	481	20	4,2
	Motor mechanic	10	1	10,0
	Moulder	293	50	17,1
	Diesel mechanic	46	5	10,9
	Millwright (electro-mechanical)	156	55	35,3
	Refractory bricklayer	209	27	12,9
	Pattern-maker	11	2	18,2
	Roll turner	28	3	10,7
	Blacksmith	8	1	12,5
	Rigger	45	14	31,1
	Other	201	35	17,4
	Sub-total	3 324	480	14,4
5	WITWATERSRAND			
	Fitter and turner	17	1	5,9
	Fitter	8	4	50,0
	Turner	18	6	33,3
	Electrician	56	13	23,2
	Welder/boilermaker	37	7	18,9
	Pattern-maker	9	1	11,1
	Millwright	35	5	14,3
	Die-maker	5	3	60,0
	Sub-total	185	40	21,6
6	PRETORIA AND DISTRICT			
	Fitter and turner	10		
	Fitter	303		
	Turner	55		
	Electrician	127	14	11,0
	Instrument mechanic	37	1	2,7
	Plater	113	2	1,8
	Welder	69		
	Motor mechanic	6		
	Moulder	34	6	17,6
	Diesel mechanic	23		
	Millwright (electro-mechanical)	148	3	2,0
	Refractory bricklayer	104	13	12,5
	Toolmaker	32	10	31,3
	Pattern-maker	3	1	33,3
	Roll turner	80	13	16,3
	Blacksmith	24	6	25,0
	Rigger	53	10	18,9
	Other	111	11	9,9
	Sub-total	1 332	90	6,8
	TOTAL	6 049	1 040	17,2

The recruitment of electricians also poses a problem for Port Elizabeth industries, where the high calibre "wireman" is practically impossible to come by (56, p. 34). Apparently these men break away from maintenance work in factories and eventually leave to start their own businesses which are more profitable. It also appears that there is a perpetual short supply of electricians available to secondary industry in Port Elizabeth. The problem does not seem to centre in the scarcity of apprentices or in their failure to qualify. After completion of a four or a five year course, they work for a few years but thereafter are lost to the distribution side of industry and earn more on a commission basis. Actually there is no shortage of trained electricians, it is just a case that they are not employed in their trade (56, p. 34).

The highest turnover in Port Elizabeth occurs amongst fitters, turners and tool-makers. Artisans are not all that scarce in this area, but they presumably come and go. Shortages seem to be sporadic rather than permanent. The situation appears to be that at a given time some industries might operate at full strength while others might have vacancies for artisans; the latter interim might in fact be out of work. This might be the result of full employment. On the other hand, with a slow-down in the motor industry when only certain sections would work 2 or 3 shifts no recruitment problem is experienced. When there is a sudden revival and round the clock production, shortage of staff is inevitable. An expansion programme is sometimes the only reason why vacancies occur. In such a case new posts are created which have to wait to be filled. In relation to the size of the motor industries in the Port Elizabeth area, the shortage of artisans must be regarded as small (56, p. 35).

Trained fitters are said to be very scarce in Cape Town. Both the motor and engineering industries are forced to make use of apprentice fitters and turners. The chemical industry in particular experiences a short supply of turners whereas in the metal industry fitters are scarce. Though not really a persistent problem in urban areas, the recruiting and retaining of artisan labour is a permanent problem in the Cape Midland industries (56, p. 35).

According to Table 2.26 the artisan labour situation in Natal is, no doubt, distorted. Though the statistics largely reflect the rural situation in that region, urban areas also have recruitment problems. There is a constant shortage of instrument mechanics at petrol refineries, and a shortage of up to 66 per cent among fitters has been recorded in the non-metallic product manufac-

turing industries included in the survey. Electricians and welder/boiler-makers are also in short supply and the supply of artisans is generally said to be much more limited in Durban than for instance in Johannesburg. Engineering artisans are scarce throughout Natal. Durban manufacturers lose artisans to the construction consortiums of new overseas industrial projects. Their biggest rival, however, is the Durban Corporation who employs the majority of the pool of artisans, paying them well and offering attractive fringe benefits (56, p. 35).

In general the biggest turnover occurs among the advanced supervisory types of artisans. In certain cases supervisors have been found to be so scarce that advertisements fail to elicit any reaction from them. Among those interviewed are organisations who operate their own productivity development programs based on the Riekert report and recommendations. These employers seem to have reduced their manpower problems considerably.

Metal and engineering industries are heavily concentrated in the Vaal Triangle. Artisans are not only in short supply but their turnover is high in this area. Generally high calibre artisans tend to move on and start their own small businesses. The Vaal Triangle is an expanding industrial area and the building industry is flourishing, consequently electricians leave secondary industry to start on their own as contractors. This situation aggravates the artisan shortage problem for secondary industry. Table 2.18 shows that the highest shortage in this area exists for fitters and turners (39,2%), followed by that for millwrights (35,3%), while riggers are equally scarce (31,1%). Advertisements for these types of artisans appear most frequently in the press. The position is such that only the largest organisations in the area provide training for apprentices and automatically have to supply the whole market. Though their engineering apprentices tend to complete training, these organisations are not fortunate enough to retain the services of all of them. These large metal and engineering industries in the Vaal Triangle are actually forced to complement their own staff by recruiting overseas (56, p. 36).

Maintenance computer staff are specialised technical people who are normally trained by their particular company which budgets for its own labour requirements. During 1970 and 1971 when there was a drop in sales, these companies cut down on the number of trainees. The result is that they are now

experiencing a staff shortage whereas the computer trade is flourishing once more (56, p. 36).

The artisan situation in Pretoria is such that small firms cannot find qualified staff. They cannot compete with large employers. The large employer not only trains artisans for his own requirements but is in a position to offer attractive wages and fringe benefits (56, p. 36).

2.4.4 Methods of alleviating the artisan shortage

As mentioned, there are firms who are solving their artisan problem by applying productivity development programmes on the lines suggested in the Riekert report. Since the inception of the productivity plan they have experienced no shortage.

Organisations whose staff have housing problems are providing flats and as soon as possible will provide houses in order to retain present, and attract future staff. Where applied, better treatment for artisans has resulted in higher productivity, job satisfaction and better human relationships. In cases where the same employment conditions for all workers have been introduced, employees accorded equal status, and all made to feel part of the organisation, the labour turnover among junior staff has dropped significantly. Shift work remains a major issue. Among improved working conditions the change-over to an 8-hour day and 5-day week seems to have had the greatest effect on the turnover problem. Increased wages have certainly arrested the turnover rate, especially in the smaller firms (56, p. 38).

The very extensive requirements of large industries are forcing them to recruit artisans overseas. They may have a full-time permanent recruiting team stationed overseas, or periodically send recruiting teams to Europe. However, the staff thus required often cannot satisfy all their requirements. In some cases it is very specialised skills that are required, not so much the "body" that must be imported. The medium-sized organisation usually recruits with the help of the Department of Immigration. Officials at local offices who are advised of the arrival of trained technical personnel, have no difficulty in placing them.

The smaller employer does not regard the employment of foreigners as a solution to his manpower problems. Owing to good wages offered in South Africa recruiting overseas poses no problem, but immigrants often do not stay, and as soon as they find out about the employment conditions in South Africa they go to the highest bidder. Sometimes they never even start on the job

offered by the firm that brings them here, but accept better offers en route. Immigrants very soon realise in what high demand their skills are in this country and consequently there is a high turnover among them. It is estimated that 15 per cent of the artisans moving about the country are immigrants and the single man is the worst rover; some who are married say their wives do not like it here and they consequently return to their home country (56, p. 39). On the other hand, cases of local companies affiliated to overseas companies, immigrants sent out by the parent company tend to settle down. Thus one finds the situation that men who originally came to start the company are now the superintendents in charge of sections. Young industries only starting to manufacture in fields new to South Africa obviously have to recruit overseas. On the other hand, certain industries do not go out of their way to recruit overseas because the training of overseas artisans is so highly specialised that it does not allow of flexibility; for instance, a pipe-fitter would not put his hand to anything else but pipe-fitting (56, p. 39).

More established overseas-based firms no longer recruit overseas because they have had the time to train people for their own requirements. All large South African-based industries are now training their own apprentices. These firms suffer very high losses to those who do not train, yet, only a few complain that the results of training schemes have been disappointing.

As a result of the artisan shortage, certain organisations have resorted to reducing training time. A group of about 12 men is taken at a time. Training follows the pattern of that applied at the West Lake Training Centre, but is more intensive with a view to the particular requirements of the specific industry. Men over 20 but under 30 are recruited and put through intensive training for a period of 15 months. After this training period they are not fully qualified artisans but are eligible for testing at the Olifantsfontein Test Centre, and it has been found that the difference in the pass rate between these adults and apprentices is less than 5 per cent. People qualifying in this manner are claimed to have reached a training level and scope not limited to the requirements of the firm, and, because of the fact that they have been trained on the job with the firm's equipment and in its special techniques, they are of greater value to the organisation than those trained elsewhere.

In general the scarcity of qualified engineering artisans has forced industry to make use of apprentices or unskilled operatives who are given in-company training. Employers are having

second thoughts about the extravagant use of highly skilled labour. Only one artisan is thus employed at the site for each section, and he supervises operatives; but even so employers are always looking for qualified artisans to supervise processes.

Trade Unions within large organisations have now agreed to the practice of assigning artisan assistants to qualified artisans (56, p. 40). These assistants do many of the artisan's jobs and the qualified man undertakes responsibility for their work. In the minor trades one artisan may be in charge of up to four assistants. SEIFSA is to take the matter up with the Industrial Council and the Trade Unions in an effort to provide scope for this practice throughout the steel and engineering industries.

The next move on the part of some of the employers is to try and automatise the work and cut down on the use of highly skilled labour. It is common knowledge that technological changes lead to increased mechanisation which could transform working conditions. As industry changes over to automation, skilled labour could be used to greater advantage. Automation is more developed in some sectors of industry than in others, and affects only a small number of the industries included in the survey carried out by the HSRC (56). Usually only a section of the plant is automatised, or else only some of the machinery installed is automatic or semi-automatic. However, industry will always need some highly skilled workers to maintain and supervise even fully automatic machines. In some industries particular tasks have specific characteristics which make them more difficult to automatise.

The conclusion is that it is not so much a matter of deriving the job of its skills as it is one of upgrading. The artisan is being used in a supervisory capacity in production positions (56, p. 40).

The shortage of qualified artisans in the RSA seems to be acute. Employers are taking various steps to cope with this problem such as recruitment overseas. This has however proved not to be a satisfactory solution in solving the problem, as anomalies occur in this respect. As in the case of the shortage of technicians an acceptable measure would be to train sufficient Indian artisans in different fields in order to try and satisfy the increasing demand. The training of such artisans will to a great extent remain the responsibility of technical colleges for Indians. In this respect technical schools may also have a role to play.

2.5 THE SHORTAGE OF APPRENTICES

2.5.1 The general situation

Apprenticeship has traditionally supplied the trade skills for industry, a system which has proved best suited to provide industrial employees with the desired quality of skill. Apprenticeship training is coupled with institutional and on-the-job training. It is economically feasible because an apprentice is actually hired and taught work skills while he is contributing to his employer's production.

There was a shortage of men in training in the secondary industries surveyed by the HSRC (56). According to this report there were two sides to the situation. Firstly, there seems to be general reluctance to become an artisan nowadays and secondly the reluctance of employers to train artisans is an important factor in restricting the intake of apprentices. Some large organisations do not consider that their training requires supplementary or related institutional instruction. This is the case where tasks are very specialised and peculiar to particular industries. Training problems have however also been found to centre around the lack of sufficient skilled job instructors to cope with the influx of new trainees and the difficulty of releasing artisans for undertaking such training when maximum manpower utilization is necessary (5, p. 37).

It has been suggested that some pupils who show talent in the technical field be channelled off to CATE after Standard eight or before they reach Standard ten. The White matriculant has always had a lot of avenues to choose from and has often ignored the trades. The wages in many unskilled jobs have been forced up by the scarcity of reliable job candidates and it often happens that young men who have entered apprenticeships are lured away from the temporary low wages of vocational training by the comparatively good pay in other jobs (56, p. 38).

2.5.2 The metal and engineering industries

The metal and engineering industries are large scale trainers of apprentices, but have difficulty in recruiting apprentice fitters. There is a very high turnover of apprentice fitters, and from experience one large employer of apprentices was of the opinion that only about 14 per cent of trainees would complete their courses (56, p. 37). Apart from the poor quality of apprentice fitters, an acute shortage of such apprentices was found to exist - a shortage of 29 per cent in one large steel plant alone (56, p. 37).

2.5.3 The motor industry

Tool-making is the main problem area in the motor industry. Sufficient numbers of young men just cannot be recruited for the trade (56, p. 37). It is a difficult course, requiring a reasonably high level of education and intelligence. Few of those who start, finish their training. In the motor manufac= turing industry the promising apprentices are often allowed to go on to design once they have completed their training and have worked at their trade for about 2 years.

2.5.4 The electrical field

The recruitment of instrument mechanic apprentices offers no problem and their turnover is low. There is also no problem in drawing enough electrician apprentices. They qualify, but are often soon lost to the distribution side of industry or they start their own businesses. In the electrical field otherwise, it was the finding that no young men were applying for the trades of armature winding, sheet metal working and cable joining. Such is also the case with apprentice moulders (56, p. 38).

2.6 THE DEMAND FOR INDIAN TECHNICIANS AND ARTISANS

In this chapter thus far, an indication has been given of the expected demand for Indian labour in 1980. At this stage it would perhaps serve a useful purpose to give specific attention to the expected demand for Indian technicians and artisans in the various economical sectors in the year 1980, seeing that they are generally linked with technical education. Table 2.19 gives an indication of the projected expected demand for Indian technicians and artisans according to economical sector in 1980. These figures were obtained from research carried out by the HSRC (54).

SEE TABLE 2.19 ON NEXT PAGE

TABLE 2.19

PROJECTION OF THE DEMAND FOR INDIAN TECHNICIANS AND ARTISANS ACCORDING TO ECONOMICAL SECTOR IN THE YEAR 1980

a. Males

ECONOMICAL SECTOR	TECHNICIANS		ARTISANS	
	N	%	N	%
Agriculture	0	0	818	1,1
Mining	13	1,4	327	0,5
Factory System	297	31,7	54 784	76,4
Electricity, gas and water	0	0	226	0,3
Building and construction	15	1,6	66 917	9,6
Commerce	28	3,0	44 019	5,6
Transport and communication	0	0	11 313	1,8
Services and financing	583	62,3	33 330	4,7
TOTAL	936	100,0	71 734	100,0
b. Females				
Agriculture	0	0	0	0
Mining	0	0	0	0
Factory System	0	0	20 234	97,8
Electricity, gas and water	0	0	0	0
Building and construction	0	0	8	0,1
Commerce	2	2,3	0	0
Transport and communication	0	0	60	0,3
Services and financing	84	97,7	394	1,8
TOTAL	86	100,0	20 696	100,0

According to Table 2.19 it can thus be seen that as regards male Indian technicians, the highest demand is expected to be in the services and financing sector (62,3%), which is nearly twice as high as the second highest expected demand, namely in the factory system sector (31,7%). Together these two sectors constitute 94 per cent of the total expected demand for male Indian technicians in 1980. As far as male Indian artisans are concerned, the highest demand in 1980 is expected to be in the factory system sector (76,4%). This is far higher than the second highest estimated demand, namely 9,6 per cent in the building and construction sector, in fact it is more than twice as high as the total of the expected demands in all other sec= tors. What is conspicuous is that although the expected demand for male Indian technicians is extremely high in the services and financing sector, this is not the case as regards the expec= ted demand for male Indian artisans in the same sector. There is, however, some correllation between the expected demand for male Indian technicians and artisans in the factory system sector.

The demand for female Indian technicians is not expected to be very high, but then female Indian labour plays a far less prominent role in the economy of the country than Indian men, as can readily be seen in the tables already given in this study. Even so, the total expected demand for female Indian technicians by 1980 (86) must still be regarded as extremely low, seeing that it is only approximately 8 per cent of the total expected demand for Indian technicians by 1980. It is, however, quite significant that the highest expected demand for female Indian technicians is, as in the case of the expected demand for male Indian technicians, also in the services and financing sector (97,7%). It is even more significant that, according to Table 2.16 (b), the highest demand for female Indian artisans is expected to be in the factory system sector (93,8%) which, as in the case of the expected demand for male Indian artisans, is far higher than the total of the expected demands for female Indian artisans in all other sectors. According to Table 2.16(b), however, the total number of the expected demand for female Indian artisans in the factory system sector (20 234) is even less than half the total number of the expected demand for male Indian artisans in the same sector (54 784).

It is, however, of utmost importance to keep in mind that in the figures given under the heading "artisans" are included also the number of operatives and semi-skilled workers. The assumption must therefore be made that should the figures for these two groups of workers not be taken into account, in other words "subtracted" from the figures given in the table, the figures as regards artisans will still remain relatively the same.

Thus far, an overall view has been given of Indian employment with specific reference to the situation as expected in the year 1980. It must, however, be borne in mind that the projection for 1980 is based on the assumption that the status quo will be maintained, especially as far as legislation is concerned. There are, however, numerous factors which may have a significant influence on the course of events. In this sense it can safely be assumed that the Whites in the Republic cannot hope to cope with the demand for labour alone and that new sources will have to be found to meet the demand. Seen against this background, it is at this stage perhaps appropriate to give an overall view of the technical sector of labour in South Africa. Of particular interest is the demand for and supply of technicians and the shortage of artisans and apprentices.

2.7 TECHNICAL AND INDUSTRIAL OCCUPATIONS AVAILABLE TO INDIANS

An indication has already been given of the general demand for and supply of labour in South Africa, with specific reference to the role of the Indians in this respect. Indian employment trends have taken certain broadly defined patterns in recent times. Traditionally, the labour pattern in South Africa has generally been of White workers performing skilled jobs, Indians and Coloureds semi-skilled jobs and the Blacks unskilled jobs. In recent times this situation has changed altogether as the economy has grown and the demand for skilled labour has reached greater proportions. The inability of the White group to meet the increasing manpower needs of the economy has led to Indians and Coloureds having been brought in to supplement White labour in these skilled fields even though job reservations are still to some extent enforced by the Industrial Conciliation Act.

Had the process of labour supplementation not proceeded along the pattern it has been taking, it can safely be assumed that the skilled labour requirements of industry and commerce and various state undertakings would almost certainly not have been met by the White group alone. The economy would inevitably have suffered a serious setback, much to the detriment of the continued and progressive development of the country. An alarming situation was developing where too many jobs were being offered to only a few people as far as the White group was concerned, and the dangerous inflationary trend that was inherent in this situation has been partially checked by the use of Indians and Coloureds in a supplementary capacity.

The aim of this study being twofold (see Chapter 1) and concentrating mainly on the technical sphere of labour, an indication has been given of the state of affairs in South Africa. It is evident that the manpower shortage is acute. Whereas Indian labour is already successfully being implemented to meet the demand to some extent, there is a possibility that Indian labour can be used to fill even more of the vacancies already indicated.

In this connection, technical education for Indians is playing a very important role by providing them with the necessary training and know-how for the various technical occupations. The success of meeting the demand for labour in the technical field by making use of Indian labour thus depends largely on the efficiency of technical education. This aspect is discussed in Chapter 4.

Whereas more and more job opportunities in the technical field are constantly being filled by Indians, it will be very difficult, if not impossible, to give an up-to-date indication of all job opportunities in the technical field already occupied by Indians. It is, however, possible and may also serve a useful purpose, to give attention to some of the main employers of Indians in the technical field.

2.7.1 Indian industries

Industrial development by Indians is strongly encouraged by the authorities. Special concessions are available to Indian industrialists wishing to establish undertakings in certain selected areas where Indian labour is available. Apart from additional employment opportunities, a higher standard of living for the community in general can be attained by this means. At the same time, the Indian economy which was once strongly trade-orientated is now becoming more balanced, that is, an interest is now also shown in other sectors of the economy. The result of this economic expansion is already noticeable. As opposed to the 181 Indian-owned industries in 1961, a recent comparable figure was 625 (13, pp. 11-13).

Eighty per cent of the South African Indians live in Natal and it is here that most of their industries are to be found, mainly on the Natal North and South coasts and in the vicinity of Pietermaritzburg in the interior. The presence of essentials to industry such as water, electricity, sufficient labour and a harbour, will place Indian entrepreneurs in Natal in the favourable position of being able to concentrate more and more on manufacturing industries in future.

Because of their long association with the clothing industry, especially as retailers and tailors, Indian industrialists have concentrated mainly on the manufacture of clothes. These include a variety of modern clothing articles which have captured for Indian clothing factories approximately half the middle and lower income markets. In Natal alone there are more than 100 clothing factories, offering employment to more than 7 000 Indians (13, pp. 11 – 13).

Closely associated with the clothing industry is the textile industry which is relatively new to Indians. The first exclusively Indian-owned and -managed textile mill came into operation in 1965 near Pietermaritzburg. In 1972, 12 such mills already existed in South Africa, among others Prilla Textile Mills and Rosedale Textile Mills; together they employ more than 500 Indians. In addition to this an ever increasing need for qualified engineers, for chemists for the necessary research and for textile technologists exists. Another textile industry is the Crimp factory in Laudium near Pretoria. All the technicians in the employment of this concern have undergone special training in the maintenance of the intricate machines of the fabric mill with operates on a computer principle. Approximately 150 workers are employed at this factory (13, p. 26).

In addition to the clothing and textile industries, there are more than 50 Indian-owned furniture factories, while approximately the same number of foodstuff manufacturers are also in production. At Verulam, on the Natal North coast, where there are at least six such factories, one food factory has been tinning and bottling meat, spices and vegetables as well as producing curry powder for 27 years. In 1971, this organization had to build an additional factory to keep pace with the demand for their products. In Laudium a polony and small goods factory, built according to modern standards is the only Indian-owned undertaking of its kind in the Transvaal (18, p. 25).

The manufacture of leather goods, cooking oil, tools, stationery, cement pipes, canvas products, plastic and paper bags and bus bodies is also progressing on a firm footing. These products are mainly for local consumption, although some are exported on a limited scale. One leather industry in Laudium manufactures no less than 60 types of travel and shopping bags and gives employment to more than 70 employees. In another section of the building this enterprising concern also manufactures a large range of cosmetics and perfumes, mainly for the Black market (18, p. 26).

The entry of South African Indians into tertiary industry has progressed well in recent years. Characteristic of them is their unquenchable initiative. There is ample evidence that they are eager to augment their economic self-sufficiency still further by means of positive participation in industry which can only lead to increased employment opportunities for Indians.

2.7.2 Other industries

Many industries, although not relying exclusively on Indian labour, are largely dependent on Indian manpower. One such firm which is providing ever increasing employment opportunities for Indians is Iscor. With the demand for manpower exceeding the ability of the White population to supply the needs of industry, Iscor is looking to the Non-White sector to fill hundreds of different jobs at its Newcastle works, just as all industry makes use of available labour in border area development. (17,p.22)

This policy has opened the door to a wider range of job opportunities for Newcastle's Indian population and Iscor expects to have by 1980, quite a number of Indian men on the payroll as machine operators and clerical workers. Indian staff are selected on the basis of aptitude just as are all other employees, and a system of merit rating has been introduced to ensure that each man, whether operator or clerk, can fully develop his personal potential after initial and follow-up training. With an eye to the future development of this section of the population, Iscor has already created an Indian Affairs and

General Welfare Administration Section at the Newcastle works (17, p. 22).

Closely connected to the Iscor works at Newcastle and in fact owned by Iscor, is Durban Navigation Collieries, which employs quite a number of Indians. This mine, situated at Durnacol, five kilometres from Dannhauser in Northern Natal, commenced operations at the beginning of the century and its output is now destined for Iscor's new plant at Newcastle. With Newcastle being the new growth point for the iron and steel industry, demand for coal is expected to increase tremendously and the Durban Navigation Collieries is increasing its production to meet the expected demand. This in turn could imply an increase in the demand for manpower.

Another concern closely related to the Iscor works is Venco (Newcastle) Engineering Co. (Pty) Ltd., which has been established to cater for the engineering maintenance requirements of Iscor as well as for other industries in the Tugela basin. The establishment of Venco at Newcastle will provide further employment opportunities for Indian youths as skilled and semi-skilled workers. In 1973 the first thirty Indians were trained as apprentices at the company's cost at the M.L. Sultan Technical College in the following trades (26, p. 7):

a. Turner/machinist - a trade which embraces the operating of lathes, vertical lathes, horizontal borers and milling machines.

b. Fitter/machinist - for which training is given in fitting and assembling, planing and shaping and grinding.

c. Plater/welder - a trade which embraces all aspects of plating and structural work as well as basic welding and gascutting.

The basic requirements for persons interested in taking up an apprenticeship are that they should be between the ages of 18 and 21 years and should have passed at least Standard 8. The selected candidates receive the standard rates of pay applicable to apprentices. It is estimated that, in addition to the European and Black personnel, at least 420 Indians will be required to operate the Venco factory by 1980.

When the Iscor works in Natal become fully operational, opportunities will be created for other industrialists to establish themselves in Newcastle in industries which require the products

manufactured by Iscor. It is hoped that Indian industrialists will not let the opportunity pass of participating in the prospective ventures which the Newcastle of the future will be offering, but that they will fully explore the possibilities of establishing themselves in this industrial sector for by doing this they will be able to offer more and more employment to Indians. The poultry industry differs totally from those mentioned so far but nevertheless provides employment to hundreds of Indians. This industry consists of many small and large undertakings that include the largest chicken-breeding and processing enterprise in Africa namely the one at Hammarsdale in Natal. There are various opportunities for Indians in the enterprise. These include various grades of clerical work, supervisory work in the broiler units, production and marketing and even research. Indians are also employed as typists, switchboard operators and they operate the company's small printing section which produces much of the stationery required. Some Indians act as foremen in the processing plants and other farm operations, while various skilled artisans are also employed in maintenance, building, plastering and carpentry as well as in the mechanical workshops where a fleet of some seventy vehicles is maintained (28, p. 10). With an ever-growing demand for meat to feed an expanding population, more opportunities in this industry are likely in the future.

2.7.3 The Department of Posts and Telecommunications

The Department of Posts and Telecommunications offers comprehensive training and a large variety of career opportunities to Indians in the Telecommunication field. To help alleviate the serious staff shortage in the telecommunications field, forty Indian youths were taken on as pupil technicians in Natal during 1976. This was almost double the number employed in 1975 and it was the maximum number for which training facilities could be provided. The work can be divided into four different fields:

a. Automatic exchanges whose equipment throughout the Republic has to be serviced and maintained. New exchanges are constantly being erected and equipped even in the smaller rural areas of the Republic.

b. Carrier systems, where intricate electronic apparatus converts the normal speech band to a high frequency band by means of which the transmission is carried out with a minimum of interference. Maintenance services have to be available where these systems are installed.

c. Subscribers' equipment. A group of technicians is responsible for the installation and maintenance of subscribers' telephones, switchboards, private branch exchanges and the lines with which they are connected to public exchanges.

d. Outdoor equipment where technicians plan and supervise the construction and maintenance of overhead and underground telephone lines (46, p. 10).

The technician specialises in one of the fields mentioned above. There is thus a large variety of work and many different centres exist where a telecommunications technician can be employed. As indicated the work includes both outdoor and indoor activities. Usually telecommunication technicians work a five-day week, but essential services also have to be rendered over week-ends and public holidays when the need arises.

To enter for the course offered by the Department of Posts and Telecommunications at the M.L. Sultan College, applicants must possess a Senior Certificate or the equivalent thereof with Mathematics and General Science or Chemistry in the Lower Grade or a Junior Certificate with Mathematics and Physics or Chemistry in the Higher Grade. Insight, ability and interest in the field of electricity and electronics are necessary personal qualities. Good eye-hand co-ordination, accuracy, responsibility and the ability to plan are also essential qualities for success in this career. The annual intake is determined by the availability of general training facilities. (46, p. 11). Training in this connection is discussed in Chapter 4.

2.7.4 The South African Defence Force

When the first 200 Indian trainee volunteers arrived at the new Indian Service Battalion's training base at Salisbury Island in January 1975, an important milestone in defence history had been reached. In a White Paper on defence, tabled in Parliament in 1973, it was declared that a Service Battalion for Indians was planned and that Salisbury Island was to house the various training facilities (42, p. 16).

Although the Battalion is the responsibility of the S.A. Navy, the Army and Air Force provide training personnel. The training itself is of a general nature, relating to all three sections (air force, army and navy) of the Defence Force, and catering for trainees aspiring to enlist in the Permanent Force after

their training period of twelve months. Separate training facilities are provided and special attention given to tech= nical training seeing that the forces need the services of sailors, administrative personnel, chefs, waiters and especially skilled and semi-skilled tradesmen. Seen in its broad dimen= sions, the training not only benefits those who wish to make the Permanent Force their career, but also those who will later be employed in the civilian labour market.

CHAPTER 3

SOME FOUNDATIONS FOR EFFICIENT TECHNICAL EDUCATION

3.1 INTRODUCTORY REMARKS

Efficient functioning of an educational system without basic planning is unconceivable. Although persons concerned with educational planning do not agree on its meaning (12, p. 3), they concede that there are fundamental matters which are valid as foundations for efficient educational planning and for the realisation thereof in practice. In this chapter attention is given to some of the foundations for efficient technical education which has a bearing on every population group, and in this study, specifically on the Indians in the RSA.

The following foundations can also serve as criteria in order to evaluate the efficiency of the current system of technical education for Indians.

3.2 FORMATIVE VALUE

The content-matter of all subjects to which a child or student is introduced at school is, in fact, contents of life. This acquired knowledge or contents of life makes it possible for the child to develop or perfect his personal potential and in so doing to become an adult, because he learns to distinguish values and norms via the content-matter.

Besides physical growth, becoming an adult also implies the development or perfection of the mind as well as the values, the emotional, and volitional life. This development is neces= sary for the human being in his creation of relations with his fellow-men and his orientation as regards the realities of life around him. By means of efficient educational planning, recognition is given to the formative values of school sub= jects as embodied in appropriate syllabuses and pedagogic sound education. All school subjects therefore have formative value - some to a larger and others to a lesser extent.

In some educational circles little value has formerly been accorded to the formative value of technical subjects. Today this view is regarded as unpedagogic in educational circles and is rejected. The physical sciences have an increasing influence on technical subjects as well as on the technical aspects of industry and therefore they play an important role in forming

pedagogic criteria for effective technical education. Van der Stoep (51, p. 3) states the following: "(And) In view of the fact that a specific knowledge of the natural sciences has always been necessary to understand modern pronouncements and findings, considerably more subject-matter must be dealt with at school at present than for example 10 or 15 years ago".

The world of the pupil in a technical school is predominantly a technically, socially and scientifically determined one and therefore the problem or question arises as to which interests the pupils will develop by the general formative subjects of the technical school. An ever increasing amount of technicalisation, mechanisation and automation is occurring in the various occupational fields. As soon as man regards himself as expendable or as the second most important factor in the performing of labour, then the inner, human relationship with his work is threatened. It is essential that man must always be aware of or understand the how and why of any automatic process, whether he is dependent on the process or not, or else such a process may be regarded as a threat to man's freedom, independence and self-justification. Technical education plays an important role in warding off this threat by aiding the child to develop independence, freedom and self-justification. The technical school must be able to make the pupils conscious of and immune against the growing dissociation which is so characteristic of the modern processes of labour. The child growing up in the technical aspects of life must still be able to have confidence in himself and in so doing assure himself that he, and not the machine, is the most important factor in the technical aspects of life. It is therefore imperative that technical education does not over-accentuate technique, but that the same degree of attention be given to the development of the character and person of the child.

In the technological and industrial world of today, the role of the individual is becoming more and more insignificant. The child must nevertheless be able, with the aid of technical education, to acquire a consciousness of solidarity, that is, he must also be able to derive a common pride and satisfaction from the collective effort and product. Also very important is the fact that a labourer must not feel himself physically bound to only one specific occupation or type of work, but must feel free to orientate himself in the general technical field. This will also aid the child in choosing his occupational field according to his own interests.

Therefore, seen from a pedagogic point of view, for technical education to be effective, it must be able to guide the child so that his potentialities and therefore his becoming a person, as far as possible in given circumstances, come to optimal development in reaching adulthood, so that he can participate in society by knowing, understanding and differentiating.

3.3 VOCATIONAL DIRECTEDNESS

In the previous section accent was placed on the fact that all subjects have formative value. However, the enrichment of a child's knowledge brought about by a subject should be taken into account. In fact, it is accepted that the factual knowledge acquired by the child at school is relevant to the vocational life in which a child will eventually participate as an adult. Owing to this, it may be stated that the education which the pupils receive at school, is to a great extent vocationally directed.

According to the current system of differentiated education, the concept of vocational directedness is accepted. In accordance with this, pupils are given the opportunity, in further accordance with their capabilities, aptitude and interests, to choose a combination of subjects especially at senior secondary school level, which has a bearing on a specific vocational field. As already stated, but now especially confirmed, these subjects are connected to a child's post-school education or vocation. As regards the already mentioned system of differentiated education, human and physical sciences, commercial, technical, agricultural and artistical direction of study are aimed at whereas a practical orientated course is offered for dull normal pupils.

If the principles of differentiated education are also accepted as valid foundations for technical education for Indians, then owing to the previously mentioned facts, it is essential that specific vocational directedness should also be a characteristic of these schools. For example, the subject combinations which are offered should enable a pupil to choose, apart from general formative subjects, specific technical vocationally-directed subjects, so that he can reveal a large degree of vocational preparedness after having completed the senior secondary school phase.

It is obvious that the presentation of specific vocationally-orientated courses demands the availability of effective and sufficient facilities. For the technical school, this implies,

amongst other things, workshops with the necessary tools, equipment and material. Probably more important, however, is the fact that technical education can only be effective if offered by suitably qualified teachers. Mere knowledge and skill in a specific technical vocational direction is no guarantee that such a person is able to convey his knowledge and skills to others (in this case pupils). In technical schools also, a teacher should, besides his technical training, also be educationally (therefore pedagogically) schooled. Indeed, the teacher at a technical school should also be an educationist.

Effective technical education must be able to provide for multiple forming of the individual who has to cope with the requirements set by industry, that is, there must be sufficient opportunity for forming responsibility, joy in labour and willingness to co-operate and function. This implies a broad perceptional processing with which a large number of pupils attending a technical school will not be able to cope, but if technical education is to be effective, these pupils must also be catered for. They must also be given the opportunity, through technical education, to come into contact with more or less identical techniques, and understand functions so that a communal consciousness can be developed, that is, the pupils must also be able to orientate themselves in the general technical practice (23, p. 5).

When contact between pupil and subject-matter has to be effected, then the best way seems to be performing or "doing" in the contact situation, so that pupils can, according to their own interest, come into contact with the technique and in this way become familiar with the technique within their ability. The pupils will then be able to operate within the field of their technical occupation with ease and confidence which eventually leads to vocational orientation, resulting again in the choice of an occupation (23, p. 5).

3.4 CONSIDERATION OF THE COUNTRY'S MANPOWER REQUIREMENTS

The expansion of scientific and technological knowledge and the economical development in various industrial countries has, amongst other things, led to a change in the structure of the occupational world. One result of this is that, besides the disappearance of some vocations and the appearance of others, a differentiation of functions within a specific vocation has come into being. Specialisation within a specific vocational sphere is surely the best example in the latter case. In such a sphere but also in other vocational spheres, extensive and

specialised knowledge is often required. This has especially led to an ever increasing demand for high level manpower.

It can therefore, with reference to the foregoing, be stated that any form of education in a specific country must be able to keep pace with the manpower requirements of that country. This does not, however, imply that education must be dictated to by, amongst others, industry, but it would be absolutely unrealistic and unwise if the educational world does not continuously take note of such changes in this vocational sphere and make the necessary adjustments to provide for the specific demands. In contemporary educational circles notice has been taken of this aspect and consideration of current manpower requirements has characterised efficient educational planning.

What has been said in the previous paragraphs is especially applicable to technical education in the RSA. The rapid development in the economical sphere in general and specifically in the scientific and technological field has stressed the need for technically well-trained and qualified persons (see Chapter 2 in this connection). All forms of technical education must therefore be of such a nature that they will keep pace with the development in the technical vocational sphere, in order to provide adequately for these specific manpower requirements. It must be clear without going into details, that an efficient guidance system should form an essential part of this specific school system. By means of the active participation of the school counsellor, the school and the vocational world can be brought closer together by the specific nature (including possibilities) and requirements of each sphere. By doing this, the very important co-ordination between school and vocational world can be achieved.

CHAPTER 4

TECHNICAL EDUCATION AVAILABLE TO INDIANS IN SOUTH AFRICA

4.1 INTRODUCTION

In the previous chapter, attention has been given to job opportunities available to Indians and to their position in the national economy. This information, together with the criteria for efficient technical education as given in Chapter 2, may serve as valuable guidelines in the assessment of technical education for Indians. Quite naturally, however, for such an assessment one also needs to be fully aware of the status quo regarding technical education for Indians in South Africa. This chapter attempts to indicate the situation regarding technical education for Indians in the RSA today. All information was obtained either from the sources in the bibliography, or from the Division of Education of the Department of Indian Affairs, or from interviews conducted with the heads of various institutions for technical education for Indians during March and August 1977.

It has been found that technical education in South Africa is often divided into various categories or levels which have proved to be confusing at times. The designations for these categories used most frequently are:

1. Secondary technical education

Generally speaking, the secondary school phase extends over a period of five years from Std 6 to Std 10 and is usually, though not exclusively, offered at a technical high school.

2. Post-secondary technical education

This category of technical education, which is offered at a technical college, includes those technical courses for which the minimum entrance qualification is a Std 6 Certificate.

3. Tertiary technical education

Tertiary technical education can be regarded as the highest level of technical education because it includes those technical courses for which the minimum entrance qualification is a Senior Certificate.

4. Advanced or adult technical education

As can be seen from the designation, this category of technical education is available only to adults; persons who have reached the school-leaving age of 16. However, as explained fully at a later stage, advanced or adult technical education includes all three other categories of technical education mentioned above.

For the purposes of this study, technical education for Indians in South Africa is discussed under two main headings, namely secondary technical education, the technical education available only at a technical high school under the jurisdiction of the Division of Education of the Department of Indian Affairs, and advanced or adult technical education as provided at the M.L. Sultan Technical College.

4.2 SECONDARY TECHNICAL EDUCATION

4.2.1 Introduction

In the Report of the Committee for Differentiated Education and Guidance in Connection with a National System of Education at Primary and Secondary School Level (12, p. 185), it was recommended that four "types" of secondary schools be maintained in South Africa, namely general secondary schools, agricultural high schools, art schools and technical high schools for boys. In addition to the latter, it was also recommended "that the domestic science high schools lose their restrictive character and be developed into genuine women's vocational schools (technical high schools for girls); that the name of this type of school be changed to technical high schools for girls; that the curriculum of the school should be changed in such a way that it will offer vocational or vocationally-directed courses for girls which can be co-ordinated with post-school study or occupational practice, ..." (12, p. 186). Both these technical schools for boys and girls were to offer only a technical field of study, divided into several technical courses which in turn comprise various technical subjects, in addition to some non-technical subjects. These recommendations of the Report, some of which have already been implemented in secondary education for Whites, have to be borne in mind when studying and evaluating the status quo as regards technical education for Indians.

For the purposes of this study, secondary technical education and technical high school education are equated, that is, secondary technical education is regarded as the education given in various technical courses, specifically at a technical high

school. The nearest definition of technical high school education (as regards South Africa) is possibly "high school education with a technical bias and high school is the operative word" (10, p. 25).

The misconception that a technical high school is the same as a trade school is fairly common and it would benefit all concerned if parents, and the public in general were made aware of the real facts. The system according to which the academically weak students go to a trade school to spend more time on practical training in the workshop than on academical work in the classroom, has faded from the educational scene and today with the differentiated scheme of education, these students are placed in the practical course which is also conducted at the technical high school. However, this seems to be a very controversial point, and attention is also given to this question in this and the following chapter.

In South Africa, secondary technical education for Indians starts at Std 6 when, in addition to his academic subjects, a pupil also receives basic workshop training. This training consists of workshop practice designed to the basic skills of differentiated trades, such as woodwork, metalwork and welding, sheetmetalwork, electrical work and brickwork. Obviously the skills taught are of a very minor nature, but they tend to show the student's ability, aptitude and dexterity, so that when he is promoted to Std 7 he can take the trade subject that suits his capabilities the best.

The work done in the workshops is NOT training in a particular trade, so that when the pupil leaves school he will be a qualified or even a partially qualified artisan in that trade. The training at a technical high school can be classed at the most as "pre-apprenticeship training", which only serves to give the student some insight into his chosen trade and to prepare him for his apprenticeship (10, p. 25). It is therefore evident that the training can only be regarded as basic, with the emphasis on correct methods, the importance of neat and accurate work, the satisfaction that a successfully completed job gives and the appreciation and care of good tools or equipment. Workshop safety is strongly emphasized and the rules of the National Occupational Safety Association are adhered to.

From Std 7 the student can work his way up to Std 10, at which stage he can obtain a Senior Certificate and afterwards, if he gains matriculation exemption, he can go to a university. If the pupil does not desire a university course, he can continue

his technical training at tertiary level, either with the aim of becoming a technician or entering an apprenticeship in a trade (10, p. 25).

Although young men who have completed their education at an academic or a commercial high school are also at liberty to embark upon a course of technician training or to enter the trades as apprentices, the benefits derived from education received at a technically biased high school are numerous in this respect. Some of the advantages not readily realised are:

a. Other than the languages, the subjects taken closely resemble those for apprentices and are closely linked with technician training and the university.

b. There is a greater prospect of the pupil obtaining an apprenticeship in the trade of his choice owing to the contact that technical high schools have, or at least are supposed to have, with industry.

c. A student who has seen a number of workshops in operation and has spent some time in one or more of them is better able to decide where his interests lie, or better still, is more qualified to decide on what he is definitely NOT interested in.

d. There is additional remission in respect of the period of apprenticeship for boys obtaining Technical Junior, Intermediate and Senior Certificates. His period of apprenticeship may be shortened before he is trade-tested. With a five-year apprenticeship he can apply to be trade-tested after $2\frac{1}{2}$ years. The same applies if the student leaves school in Std 9 or in Std 8, but in these cases the apprenticeship period before trade testing is longer and the starting salary smaller.

e. The pupil may demand a higher starting salary when entering an apprenticeship.

Technical high school education for Indians in South Africa was introduced in 1955 (10, p. 27) and has since made considerable progress. The various aspects as regards the status quo in secondary technical education for Indians are discussed below under the various headings.

4.2.2 Secondary schools, facilities and equipment

As far as secondary technical education for Indians in South Africa is concerned, those schools which are regarded as technical high schools are the following: M.H. Joosub Technical High; M.L. Sultan Stanger High; M.L. Sultan Pietermaritzburg High and Loram State Indian High.

a. M.H. Joosub Technical High

This school, which is situated in Lenasia and is the only technical high school for Indians in the Transvaal, was originally designed and built as a technical high school. It features 28 classrooms, 9 specialist rooms, 2 drawingrooms and 3 workshops. The latter consist of one basic techniques workshop, one wood-working workshop and one motor mechanics workshop, all of which are nearly fully supplied with the equipment appearing on the standard lists of the Division of Education of the Department of Indian Affairs. Audio-visual apparatus includes 3 overhead projectors, 1 x 16 mm projector, 2 thermal copying machines, 3 tape-recorders, 1 radiogram and 1 high fidelity radio. In this respect it must be mentioned that difficulty is experienced in obtaining quotations from firms in Johannesburg for the repair of this equipment, owing to the distance involved. The monetary allocation for materials used in the workshops is regarded as satisfactory, although some difficulty is experienced with the delivery of these articles to the school (62).

b. M.L. Sultan Stanger High

One of the three technical high schools for Indians in Natal, the M.L. Sultan Stanger High was, however, not designed and built as a technical high school. The main building was completed in 1961 and this is regarded as the first phase in the building programme, whereas the second phase entailed the building of additional rooms that were eventually used for the tuition of technical subjects. At present there are 35 classrooms, 1 junior science laboratory, 1 senior science laboratory, 1 biology specialist room, 2 domestic science rooms (kitchens), 1 history specialist room, 1 geography specialist room, 4 technical drawing rooms and 2 typewriting rooms. In addition there are 4 workshops consisting of one workshop for woodworking, one workshop for metalworking and 2 workshops for motor mechanics, one of which is divided into 2 sections, one section being used for woodworking and the other section for motor mechanics. The workshop used only for motor

mechanics can hardly be described as a workshop and compares very unfavourably with workshops available at the other schools and is also extremely limited in space. Neither of the motor mechanics workshops is fully equipped with the equipment given on the standard lists of the Division of Education of the Department of Indian Affairs.

The monetary allocation for materials used in the workshops is regarded as satisfactory but, as is the case with M.H. Joosub Technical High, difficulty is experienced with the delivery of these articles to the school. The general feeling is that there are firms that are nearer than those in Durban which can adequately cope with delivery (64). The available audio-visual apparatus seems to be adequate.

c. M.L. Sultan Pietermaritzburg High

Designed as a technical high school, the M.L. Sultan Pietermaritzburg High was built in 1961-62. In addition to the number of classrooms, there are 3 workshops, one each for woodworking and bricklaying, the latter course which was, however, discontinued two years ago. The remaining workshop, currently used for motor mechanics and metalworking (including welding), is extremely limited in space; in fact, it creates a very dangerous working situation with all the machinery and equipment for the various trades standing close together; some of these machines are also inadequately fitted with safety precautions according to a report by the National Occupational Safety Association. These machines are also regarded as outdated, although the constant supply of new machines seems to compensate to some extent. There is also an acute shortage of storage space for materials, for which the monetary allocation is regarded as sufficient. The audio-visual apparatus seems to be of great value, especially the 5 available overhead projectors (63).

d. Loram State Indian High

This school, which was once under the control of the M.L. Sultan Technical College, currently has no facilities for technical education, the facilities at the M.L. Sultan Technical College being used for this purpose. The reason for this is that Clairwood High School is presently being converted into a technical high school which will eventually serve as a substitute for Loram State High, whose name is also expected to be changed once the new school is occupied. The conversion is expected to be completed by the end of 1977 and until such time, the present school building and the facilities of the

College will be used. Discussing the present school will therefore serve no purpose, but attention must be given to the new school.

In addition to the present facilities at Clairwood, a technical wing is being built at a cost of approximately R890 000, compri= sing the following:

a. Workshops for motor mechanics, plumbing, welding, spray= painting, panel-beating, bricklaying, fitting and turning, electrical/radio work and woodworking.

b. A general storeroom, a storeroom for materials, an office and storeroom for the janitor and quarters for servants.

The monetary allocation for equipment to be used in the work= shops is in the vicinity of R220 000 and this, together with the allocation for materials, is regarded as sufficient (61). At a later stage, an administration block, drawing rooms and specialist rooms are also to be built.

4.2.3 Courses and subjects

A technical course at senior secondary level starts in Std 8 and is a course of study in which, in addition to the two official languages, at least half of the remaining subjects taken, are recognised technical subjects. As previously mentioned, according to the report of the Committee for Differentiated Education, it was recommended that technical schools offer only a technical field of study, so that today it is this technical field of study which, more than anything else, differentiates a technical high school from the other types of high schools. This, at least, is the position regard= ing secondary technical education for Whites in South Africa.

The position regarding secondary technical education for Indians differs somewhat from that for Whites. There is, for instance, not one Indian high school which offers only a technical field of study. The four schools mentioned under 4.2.2 are at pre= sent, in addition to some technical courses, also offering various other non-technical courses, so that these schools are, strictly speaking, not technical schools. This point is dis= cussed in Chapter 5. Nevertheless, with the exception of M.H. Joosub High which is at present not offering any technical courses, the other three schools are at present offering the following technical courses:

"a. The ordinary technical course, which includes the following subjects:

1. The first official language,

2. The second official language,

3. Mathematics,

4. Physical Science,

5. Technical Drawing and

6. one of the following subjects:

(a) Motor Mechanics

(b) Woodworking

(c) Welding and Metalworking

(d) Bricklaying and Plastering

(e) Radiotrician Work

(f) Electrician Work

(g) Fitting and Turning

(h) Plumbing and Sheetmetalworking

All these subjects are offered on the Standard Grade Level whereas the first and second official languages, Mathematics, Physical Science and Technical Drawing are also offered on the Higher Grade Level. The levels on which the subjects are taken and passed in the matriculation examination determine the type of Senior Certificate awarded, i.e. a Senior Certificate with or without matriculation exemption.

Together with Technical Drawing, the subjects mentioned under 6 constitute the so-called acknowledged technical subjects which are also referred to in this study. It must be noted that Technical Drawing is the only technical subject which can be offered on either the HG or SG whereas all other technical subjects can only be offered on the SG. All the subjects mentioned thus far are only offered at some of the four technical high schools for Indians. At this stage it would therefore be appropriate to indicate which technical subjects are offered at these schools. This is done in Tabel 4.1.

From Tabel 4.1 it can readily be seen that Loram High is at present the only Indian technical high school which is offering all the acknowledged technical subjects. M.H. Joosub High, which is not included in the table, is not at present offering any technical subjects. The only technical subjects being offered at this school at present are the following being offered at the junior secondary level:

1. Industial arts: Standard 6, 7 and 8,

2. Woodworking: Standard 6, 7 and Standard 8 practical,

3. Technical drawing: Standard 7 and Standard 8 practical (62).

b. The practical technical course

This course starts in Standard 6 and at present lasts up to Standard 8. During these three years, a pupil in the practical course takes, in addition to his non-technical subjects (which are all on a "practical" level or grade), the following technical subjects, which are also on a "practical" level or grade: Technical Drawing plus either Workshop Practice and Theory or Industrial Arts Practice and Theory. Tabel 4.2 indicates which of the technical schools are at present offering these subjects and to which standards.

TABLE 4.1

TECHNICAL SUBJECTS FOR THE ORDINARY SENIOR SECONDARY TECHNICAL COURSE OFFERED AT THE VARIOUS INDIAN TECHNICAL HIGH SCHOOLS – 1977

Subjects	Schools and standards											
	M.L. Sultan Pieter=maritz=burg			M.L. Sultan Stanger			Loram High			M.H. Joosub High		
	8	9	10	8	9	10	8	9	10	8	9	10
Motor mechanics	×	×	×	×	×	×	×	×	×			
Woodworking	×	×	×	×	×	×	×	×	×			
Technical drawing (HG)	×	×	×	×	×	×			×			
Technical drawing (SG)	×	×	×			×	×	×	×			
Welding and metalworking							×	×	×			
Bricklaying and plastering							×	×	×			
Radiotrician work							×	×	×			
Electrician work							×	×	×			
Fitting and turning							×	×	×			
Plumbing and sheetmetal=working							×	×	×			

TABLE 4.2

TECHNICAL SUBJECTS FOR THE PRACTICAL COURSE AT THE VARIOUS INDIAN TECHNICAL HIGH SCHOOLS - 1977

Subject	Schools and standards											
	M.L. Sultan Pietermaritzburg			M.L. Sultan Stanger			Loram High			M.H. Joosub High		
	6	7	8	6	7	8	6	7	8	6	7	8
Workshop Practice and Theory		×	×			×						
Industrial Arts Practice and Theory					×				×	×	×	×
Technical Drawing		×	×		×	×				×	×	×

It is interesting to note from Table 4.2 that although Loram High features all the technical subjects in all standards of the ordinary technical course, it is at present offering only one technical subject (Industrial Arts) in one standard (Std 8) of the practical course. Furthermore it is also interesting to note that while M.H. Joosub is at present, in addition to Technical Drawing, only offering Industrial Arts and not Workshop Practice and Theory, the opposite prevails for M.L. Sultan Pietermaritzburg and M.L. Sultan Stanger.

According to Circular No. 24 of 1977 from the Division of Education of the Department of Indian Affairs, the practical course is to be extended to include Std 9 with effect from January 1978 and Std 10 with effect from January 1979, subject to the conditions -

1. that the existing facilities at the school allow for the extension of the practical course,

2. that economic teaching units be maintained and

3. that the prior approval of the Director of Education be obtained.

The course will consist of a general direction of study and a technical direction of study, the latter which is to be offered only at a technical high school. The technical direction of study will include the following examination subjects, all of which will be at a "practical" level or grade:

1. The first official language

2. The second official language

3. Mathematics

4. Physical Science

5. One of the following technical subjects, each of which will include practice, theory and technical drawing:

    a. Motor mechanics

    b. Bricklaying and Plastering

    c. Radiotrician work

    d. Fitting and Turning

    e. Woodworking

    f. Welding and Metalworking

    g. Plumbing and sheetmetalworking

    h. Electrician work.

The intention in extending the practical course into Stds 9 and 10 is to cater for the Std 8 practical course pupil who obtains a pass in that standard. A pupil in Stds 6, 7 and 8 following the ordinary course, is at liberty to change to the practical course, but a pupil in Stds 9 or 10 following the ordinary course, wishing to change to the practical course must repeat Std 8 in the practical course. A pupil in Std 8, 9 or 10 practical course who wishes to change to the ordinary course must also repeat Std 8 in that course. According to reports received, the practical course is not, however, expected to be popular among Indians, most probably owing to the apparent limited possibilities for post-secondary education available to a pupil who has completed Std 10 in the practical course (59).

A pupil at an Indian technical high school may from 1978 be able to choose from two different technical courses in the technical field of study, namely the ordinary technical course and the practical technical course. Both these courses will include the same subjects which will only differ in the level or grade on which they will be offered in each course.

A pupil who has obtained his senior certificate (Std 10) without exemption in the ordinary technical course may follow either a technician course and become a technician, or an apprenticeship and become an artisan. A pupil who has obtained his senior certificate with exemption, may follow any of the following three courses.

1. A university course in which he may study for any degree currently being offered at a university; or

2. a technician course and become a technician; or

3. follow an apprenticeship and become an artisan.

Both pupils mentioned may leave school at any stage, providing that they have reached the school-leaving age, and follow an apprenticeship to become artisans. A pupil who has completed Std 10 in the practical course may not go to a university or a teacher's training college. No student may be admitted to the M.L. Sultan Technical College with a practical grade pass. A Std 8 Certificate in either the ordinary grade course or the practical grade course is not regarded as identical by the College.

Another aspect which needs attention is the weekly allocation of periods and time for subjects in the senior secondary school phase. Table 4.3 should be studied in this connection.

TABLE 4.3

THE WEEKLY ALLOCATION OF PERIODS AND TIME FOR SUBJECTS IN THE SENIOR SECONDARY TECHNICAL COURSES

Subjects	Ordinary Course		Practical Course	
	No. of periods per week	Time (minutes)	No. of periods per week	Time (minutes)
First language	9	315	6	210
Second language	8	280	5	175
Mathematics	6	210	5	175
Physical Science	6	210	5	175
Technical Drawing	6	210	2	70
Technical subject:				
Theory	6	210	3	105
Workshop practice			15	525
Optional period	1	35		
Non-examination subjects	3	105	4	140
Right Living		75		75

As can be seen from Table 4.3, a pupil following the practical technical course in Std 9 from 1978 and Std 10 from 1979, is going to spend far more time on his chosen technical subject, especially the workshop practice aspect ($8\frac{3}{4}$ hours per week), than on any of his other subjects. However, a pupil following the ordinary technical course spends just as much time on his chosen technical subject than on Mathematics and Physical Science. The reason is that a pupil following a technical course has to write the same examination in his non-technical subjects as a pupil following a non-technical course, in other words the time allocation for the non-technical subjects of a pupil following a technical course must inevitably be the same as that of a pupil following a non-technical course.

The time allocation for the technical subjects (especially for workshop practice) has proved to be inadequate and to try and compensate for this, some of the time allocated to Technical Drawing plus the optional period is being spent on workshop practice although this still does not seem to be adequate (59).

Apparently the problem is that owing to the nature of the work done in a workshop, a single period of 35 minutes cannot be used effectively but that each session spent in the workshop should last at least 3 continuous periods, that is $1\frac{1}{2}$ hours, which means that only two such sessions can take place each week. As mentioned, this is regarded as inadequate, but a solution to this problem does not seem to be at hand.

4.2.4 Pupils

The statement has been made that since technical education for Indians was introduced in 1955, it has made considerable pro= gress. One way of gauging this progress is by looking at the number of pupils taking technical subjects at the various technical schools for Indians, especially during this and the past two years. Tables 4.4 – 4.6 should be studied in this connection.

TABLE 4.4

THE NUMBER OF PUPILS TAKING TECHNICAL SUBJECTS IN THE VARIOUS SENIOR SECONDARY STANDARDS IN 1975, 1976 AND 1977 – EACH SCHOOL SEPARATELY

a. M.L. Sultan Pietermaritzburg High

Subject	Std 8			Std 9			Std 10			TOTAL		
	75	76	77	75	76	77	75	76	77	75	76	77
Motor mecha= nics	17	42	35	–	10	25	10	–	9	27	52	69
Woodworking	20	37	40	13	10	30	5	5	10	38	52	80
Technical Drawing (HG)	37	57	61	13	4	23	15	5	3	65	66	87
Technical Drawing (SG)	–	22	14	–	16	32	–	–	16	–	38	62
TOTAL	74	158	150	26	40	110	30	10	38	130	208	298

b. M.L. Sultan Stanger High

Subject	Std 8			Std 9			Std 10			TOTAL		
	75	76	77	75	76	77	75	76	77	75	76	77
Motor mecha=nics	37	66	89	25	30	57	17	14	24	79	110	170
Woodworking	31	31	25	12	21	22	11	8	11	54	60	58
Technical drawing (HG)	68	97	114	37	51	79	28	13	30	133	161	223
Technical drawing (SG)	-	-	-	-	-	-	-	9	5	-	9	5
TOTAL	136	194	228	74	102	158	56	44	70	266	340	456

c. Loram State High

Subject	Std 8			Std 9			Std 10			TOTAL		
	75	76	77	75	76	77	75	76	77	75	76	77
Motor mechanics	–	57	23	–	11	27	–	5	4	–	73	54
Woodworking	–	37	17	–	12	12	–	2	5	–	51	34
Technical drawing (HG)	–	–	–	–	–	–	–	11	9	–	11	9
Technical drawing (SG)	–	201	132	–	58	84	–	8	12	–	267	228
Welding and Metalworking	–	12	16	–	3	1	–	–	1	–	15	18
Bricklaying and plastering	–	5	6	–	1	2	–	–	–	–	6	8
Radiotrician work	–	13	1	–	9	10	–	4	3	–	26	14
Electrician work	–	33	32	–	12	12	–	3	5	–	48	49
Fitting and Turning	–	35	27	–	5	13	–	5	2	–	45	42
Plumbing and sheetmetalwork	–	9	10	–	5	7	–	–	1	–	14	18
TOTAL	–	402	264	–	116	168	–	38	42	–	556	474

TABLE 4.5

THE TOTAL NUMBER OF PUPILS IN THE SENIOR SECONDARY STANDARDS TAKING WOODWORKING, MOTOR MECHANICS AND TECHNICAL DRAWING IN 1975, 1976 AND 1977 – ACCORDING TO STANDARD

Subjects	Std 8			Std 9			Std 10			TOTAL		
	75	76	77	75	76	77	75	76	77	75	76	77
Motor mechanics	54	165	147	25	51	109	27	19	37	106	235	293
Woodworking	51	105	82	25	43	64	16	15	26	92	163	172
Technical drawing (HG)	105	154	175	50	55	102	43	29	42	198	238	319
Technical drawing (SG)	–	223	146	–	74	116	–	17	33	–	314	295
TOTAL	210	647	550	100	223	391	86	80	138	396	950	1079

TABLE 4.6

THE TOTAL NUMBER OF PUPILS IN THE SENIOR SECONDARY STANDARDS TAKING TECHNICAL SUBJECTS IN 1975, 1976 AND 1977 – ACCORDING TO STANDARD

Std 8			Std 9			Std 10			TOTAL		
75	76	77	75	76	77	75	76	77	75	76	77
210	754	642	100	258	436	86	92	150	396	1 104	1 228

TABLE 4.7

THE TOTAL NUMBER OF PUPILS IN THE SENIOR SECONDARY STANDARDS TAKING TECHNICAL SUBJECTS IN 1975, 1976 AND 1977

1975	1976	1977
396	1 104	1 228

At present Loram State High has the highest total number of senior secondary standard pupils taking technical subjects (474), followed by M.L. Sultan Stanger High (456) and M.L. Sultan Pietermaritzburg High (298), as can be seen from Table 4.4. According to the senior secondary standards separately Loram also has the highest number of pupils taking technical subjects in Std 8 and 9 but, surprisingly, M.L. Sultan Stanger High has the highest number of pupils (70) taking technical subjects in Std 10, compared with Loram (42) and M.L. Sultan Pietermaritzburg High (38). The fact that there is a difference between Loram and M.L. Sultan Stanger High of only 18 senior secondary pupils taking technical subjects is especially noteworthy considering that the latter school is at present offering only 2 such subjects, apart from Technical Drawing whereas Loram is offering 8 technical subjects and furthermore the latter school is situated in a metropolitan area while M.L. Sultan Stanger High is not.

From Tables 4.4 and 4.5 it can be seen that the greatest number of senior secondary pupils at present taking one single technical subject (excluding Technical Drawing) are the 293 taking Motor Mechanics, followed by 172 taking Woodworking, 49 taking Electrician Work, 42 taking Fitting and Turning, 18 taking Plumbing and Sheetmetalworking, 18 taking Welding and Metalworking, 14 taking Radiotrician work and 8 taking Bricklaying and Plastering. It must, however, be borne in mind that Motor Mechanics and Woodworking are at present being offered by all 3 schools mentioned thus far, while all the other technical subjects are only being offered at Loram State High. Even at the latter school though, Motor Mechanics seems to be the most popular technical subject. The exception to the rule is at M.L. Sultan Pietermaritzburg where more pupils are currently taking Woodworking (80) than Motor Mechanics (69). There are, however, various factors which have an influence on these numbers, so that it would be incorrect to state that, according to the figures, one technical subject is more popular than another. One such an example is at M.H. Joosub High where there are at present no pupils taking Motor Mechanics (at junior and/or senior secondary level) owing to the fact that a teacher for this subject is unavailable, although according to a survey carried out at the school, Motor Mechanics will be the technical subject in demand once it is offered (62).

According to Table 4.6, the number of pupils in the senior secondary standards taking technical subjects has increased from 396 in 1975 to 1 228 in 1977, which represents an increase of 210 per cent within two years! According to the separate senior

secondary standards (Table 4.6), the number of pupils taking technical subjects in Std 8 since 1975 has increased from 210 to 642 (205,7%), in Std 9 from 100 to 436 (336%) and in Std 10 from 86 to 150 (74,4%). The percentage increase in Std 9 pupils is especially noteworthy.

According to the data for each school (Table 4.4), it can be seen that the number of Std 8, 9 and 10 pupils taking technical subjects at M.L. Sultan Pietermaritzburg High has increased by 76 (102,7%), 84 (323%) and 8 (26,6%) respectively since 1975. At M.L. Sultan Stanger High the increases in numbers and percentages since 1975 for Standards 8, 9 and 10 are 92 (67,6%), 84 (113,5%) and 14 (25%) respectively. According to the figures for Loram State High, there has been a reduction of 138 in the number of Std 8 pupils taking technical subjects since last year, a loss of 52,5 per cent, while the number of Std 9 and 10 pupils taking technical subjects has only increased by 52 (44,8%) and 4 (10,5%) respectively since last year. This can be compared with the figures for M.L. Sultan Pietermaritzburg High where there has been an increase of 70 (175%) and 28 (280%) in the number of, Std 9 and 10 pupils respectively since last year, and the figures for M.L. Sultan High where the increase in the number of pupils taking technical subjects in above-mentioned two standards is 56 (56%) and 26 (59%) respectively since last year.

One aspect of pupil enrolment which has not quite been highlighted in the tables thus far, is the pupil failure rate. Assuming that the pupils taking technical subjects who are currently in Std 10 are the same pupils who were in Std 9 last year and obtained a pass, and that the latter pupils were the same pupils who were in Std 8 during 1975 and had obtained a pass, the pupil failure rate for each school separately can be illustrated in Tables 4.8 - 4.11, using the figures given in Tables 4.4 - 4.7.

TABLE 4.8

THE PUPIL FAILURE RATE AT M.L. SULTAN PIETERMARITZBURG HIGH SINCE 1975

Subject	Number of pupils in standards and year			Net loss since 1975	% loss
	Std 8 1975	Std 9 1976	Std 10 1977		
Motor mechanics	17	10	9	8	47,0
Woodworking	20	10	10	10	50,0
TOTAL	37	20	19	18	48,6

TABLE 4.9

THE PUPIL FAILURE RATE AT M.L. SULTAN STANGER HIGH SINCE 1975

Subject	Number of pupils in standards and year			Net loss since 1975	% loss
	Std 8 1975	Std 9 1976	Std 10 1977		
Motor mechanics	37	30	24	13	35,1
Woodworking	31	21	11	20	64,5
TOTAL	68	51	35	33	48,5

TABLE 4.10

THE TOTAL PUPIL FAILURE RATE AT M.L. SULTAN PIETERMARITZBURG HIGH AND M.L. SULTAN STANGER HIGH SINCE 1975

Subject	Number of pupils in standards and year			Net loss since 1975	% loss
	Std 8 1975	Std 9 1976	Std 10 1977		
Motor mechanics	54	40	33	21	38,8
Woodworking	51	31	21	30	58,8
TOTAL	105	71	54	51	48,8

TABLE 4.11

THE PUPIL FAILURE RATE AT LORAM STATE HIGH SINCE 1976

Subjects	Number of pupils in standards and year		Net loss since 1976	% loss
	Std 9 1976	Std 10 1977		
Motor mechanics	11	4	7	63,6
Woodworking	12	5	7	58,3
Technical drawing (HG + SG)	58	21	37	63,7
Welding and metalworking	3	1	2	66,6
Bricklaying and plastering	1	0	1	100,0
Radiotrician work	9	3	6	66,6
Electrician work	12	5	7	58,3
Fitting and Turning	5	2	3	60,0
Plumbing and Sheetmetalworking	5	1	4	80,0
TOTAL	116	42	74	63,7

From Tables 4.8 - 4.10 it can be seen that the total pupil failure from Std 8 in 1975 to Std 10 in 1977 at M.L. Sultan Pietermaritzburg High (48,6%) and M.L. Sultan Stanger High (48,5%) for the mentioned subjects are virtually identical. At both these schools the failure rate of pupils taking Woodworking is higher than the failure rate for pupils taking Motor Mechanics, but whereas the pupil failure rate in the latter subject from Std 8 in 1975 to Std 10 in 1977 is higher at M.L. Sultan Pietermaritzburg High (47%) than at M.L. Sultan Stanger High (35,1%), the failure percentage at the latter school is higher for pupils taking Woodworking (64,5%) than the failure percentage for

pupils taking Woodworking at M.L. Sultan Pietermaritzburg High (50%).

According to Table 4.11 the total pupil failure figure from Std 9 in 1976 to Std 10 in 1977, at Loram State High is 74 (63,7%). This is higher than the total failure figure for the same two standards during the same period at M.L. Sultan Pietermaritzburg High and M.L. Sultan Stanger High combined, which is only 17 (23,9%). It must be stressed though that the latter figures represent the pupil failure figures in only 2 technical subjects whereas the figures for Loram State High, as quoted above, represent the pupil failure figures for 8 technical subjects. However, comparing the pupil failure figures for pupils taking Motor Mechanics and Woodworking from Std 9 in 1976 to Std 10 in 1977, Loram State High still has the highest pupil failure percentage in Motor Mechanics (63,6%), followed by M.L. Sultan Stanger High (20%) and M.L. Sultan Pietermaritzburg High (10%) and also the highest pupil failure percentage in Woodworking (58%), followed by Stanger (20%) and Pietermaritzburg which suffered no loss.

Looking at the pupil failure figures for M.L. Sultan Pietermaritzburg High (Table 4.8), it can be seen that the total pupil failure figure from Std 8 in 1975 to Std 9 in 1976 is 17 (46%), whereas the total pupil failure figure from Std 9 in 1976 to Std 10 in 1977 is only 1 (5%). At M.L. Sultan Stanger High (Table 4.10) the situation is somewhat different, because the total pupil failure figure from Std 8 in 1975 to Std 9 in 1976 is 17 (25%) whereas the total pupil failure figure from Std 9 in 1976 to Std 10 in 1977 is 16 (31%). Thus, according to percentages, there has been a far higher loss of pupils from Std 8 to Std 9 (46%) than from Std 9 to Std 10 (5%) at M.L. Sultan Pietermaritzburg High, whereas at M.L. Sultan Stanger High the opposite is true, owing to a higher loss of pupils from Std 9 to Std 10 (31%) than the loss of pupils from Std 8 to Std 9 (25%). Taking the totals for the two schools together (Table 4.10), it may be seen that the total loss of pupils (34) from Std 8 in 1975 to Std 9 in 1976 is exactly twice the total loss of pupils (17) from Std 9 in 1976 to Std 10 in 1977. Generally therefore, and with these two schools as a criterion, it can be stated that the main loss of pupils taking technical subjects at senior secondary level occurs between Std 8 and Std 9.

So far an indication has been given of the number of pupils presently taking technical subjects at senior secondary level as well as during the past two years. According to a projec-

tion made by the Division of Education of the Department of Indian Affairs, the number of pupils taking technical subjects is expected to increase during the next 3 years (58). This projection is shown in Table 4.12.

TABLE 4.12

A PROJECTION OF THE NUMBER OF PUPILS EXPECTED TO TAKE TECHNICAL SUBJECTS DURING 1978, 1979 AND 1980

Subjects	Year and number of pupils		
	1978	1979	1980
Motor Mechanics	299	359	429
Woodworking	251	301	361
Fitting and Turning	72	86	102
Electrician	53	63	74
Radiotrician	62	74	88
Bricklaying and Plastering	73	88	100
Welding	26	31	37
Plumbing	42	50	59
Panel-Beating	28	34	41
Basic training	765	918	1 068
TOTAL	1 671	2 004	2 359

It must be mentioned that this projection is based on the trend of enrolment for the various technical subjects at the four technical high schools for Indians. According to the Division of Education of the Department of Indian Affairs, this projection will not change radically if it were to be based on the demand for the various technical subjects (59).

This cannot, however, be placed beyond doubt, especially when considering that the majority of technical subjects are not being offered at three of the four technical high schools for Indians, in other words there are at present no pupils enrolled in these subjects at these three schools, simply because the subjects are not being offered. That does NOT mean to say that

these subjects are not in demand; on the contrary, as has been mentioned before, some of these subjects are apparently high in demand and the enrolment is expected to be high once they are offered.

It would be interesting to know exactly what the enrolment figures for the various technical subjects would be should they be offered at all four technical high schools.

4.2.5 Teachers

The position as regards teachers responsible for technical subjects at the four technical high schools for Indians, is such that it should, at least, be considered as being unsatisfactory. It could, in fact, be stated that the single most important problem in technical education for Indians today, is the teacher situation. This can best be understood by closely studying the problem.

At present a total of 23 teachers are teaching technical subjects at the four technical high schools for Indians. Of these, 3 are at present teaching Motor Mechanics, 19 are teaching Technical Drawing, 6 are teaching Industrial Arts and 2 are teaching Woodworking. It must be noted that 15 of these teachers are teaching only one technical subject, while the other 8 are teaching more than one technical subject. The fact that there are at present only 5 teachers teaching technical subjects other than Technical Drawing and Industrial Arts is not satisfactory, even more so when it is borne in mind that these 5 teachers are teaching only two technical subjects, namely Motor Mechanics and Woodworking, which means that there are not teachers available who are capable of teaching the other technical subjects. The position here, which at present only has bearing on Loram State High, is that the pupils taking technical subjects are being taught the practical (workshop) aspects by staff from the M.L. Sultan Technical College who have been seconded to teach these technical subjects. These lecturers do not, however, fall under the jurisdiction of the Division of Education of the Department of Indian Affairs. There are at present only three teachers teaching technical subjects at Loram State High, of whom all 3 are teaching Technical Drawing, which means a teacher to senior secondary pupil ratio of 1 : 158. When the new school at Clairwood is opened in 1978, some of the lecturers from the M.L. Sultan Technical College at present teaching the pupils from Loram High will be seconded to the new school. This will solve the teacher shortage problem there for at least the next two years (59).

At M.L. Sultan Pietermaritzburg High, 4 teachers from a staff of 35 are teaching technical subjects, of whom 1 is teaching only 1 technical subject, namely Technical Drawing, while the other 3 are teaching more than one technical subject. The teacher to senior secondary pupil ratio here is 1 : 74. M.L. Sultan Stanger High has the largest number of teachers for technical subjects, namely 14, though 9 of these are teaching only Technical Drawing while only 1 is teaching Woodworking and other technical subjects, 1 is teaching Industrial Arts and other technical subjects, 1 is teaching Motor Mechanics only and 2 are teaching Motor Mechanics and other technical subjects. The teacher to senior secondary pupil ratio is 1 : 32. As already mentioned, M.H. Joosub High has no senior secondary pupils taking technical subjects. Here the only 2 teachers teaching technical subjects, from a staff of 35, are at present teaching Industrial Arts and Technical Drawing to the junior secondary (including practical course) pupils.

Bearing in mind that some teachers have more than one qualification, the position regarding the qualifications of teachers currently teaching technical subjects at the four Indian technical high schools is as follows:

- 2 teachers have degrees;
- 7 teachers have a National Teacher's Diploma which is a one-year full-time course with the Senior Certificate or N.T.C. III as entrance requirements;
- 1 teacher has a National Technical Teacher's Diploma which is a post-matriculation diploma equivalent to a M + 4 qualification;
- 1 teacher has a National Technical Certificate Part V which is a purely non-teaching qualification equivalent to M + 2;
- 3 teachers have a Junior Secondary Education Diploma which is a 3-year combined academic and professional teaching diploma equivalent to M + 3 and qualifying a teacher to teach general school subjects up to junior secondary level;
- 1 teacher has a National Technician's Diploma which is a non-teaching technical qualification equivalent to M + 3;
- 1 teacher has a Technician's Diploma which is a non-teaching technical qualification equivalent to M + 3;
- 2 teachers have a Diploma in Industrial Arts which was a special one-year full-time course in Woodwork, Metalwork and Technical Drawing, offered by the Department of Indian Affairs to teachers who already possessed a teaching

qualification evaluated at M + 2 standard or higher. (This course was offered for a few years to train teachers to teach Woodwork, Metalwork and Technical Drawing in the Junior secondary phase. This course was an interim measure to meet the shortage of teachers in Industrial Arts and was introduced into the junior secondary curriculum under the new differentiated system of education. These teachers are now trained at the Indian colleges of education for the Junior Secondary Diploma which is a 3-year full-time course.)

- 4 teachers have a Lower Secondary Education Diploma which is a 3-year full-time combined academic and professional teaching qualification for teachers of junior secondary subjects in the ordinary school curriculum and is equivalent to M + 3;
- 1 teacher has a Natal Teacher's Senior Certificate which is a one-year full-time post-senior certificate or a two-year full-time post-junior certificate teaching course which was offered by the Natal Education Department up to 1950 and is equivalent to M + 1;
- 1 teacher has a National Technician's Certificate which is a post-senior certificate non-teaching technical course equivalent to M + 2;
- 1 teacher has a Higher National Certificate in Mechanical Engineering which is a post-senior certificate non-teaching engineering course equivalent to M + 3; and
- 3 teachers have either a Natal Senior Certificate or a National Senior Certificate.

Clearly the position as regards teachers of technical subjects is serious; even more so when looking at Table 4.13 which gives the projected cumulative demand for teachers in technical subjects till 1980. This projection, made by the Division of Education of the Department of Indian Affairs, is based on the projection of the number of pupils expected to take technical subjects in the near future (Table 4.12) and the number of teachers needed to teach them (59).

TABLE 4.13

THE PROJECTED CUMULATIVE DEMAND FOR TEACHERS OF TECHNICAL SUB= JECTS AT INDIAN TECHNICAL HIGH SCHOOLS

Subjects	Number of teachers required and year					
	1975	1976	1977	1978	1979	1980
Motor Mechanics	10	15	16	16	16	16
Woodworking	10	15	16	16	16	16
Fitting and turning	-	3	3	3	4	4
Electrical work	-	3	3	3	3	3
Radiotrician work	-	2	2	2	2	2
Brickwork and Plastering	3	6	6	6	6	6
Welding	-	2	3	3	3	3
Plumbing	-	2	2	2	3	3
Panel-beating and Spray-painting	-	1	2	2	3	3
TOTAL	23	49	53	53	56	56

In trying to solve the teacher shortage problem, various schemes have been suggested and some even implemented. One such scheme is a "crash course" consisting of one year full-time training offered to teachers in Industrial Arts. For various reasons this course has failed to live up to expectations, but plans are being made to revise the implementation of this type of course. Another scheme is to (try to) draw qualified artisans or tradesmen from the private sector or from industry and train them as teachers. The main problems encountered here so far are that the private sector is providing tough competition as far as salaries are concerned and furthermore the people who may be willing to be trained as teachers are in most cases not the most highly qualified or skilled in their particular trade (58).

The minimum requirements for applicants are:

a. A four-subject NTC 3 plus the two official languages, with at least one on the higher grade, or an equivalent qualification;

b. a completed apprenticeship contract;

c. a successful trade test, and

d. 2 years' appropriate trade experience after completion of the apprenticeship contract and successful trade test.

Successful applicants will be appointed as teachers employed by the Department of Indian Affairs and must enrol for a one-year teacher training course at a College for Advanced Technical Education. During the period of training full salary according to qualifications and previous experience will be paid. The success of this scheme has yet to be proved.

4.3 ADVANCED TECHNICAL EDUCATION

4.3.1 Introduction

As already mentioned, for the purposes of this study technical education for Indians is discussed under two main headings or categories, namely secondary technical education, as discussed in paragraph 4.2, and advanced or adult technical education. As also previously mentioned, adult technical education can be defined as technical education given to students who have reached the school-leaving age of 16. The only institution in South Africa which is at present offering advanced technical education to Indians is the M.L. Sultan Technical College in Durban. It should therefore not seem strange that this part of Chapter 4 is concerned only with the activities of the M.L. Sultan Technical College of which a brief history and background are firstly given below and thereafter a discussion of the various aspects of adult technical education at the College.

4.3.2 Brief historical background of the M.L. Sultan Technical College

From the College records the origin of the College can be traced back to 1928 when, because technical education for Indians was still unavailable in South Africa, part-time classes were started in various buildings in the Durban area, including Sastri College where commercial and technical classes were provided in 1930. In 1942 a donation of R25 000 was made by Hajee Malukmahomed Lappa Sultan towards the erection of a technical college, which was later to be named the M.L. Sultan Technical College (60).

On 18 January 1946 the Minister of Education (Union Education Department) proclaimed his intention to declare the M.L. Sultan

Technical College an Institution of Higher Education in terms of the Higher Education Act No. 30 of 1923. On 12 September 1946, the College Council met for the first time. Concerted efforts together with magnificent donations and tremendous sacrifices by many individuals and organisations resulted in the planning and erection of the main building which was offi= cially opened on 7 September 1956. In addition to this building several other specialist buildings were afterwards also built on the $\pm$ 6 acre site in Centenary Road, Durban. Subsequently other branches of the College were also created in Pietermaritz= burg and Stanger. These branches were recently transferred to the Division of Indian Education when the College started planning specialisation only in tertiary education.

In terms of the Indians Advanced Technical Education Act of 1968 (Act No. 12 of 1968), the College gained the elevated status of a College for Advanced Technical Education as from 1 March 1969. The functions of the College as specified in the Act are to provide (60):

"(i) such advanced technical education and training and such teacher-training; and

(ii) such secondary and other education on a full-time or part-time basis as the Minister may approve".

In addition to these educational functions, the College is also engaged in the further important function of assisting in alleviating the manpower shortage.

At present the College in actual fact consists of seven divisions namely (60):

(i) The Division of General Studies

(ii) The Division of Commerce

(iii) The Division of Hotel and Catering

(iv) The Division of Home Economics

(v) The Division of Technology, and

(vi) The Division of Physical Education.

(vii) The Apprentice School.

4.3.3 "Special" technical education at secondary school level (60)

Prior to the M.L. Sultan Technical College being declared an institution for Advanced Technical Education as from 1 March 1969, it had on its campus the following secondary schools offering education up to Std 10:

a. The School of Commerce and Secretarial Practice,

b. The School of Catering Services,

c. The Technical High School, and

d. The School of Homecrafts.

Since then the College has discontinued all its full-time secondary education, including the transfer of the Stanger and Pietermaritzburg branches to the Division of Indian Education. However, the College is still offering "special" secondary education which, because of its specialised nature, is not duplicated elsewhere and allows the training of adult students in courses leading specifically to the Senior Certificate/ Matriculation Exemption (university entrance) or to an apprenticeship. As can be seen from Figure 4.1, the Divisions of the College conducting "special" technical education at secondary school level, are the following:

a. Apprentice School

The Apprentice School was formerly part of the Division of Technology of the College. Owing to an unprecedented increase in the number of apprentices attending the Block Release System of instruction, a separate division or "school" had to be created in 1974. Logically this school will in future take its place as a (separate) Technical College, as in technical education for Whites in South Africa.

At the Apprentice School, indentured apprentices who are regis= tered with the Department of Labour receive theoretical training in their particular trades in the N1, N2 and N3 grades as is laid down in the apprenticeship contract. Full-time and part-time classes are provided for theoretical training in 53 different trades. The entrance qualifications are either a Std 7 or Std 8 Certificate, depending on the chosen trade and a student must also be over 16 years of age and under 21, although a student older than 21 can still obtain a Major Apprenticeship. To obtain a N1, N2 or N3 Certificate, a student must pass at least three subjects each year, with Trade Theory as compulsory subject. On attaining a N2 Certifi= cate a student can terminate his apprenticeship contract at an earlier stage, as he is then eligible for a voluntary trade test provided that he has worked for $2\frac{1}{2}$ years as an apprentice. If he fails the voluntary trade test, he will be required to undergo the compulsory trade test again at a later date.

The enrolment figures for 1977 at the Apprentice School are given in Table 4.14 while Table 4.15 gives an indication of the results in the National Examinations for Indian apprentices at the end of 1975 and 1976.

FIGURE 4.1

THE LEVELS OF ADVANCED TECHNICAL EDUCATION FOR INDIANS

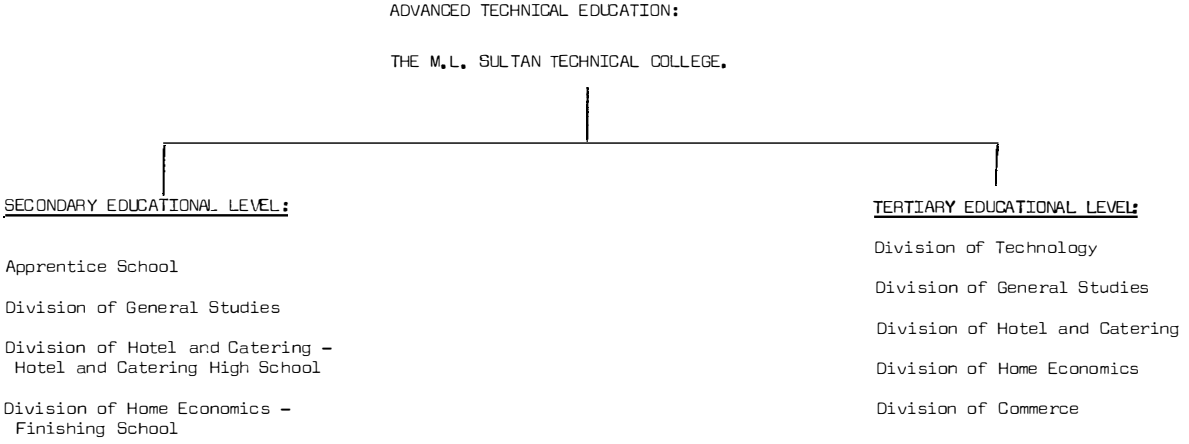


TABLE 4.14

ENROLMENT FIGURES AT THE APPRENTICE SCHOOL – 1977

	Course	Number of students
Full-time	N1	144
	N2	140
	N3	91
	TOTAL	375
Part-time	N1	112
	N2	29
	N3	22
	TOTAL	163

TABLE 4.15

EXAMINATION RESULTS : NATIONAL EXAMINATIONS FOR INDIAN APPRENTICES – 1975 AND 1976

(a) Full-time

Course	Number of subject entries		Number of subject entries passed		Subject percentage passed	
	1975	1976	1975	1976	1975	1976
N1	442	1 744	337	1 408	76%	80%
N2	202	1 472	154	1 152	76%	78%
N3	133	560	74	480	60%	85%

(b) Part-time

N1	–	300	–	115	–	38%
N2	–	113	–	49	–	43%
N3	–	102	–	38	–	38%

From Table 4.14 it is evident that the total number of part-time apprentices at the Apprentice School (163) is less than half the total number of full-time apprentices (371). What is quite conspicuous though is the fact that there is a much larger difference between the enrolment figures for the part-time N1 course (112), the N2 course (29) and the N3 course (22) than the difference between the enrolment figures for the full-time N1 course (144), the N2 course (140) and the N3 course (91). There are various reasons for these phenomena, one possible reason being that, according to reports, the part-time courses, especially the N2 and N3 courses, are simply too difficult for most apprentices to cope with.

When studying Table 4.15 it is imperative to note that the figures quoted do not represent the actual number of students in each course, but that these figures do, in fact, represent the total number of subject entries for each year. For example, according to Table 4.16, the number of subject entries for the full-time N1 course during 1976 was 1 744. This figure could, for instance, be made up of 170 students who entered the examination in 10 subjects (1 700 entries), 8 students who entered the examination in 5 subjects (40 entries), and 4 students who entered for the examination in one subject only (4 entries), thus giving a total of 1 744 subject entries for 1976.

It must be noted that the number of subject entries of the full-time courses for the national examinations has increased tremendously since 1975, especially in the N2 full-time course where it has increased from 202 in 1975 to 1 472 in 1976. In the same way the number of subject entries passed and, consequently, the subject percentage passed, have also shown considerable increases. Especially noteworthy is the high percentage of passes obtained in subjects in the full-time courses, which is in sharp contrast to the low percentage of passes in subjects in the part-time courses, which proves, as previously stated, that it is more difficult to pass a course attended on a part-time basis than on a full-time basis.

The equipment being used at the Apprentice School includes such items as multitesters, Colchester student lathes, generators, petrol engines, a steam engine and a lift pump, which are not regarded as sufficient (60).

The staff at the Apprentice School which is in charge of the three sections at the school, namely the building section, the mechanical section and the electrical section, consists of a Head and a vice-principal whereas each of the sections has its own senior teacher in addition to 8 teachers each for the

building and mechanical sections, and 6 teachers for the electrical section. These personnel are regarded as suitably qualified for their posts (60).

b. The Division of Hotel and Catering

The Hotel and Catering High School of the Division of Hotel and Catering at the M.L. Sultan Technical College provides full-time secondary education for male and female students in the catering sphere specifically. The examination subjects, offered from Std 6 to Std 10, are: English "A", Afrikaans "B", Accountancy, Commerce/Business Economics/Mercantile Law, Typing, Restaurant Studies or Reception Studies, which includes Reception Duties, Switchboard Operation, Office Organisation and System, Cashier's Duties, Tourism, Law and Uniformed Staff in Action.

Three non-examination subjects are also offered, namely Speech and Deportment, Physical Education and Shorthand.

All textbooks are available on loan but stationery is supplied free of charge. Needy students are given financial assistance by either the College Students' Amenities Fund or the Division's own Students' Amenities Fund.

During 1977 a total of 248 students enrolled at the Hotel and Catering High School: 60 in Std 7, 99 in Std 8, 58 in Std 9 and 31 in Std 10. Table 4.16 indicates the internal examination results for 1974, 1975 and 1976, whereas the results of the national examinations, held in those same years are given in Table 4.17. These examinations are subject to regulations laid down by the Department of Indian Affairs.

From Tables 4.16 and 4.17 it can clearly be seen that there has been a marked increase in the subject percentage passes in both the internal and national examinations of the Hotel and Catering High School since 1974, especially as regards the national examinations in Std 6, 7 and 10, where the percentage of subject passes has doubled since 1974.

TABLE 4.16

RESULTS OF THE INTERNAL EXAMINATIONS OF THE HOTEL AND CATERING HIGH SCHOOL DURING 1974, 1975 AND 1976

Standard	No. of subject entries			No. of subject entries passed			Subject % passes		
	1974	1975	1976	1974	1975	1976	1974	1975	1976
Std 7	228	343	246	150	240	198	66	69	80
Std 8	324	952	414	258	866	361	80	91	87
Std 9	342	399	312	246	275	264	72	69	84

TABLE 4.17

THE RESULTS OF THE NATIONAL EXAMINATIONS OF THE HOTEL AND CATERING HIGH SCHOOL DURING 1974, 1975 AND 1976

Standard	No. of subject entries			No. of subject entries passed			Subject % passes		
	1974	1975	1976	1974	1975	1976	1974	1975	1976
Std 6	147	24	22	41	12	12	28	50	54
Std 7	162	70	75	54	45	52	33	64	69
Std 8	381	530	466	255	434	346	67	82	74
Std 9	241	189	203	129	133	114	54	70	56
Std 10	330	278	224	78	172	119	24	62	53

The staff and equipment of the Hotel and Catering High School are discussed in 4.3.4, because they are part of the Division of Hotel and Catering.

c. The Division of Home Economics

The Division of Home Economics features a "Finishing School" which offers a one-year course designed for students who have failed to obtain a Senior Certificate. These are Std 10

students who are being prepared for the National Senior Certificate in those subjects which they have failed during the "first" examination.

d. The Division of General Studies

The Division of General Studies offers part-time secondary education in the afternoons and evenings in the following courses: The National Std 6 Certificate, the National Std 7 Certificate, the National Junior (Std 8) Certificate, the National Intermediate (Std 9) Certificate, the National Senior Matriculation Exemption Certificates, the Senior Certificate of the Department of Indian Affairs and the Joint Matriculation Board Junior and Senior Certificates. Each of these courses consists of 6 subjects, covering the commercial, general, natural sciences and human sciences fields.

During 1977, a total of 698 students enrolled for these courses, 12 in Std 6, 42 in Std 7, 218 in Std 8, 124 in Std 9 and 302 in Std 10.

4.3.4 Advanced technical education at tertiary level (60)

For the purposes of this study, tertiary education means education in those courses of study for which the minimum entrance qualification is the Senior Certificate, with one or two possible exceptions. The Divisions of the M.L. Sultan Technical College offering such education are discussed below.

a. The Division of Commerce

The tertiary courses offered by this Division, their duration, entrance qualifications and details of some of these courses are given in Table 4.18.

TABLE 4.18

TERTIARY COURSES OFFERED BY THE DIVISION OF COMMERCE

COURSE	ENTRANCE QUALIFICATIONS	DURATION	PART-/FULL-TIME
National Secretarial Certificate: private/medical secretaries, computer operators, legal practice	Senior certificate	1 year	Full-time
National Higher Secretarial Certificate: Private secretaries	Senior certificate	1 year	Full-time
National Secretarial Certificate	Senior certificate	1 year	Full-time
National Diploma in Commerce	Senior certificate	3 years	Full-time
National Diploma in Commerce	Senior certificate		Part-time
National Diploma in Business Management	Senior certificate	3 years	Full-time
National Diploma in Business Management	Senior certificate		Part-time
National Diploma in Cost Accounting	Senior certificate	3 years	Full-time
National Diploma in Cost Accounting	Senior certificate		Part-time
National Diploma in Public Administration/Industrial Administration/Organisation and Method Study/Electronic Data Processing and System Analysis/Estate Agency/ State Accounts and Finance/Tourism/Tourism (clerical)/Property Valuation/ Printing Management/Safety Management/Journalism/Tour Guiding/Supervisory Management/Materials Administration	Senior certificate		Part-time
South African Institute of Chartered Secretaries and Administration (C.I.S.)	St 10 or acceptable	3 years	Full-time
South African Institute of Chartered Secretaries and Administration (C.I.S.)	qualifications		Part-time
The Institute of Administration and Commerce in South Africa (I.A.C.)	St 10, exemption is pos=	3 years	Full-time
The Institute of Administration and Commerce in South Africa (I.A.C.)	sible		Part-time
The Building Societies Institute of South Africa	Senior certificate		Part-time
The Institute of Bankers	Senior certificate		Part-time
The Institute of Marketing Management	Marketing experience		Part-time
The Institute of Certified Bookkeepers (I.C.B.)	Satisfactory quali=		Part-time
The Institute of Cost and Works Accountants	fications		Part-time
The Institute of Credit Management			Part-time
General courses in: Cobal Programming/Computer Appreciation/Income Tax and Procedure/Marketing Research/Public relations/Work study and Production/ Planning/Company Formation and Procedure/Credit Control and Management/Punch card operation and verification/Industrial Supervision/Industrial Management/ Advertising/Personnel Management/Shipping Procedure/Customs Clearance/Sales= manship/Forkner Shorthand/Dictaphone typewriting/Management Accounting/Bu= siness Leadership/Sales Organisation and Management			Part-time

1. The National Secretarial Certificate

This course leads to a certificate for:

(a) Private secretaries who are in possession of at least a Std 10 Certificate and the Natal Senior "A" or "O" level. The duration of the course is one year full-time study and includes the following subjects: English "A", Afrikaans "B", Shorthand: 80 w.p.m., Secretarial Practice, Typewriting 1 (Senior): 35 w.p.m. and Financial Accounting I.

There is an external examination for these subjects whereas the following subjects are subject to an internal examination:

Afrikaans "B", if not already taken for the external examinations and Speech and Deportment. The two non-examination subjects offered are Physical Education and Business Training. The examinations are controlled by the Department of Higher Education which also issues the Certificate to successful students.

(b) Medical secretaries, namely secretaries in the service of medical practitioners. The entrance qualification for the course, which consists of one year full-time study, is the National Senior Certificate or an equivalent qualification. The subjects for the external examinations are:

English "A", Afrikaans "B", Typewriting 1 : 30/40 w.p.m., Secretarial Practice 1, Elementary Medical Knowledge and Ethics, Practical Psychology, Principles of Sociology and Financial Accounting 1. In addition there are three other subjects; Speech and Deportment, Consulting Room Practice and Practical Bookkeeping. The examination and certification are the same as for those students doing the private secretaries' course.

2. The National Diploma in Commerce

This course is offered either on a full-time (3 years) or part-time basis and the entrance qualifications are either the National Senior Certificate or an equivalent qualification and the Natal Senior "O" or "A" level.

The examination subjects offered are the following:

First year	Second year	Third year
English "A" Afrikaans "B"	Afrikaans "B" if not completed in first year	Afrikaans "B", if not already comple=ted
Financial Accounting I	Financial Accounting II	Financial Accounting III
Applied Business Economics	Applied Business Economics II	Applied Business Economics III or
Typewriting 1: 35 w.p.m.	Economics II or	Economics III
Economics I or	Shorthand II: 100/120 w.p.m.	Shorthand II or
Shorthand 1: 70/80 w.p.m.	Typewriting I/II or	Typewriting II/III or
	Mercantile Law I	Secretarial Prac=tice I

The non-examination subjects are Speech and Deportment, Business Training and Physical Education.

3. The National Diploma in Business Management

Although it is offered on a part-time basis, this course is also offered on a 3-year full-time basis when the enrolment is satis=factory. The entrance qualifications are either the National Senior Certificate or a Std 10 certificate, at the Natal "A" or "O" level. The examination subjects are the following:

First year	Second year	Third year
English "A"	Management Principles and Practice I	Management Princi= ples and practice II (Major)
Afrikaans "B"	Management Control I	Management Control II (Major)
Financial Accoun= ting I	Production and Marke= ting	Industrial Legisla= tion and Statisti= cal Methods
Industrial Accountan= cy I	Principles of E.D.P.	
Management Economics		
Economics I		

The non-examination subjects include Speech and Deportment, Business Training and Physical Education.

4. The National Diploma in Cost Accounting

The entrance qualifications for this course, which is taken on a 3-year full-time or part-time basis, are the Natal Senior "A" or "O" level and the National Senior Certificate or a Std 10 Certificate. The following examination subjects are offered:

First year	Second year	Third year
Financial Accounting I	Financial Account= ing II	Financial Accounting III
Industrial Accounting I	Industrial Account= ing II	Industrial Accounting III
Management Principles and Practice	Management Economics	Industrial Legislation
English "A"	Economics I	Principles of Electro= nic Data Processing
Afrikaans "B"	Statistical Methods	

The non-examination subjects are Speech and Deportment, Physical Education and Business Training.

5. The South African Institute of Chartered Secretaries and Administration (C.I.S.)

The examination syllabus of this Institute covers the field of knowledge necessary for successful company secretaryship and administration and management in general. Associateship or fellowship of the Institute is awarded to successful examination candidates who have, in addition, the necessary qualifying experiences in the office of a limited company, government or municipal department, or similar body in terms of the Institute's by-laws. The specific entrance qualifications for the course are either a matriculation exemption or the ruling that an applicant must satisfy the Council that he is entitled to special consideration as a "mature student". In this respect, the Council will consider applicants who have either reached the age of 23 and have obtained passes at National Senior Certificate level in English or Afrikaans, Accountancy, Mercantile Law and Economics, or the applicant must have obtained at least a minimum of 40 per cent in the Senior School Leaving Certificate examinations of one of the South African educational authorities in four subjects, defined as follows: Mathematics and either English or Afrikaans at higher level plus two subjects from either Mathematics (if not already taken) or another science subject, a language subject (excluding English and Afrikaans), Geography, History, Commerce, Bookkeeping and Commercial Arithmetic, Economics or such subjects as the Council may determine. In addition the Council also requires evidence of satisfactory experience in the office of one or more undertakings since leaving school.

The course has a minimum duration of 3 years, either full-time or part-time and the examination curriculum is as follows:

Part A	Part B	Part C	Part D
Section 1:	Section 1:	Section 1:	Personnel: Principles of Policy
Communication	Business Administration 1	Company Law	
General Principles of Law	Commercial Law	Company Secretarial Practice	Business Administration II
Section 2:	Section 2:	Section 2:	Economic Policies and Problems
Principles of Economics	Statistics	Financial Accounting II	
Financial Accounting 1	Law and Procedure of meetings	One of:	Financial Accounting II
		Taxation or Industrial Law	
		or Management Accounting	
		or Administration of Estates	

Part-time students are allowed to write the examinations either in November or May whereas full-time students are compelled to write the examinations in November.

6. The Institute of Administration and Commerce in South Africa (I.A.C.)

The aims of this Institution, which has been established in South Africa with official recognition, are, amongst others, to provide a recognised professional status for suitable persons engaged in commercial, industrial and administrative occupations within the RSA and to promote and foster efficiency in commercial, industrial and administrative services.

If a student who is not in possession of the required Senior Certificate can satisfy the Council that the nature of his duties and his general background justify exemption from this requirement, then he may also enrol for this course which has a minimum duration of 3 years, either full-time or part-time. The course is divided into various branches which include the following examination subjects:

Accountancy Branch	Company Secretaries Branch	Management Branch
Intermediate:	Intermediate:	Intermediate:
Accounting I	Accounting I	Accounting I
Commerce	Commerce	Commerce
Mercantile Law I	Mercantile Law I	Mercantile Law I
Commercial Arithmetic	Language	Language
Final: Part I	Final: Part I	Final: Part I
Accounting II	Accounting II	Accounting II
Statistics	Company Law	Statistics
Mercantile Law II	Mercantile Law II	Mercantile Law II
Final: Part II	Final: Part II	Final: Part II
Company Law	Economics	Principles and Practice of Management I
Accounting III	Secretarial Practice	Secretarial Practice
Principles of Auditing	Principles of Auditing	Company Law
Final: Part III	Final: Part III	Final: Part III
Cost Accounting	Advanced Secretarial Practice	Principles and Practice of Management
Income Tax Law and Accounts	and two of	Industrial Law
Advanced Auditing	Income tax law and Accounts	Economics
	or Accounting III	
	or Banking and Exchange	

Municipal Service Branch	Cost Accountancy Branch	Executorship and Trustees Branch
Intermediate:	Intermediate:	Intermediate:
Accounting I	Accounting I	Accounting I
Commerce	Commerce	Commerce
Mercantile Law I	Mercantile Law I	Mercantile Law I
Language	Commercial Arithmetic	Commercial Arithmetic
Final: Part I	Final: Part I	Final: Part I
Accounting II	Accounting II	Accounting II
Principles of Auditing	Statistics	Company Law
Mercantile Law II	Economics	Mercantile Law II
Final: Part II	Final: Part II	Final: Part II
Municipal Law I	Industrial Law	Principles of Auditing
Secretarial Practice	Principles and Practice of Management I	Income Tax Law and Accounts
	Cost Accounting	Secretarial Practice
Final: Part III	Final: Part III	Final: Part III
Municipal Law II	Principles and Practice of Management II	Advanced Secretarial Practice
Local Government Finance	Accounting III	Executorship Law and Accounts
Municipal Administration	Advanced Cost Accounting	Insolvency and Liquidation
		Laws and Accounts

7. The Institute of Building Societies in South Africa

Membership of this Institute is open to all persons who are employed by Building Societies. By way of examinations, the Institute teaches a student the basic principles upon which business in general and Building Society work in particular, are founded. The entrance qualification is either a Senior Certificate or any other educational qualification which may be regarded as suitable. The examination is divided into two parts:

Intermediate	Final
Administration and Management	Section A:
Bookkeeping and Accounts	Banking and Finance
Commercial Arithmetic	Building Societies Organisation I
Economics	Income Tax
Building Society Organisation	Valuation Procedure and Land Tenure
Building Societies Act	Law of Mortgage, Pledge and Sureties and Liens
	Section B:
	Accountancy
	Building Society Organisation, Administration, Procedure II
	Mercantile Law

8. The Institute of Bankers in South Africa

Any person who is employed by a Bank or any other financial Institution and who is in posession of the minimum entrance qualification of a Senior Certificate or any other suitable educational qualification, can apply for membership of this Institution. The examinations consist of the following parts:

Certificate Course	Banker's Diploma: Part I	Banker's Diploma: Part II
Banking	Money and Bank= ing I	Money and Banking II
Human Relations	Accountancy I	Accountancy II
Business Communica= tions	Law I	Law II
Foreign Exchange	Economics I	Economics II
Stocks and Shares	Management I	Management II
Bank Marketing	Statistics	Marketing or
		Agricultural Economics
		Business Economics

A separate examination in Trustee Work for which a special diplo= ma is issued, is open to all members of the Institute whether or not they have passed the preliminary and final examinations for the Banking Diploma. This examination consists of one paper on Executor's Accounts, Trustee Administration and Death Duties and one paper on Executor and Trustee Law and Procedure. All examina= tions are conducted annually in April and October.

9. The Institute of Marketing Management

The Institute of Marketing Management is a professional body and its object is to assist in the improvement of marketing manage= ment. It's primary function is to raise the standards of manage= ment education in the field of marketing. This it does by serving as an examining body and by agreement with the British Institute of Marketing, it uses the educational experience and examination material of that body for adaptation to South African conditions.

Any person who is 17 years or older and who satisfies the Insti= tute that he has had sufficient marketing experience to benefit from the training and who is recommended by his employer or, if not at present in sales or marketing, has a valid reason for wishing to become a student member and may be allowed by the Institute to enrol for the course. The Diploma is a three-part course of study, each part consisting of 4 subjects and repre= senting one year's study. The course provides for the following:

Part I	Part II	Part III
Marketing I	Marketing II	Marketing III
Economics	Economic Geography	Advertising
Commerce and Business Administration	Statistics	Marketing Research
	Accounting	Commercial Law
Introduction to Communication		

The examinations are held annually in November and exemptions in allied subjects will be considered where a student is also in possession of other educational qualifications.

10. The Institute of Certified Bookkeepers of South Africa (I.C.B.)

Students who are specialising in Bookkeeping and aiming at professional status, should enter the examinations of this Institute. The subjects offered are the following:

Associateship	Fellowship
Bookkeeping	Accounting
Commerce	Mercantile Law
One of:	One of:
Afrikaans	Auditing
English	Income Tax
Commercial Arithmetic	Costing
	One of:
	Company Law
	Economics
	Management

Credits are not given for individual subjects passed. Candidates must pass all the subjects in one examination.

11. The Institute of Cost and Works Accountants

Every applicant for registration by this institute and subsequently the courses offered, is required to submit satisfactory evidence to the M.L. Sultan College Council that he is not under 16 years of age, that he has passed an examination accepted by the M.L. Sultan College Council as indicating a satisfactory standard of general education and that at the time of application the applicant is engaged in cost accountancy or at least intends to be so engaged within a reasonable time. Furthermore the applicant must also be bona fide in preparing for the examinations of the Institute, and he must be recommended as a fit and proper person for admission to the examinations of the Institute by a member of the Institute or by a person of official standing approved by the M.L. Sultan College Council.

The course consists of the following five parts:

Part I	Part II	Part III
Business and Industrial Administration	Cost Accountancy I	Accountancy II
	Cost Accountancy II	Accountancy III
Accountancy I	Office Management	Industrial and Commercial Law
Economics		
Business Mathematics and Statistics		Data processing

Part IV	Part V
Management Accountancy I	Management Principles and Practice
Management Accountancy II	Company Law
Management Information and Quantitative Techniques	Taxation
	Financial Management

The examinations are held in May and November each year.

12. The Institute of Credit Management in Southern Africa

Only students registered with the Institute are permitted to write its examination. Applicants under the age of 21 must be in possession of a Std 10 certificate, and those over the age of 21 who do not have such a certificate must satisfy the Institute that the nature of their employment and general educational background justify registration. All applicants for registration must bear the recommendation of a member of the Institute or an approved official of the applicant's company for admission to the examination of the institute. There are three courses of study available:

(a) The Certificate in Credit Control Studies, which includes the subjects Business Administration, Human Relations, Communication, Credit Management and Elementary Bookkeeping (optional). The entrance qualification for this course, which leads to ordinary membership of the Institute, is a Junior Certificate for persons over the age of 21 or equivalent qualification.

(b) The Certificate in Credit Management Studies, which is designed basically as a refresher course for persons holding positions in credit management, or in certain cases it is a means of elevation to associate membership of the Institute. The subjects are Credit Administration I and II, and Special Statutes.

(c) The Diploma in Credit Management, for which entrance qualifications are a Certificate in Credit Control Studies or a Std 10 certificate for persons under 21 years of age, although the normal entry requirements may be waived on the grounds of age and practical management.

The course is divided into these 2 parts:

Part I	Part II
Credit Administration I	Credit Administration II
Financial Accounting	Commercial Law of South Africa
General Principles of South African Law	Management
Economics	Special Statutes of South Africa

Table 4.19 indicates the number of students who have obtained some of these Certificates or Diplomas (mentioned so far) at the Division of Commerce of the M.L. Sultan Technical College, during 1973, 1974 and 1975.

TABLE 4.19: THE NUMBER OF STUDENTS WHO HAVE OBTAINED DIPLOMAS/ CERTIFICATES AT THE DIVISION OF COMMERCE DURING 1973, 1974 AND 1975

	Number of Students		
	1973	1974	1975
National Diploma in Commerce	8	18	22
National Diploma in Public Administration	7	-	3
National Secretarial Certi= ficate (Private Secretaries)	7	5	19
National Secretarial Certi= ficate (Consulting room prac= tice)	-	-	3
Chartered Institute of Secre= taries (Intermediate)	9	-	-
Chartered Institute of Secre= taries (Final Part I)	3	-	-
Chartered Institute of Secre= taries (Final Part II)	2	-	-
National Diploma in E.D.P.	1	-	-
The South African Institute of Chartered Secretaries and Administration (C.I.S.)	-	2	-
The Institute of Certified Bookkeepers (Associateship)	-	5	4
The Institute of Certified Bookkeepers (Fellowship)	-	-	3

As can be seen from Table 4.19, the number of students who have obtained the National Diploma in Commerce and the National Secretarial Certificate (Private Secretaries), has increased considerably since 1973, although the number of students who have obtained other Diplomas or Certificates has either decreased sharply since 1973, or has shown little increase and in some cases no students were enrolled during years mentioned. To obtain the National Secretarial Certificate, a student must

obtain passes in 5 out of 6 subjects, and to obtain a diploma a student must obtain passes in 12 subjects with 2 majors. The promotions in all other professional courses are controlled by the various bodies.

The enrolment figures for the various courses at the Division of Commerce during 1977 are given in Table 4.20. From these figures it is evident that the Division of Commerce caters for a large number of students (884) of whom less than half are full-time (336) whereas the majority are part-time (548). Taking these enrolment figures as a criterion for demand or popularity of the courses, then the National Diploma in Commerce is proving to be the course most in demand or popular with a total of 307 enrolled students (full-time and part-time), while the course lowest in demand seems to be the Institute of Bankers which has only one enrolled part-time student.

TABLE 4.20 : ENROLMENT FIGURES AT THE DIVISION OF COMMERCE, 1977 (CONTINUES ON NEXT PAGE)

TABLE 4.20

ENROLMENT FIGURES AT THE DIVISION OF COMMERCE, 1977

Course	Number of students
Full-time:	
National Diploma in Commerce I	79
National Diploma in Commerce II	41
National Diploma in Commerce III	23
National Diploma in Cost Accounting I	39
National Diploma in Cost Accounting II	26
I.A.C. I	39
I.A.C. II	18
National Secretarial Certificate	71
SUB-TOTAL	336
Part-time:	
National Diploma in Commerce I	77
National Diploma in Commerce II	49
National Diploma in Commerce III	38
Public Administration I	11
Public Administration II	1
Electronic Data Processing I	19
Electronic Data Processing II	8
Electronic Data Processing III	3
Organisation and Method Study I	1
Organisation and Method Study III	2
Industrial Administration I	35
Industrial Administration II	17
State Accountancy and Finance I	1
Cost Accounting I	24
Cost Accounting II	22
Cost Accounting III	1
Business Management I	4
Business Management II	1
Journalism I	1
Shipping and Forwarding I	14
Materials Administration I	2
Chartered Institute of Secretaries I	10
Chartered Institute of Secretaries II	7
Chartered Institute of Secretaries III	1
I.A.C. I	18
I.A.C. II	17
I.A.C. III	5
I.C.B. I	13
I.C.B. II	5
Institute of Bankers I	1
Institute of Credit Management II	2
Salesmanship SP*	6
Advanced Sales Management SP*	7
Shipping (Elementary) SP*	9
Shipping (Intermediate) SP*	36
Shipping (Final) SP*	25
Punchcard SP*	14
Computer Programming	41
SUB-TOTAL	548
TOTAL (Full-time and part-time)	884

*SP = Special course

The Division of Commerce has on its staff a principal, a senior lecturer (administration), a senior lecturer (academic) who is in charge of languages, two senior lecturers (academic) in charge of commercial subjects, two lecturers for languages, seven lecturers for the National Diploma Courses and two lecturers for the professional courses.

Amongst the equipment used by the Division are typewriters, calculators, dictaphone machines, adding and accounting machines, duplicators and overhead projectors. The equipment is reported to be insufficient (60).

b. The Division of General Studies

As mentioned elsewhere, the Division of General Studies conducts certain courses at senior secondary school level. In addition to these, certain tertiary courses are also offered. Table 4.21 should be studied in this connection. This table has been drawn up by using the prospectus of the College (22) and there are especially two aspects which are quite conspicuous.

Firstly, the Division of General Studies is not offering "Secretarial courses" but is, in fact, offering secretarial subjects such as Typewriting, Shorthand, Accounting and Business Economics from VII to X level. Secondly, the so-called "Conventional courses" seem to be nothing else but language courses, some of which are also offered under "Language laboratory courses". It must, however, be noted that these "conventional language courses" are purely academic and they prepare students to sit for written examinations at various standards at the end of their study. In the case of laboratory language courses, the emphasis is on practical speaking; students are taught to speak the language through the use of a console and other related equipment. The ultimate goal is to speak a language and not to sit for a written examination.

This is, however, not mentioned in the Prospectus and is apt to cause some confusion.

TABLE 4.21

SECONDARY AND TERTIARY COURSES OFFERED BY THE DIVISION OF GENERAL STUDIES (22, p.4)

Special Courses:
G.C.E.* "A" Level – English, Mathematics, Biology, Physics, Chemistry
Post-secondary – Special Mathematics, Physical Science, Physics, Chemistry
General short courses:
Mechanised Accounting, Comptometry, Conversational Afrikaans
Secretarial courses:
Accountancy, Business Economics, Commercial Mathematics, Shorthand, Typing
Conventional courses:
Afrikaans, English, French, German, Telegu, Gujerati, Hindi, Arabic, Zulu, Tamil
Language laboratory courses:
Afrikaans, French, Portuguese, and Zulu

*G.C.E. = General Certificate of Education

Table 4.22 gives an indication of the student enrolment in some of the courses offered during 1977.

TABLE 4.22 : ENROLMENT FIGURES AT THE DIVISION OF GENERAL STUDIES, 1977 (SEE NEXT PAGE)

TABLE 4.22

ENROLMENT FIGURES AT THE DIVISION OF GENERAL STUDIES, 1977

Course	Number of students
Mechanised Accounting	17
Special French	7
R.C.S.I.*	40
Arabic Std 6	3
Hindi Std 6	29
Literacy **	21
TOTAL	117

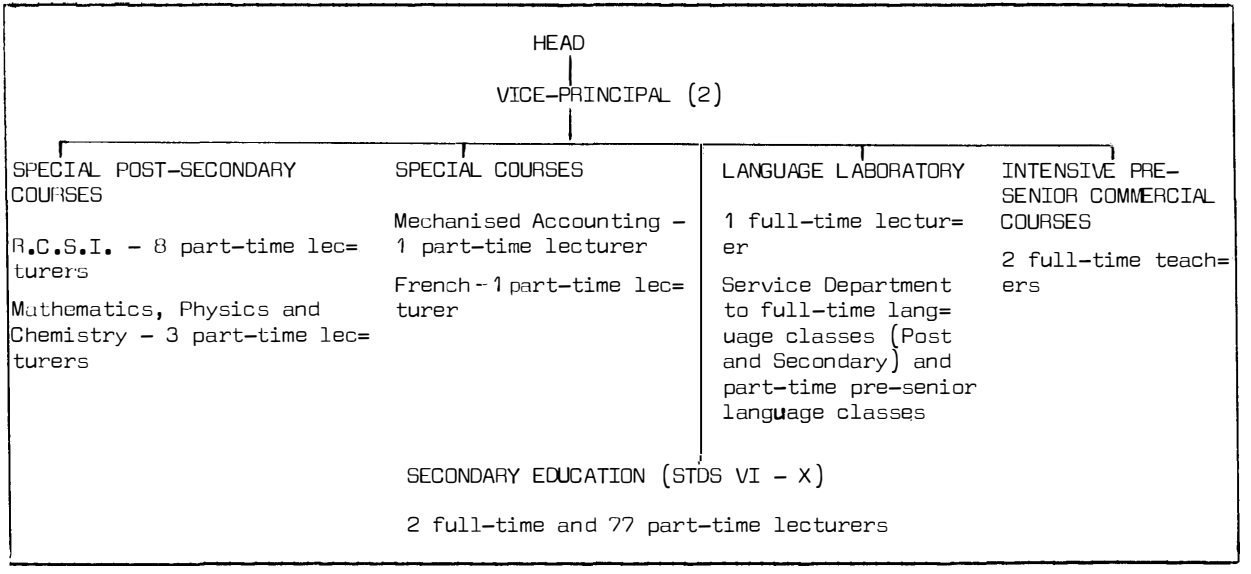
*A course included in Table 4.22 but which is not mentioned in the Prospectus of the College, is R.C.S.I. which is the abbreviation for Royal College of Surgeons Ireland. The Department of Indian Affairs has permitted the College to conduct the examinations of the Royal College by special arrangement with the R.C.S.I. Development Appeal Fund Commit= tee.

** The literacy course is designed to teach illiterate persons to read and write.

Figure 4.2 indicates the staffing structure at the Division of General Studies which, as can be seen from figure 4. , consists mainly of part-time lecturers.

FIGURE 4.2

STAFF EMPLOYED BY THE DIVISION OF GENERAL STUDIES



c. The Division of Hotel and Catering

The tertiary courses offered by the Division of Hotel and Catering are illustrated in Table 4.23

TABLE 4.23

TERTIARY COURSES OFFERED BY THE DIVISION OF CATERING

Course	Duration	Part-/Full-time
National Diploma in Hotel Administration	3 years	Full-time
Certificated Induction Courses: cooks/waiters	8 weeks	Full-time
Day release classes: Headwaiters' course/Kitchen Management I and II/Table Service, Wine Studies	$1\frac{1}{2}$ days per week for 10 weeks	Full-time
Courses in: Hotel accountancy/Reception Studies/Drink and Wine Studies/Delicatessen/Desserts/Cold Buffet Preparation/Cocktail Snacks/Staff canteen Operation/Patisseries - Bakery/Ideal Hostess Course		

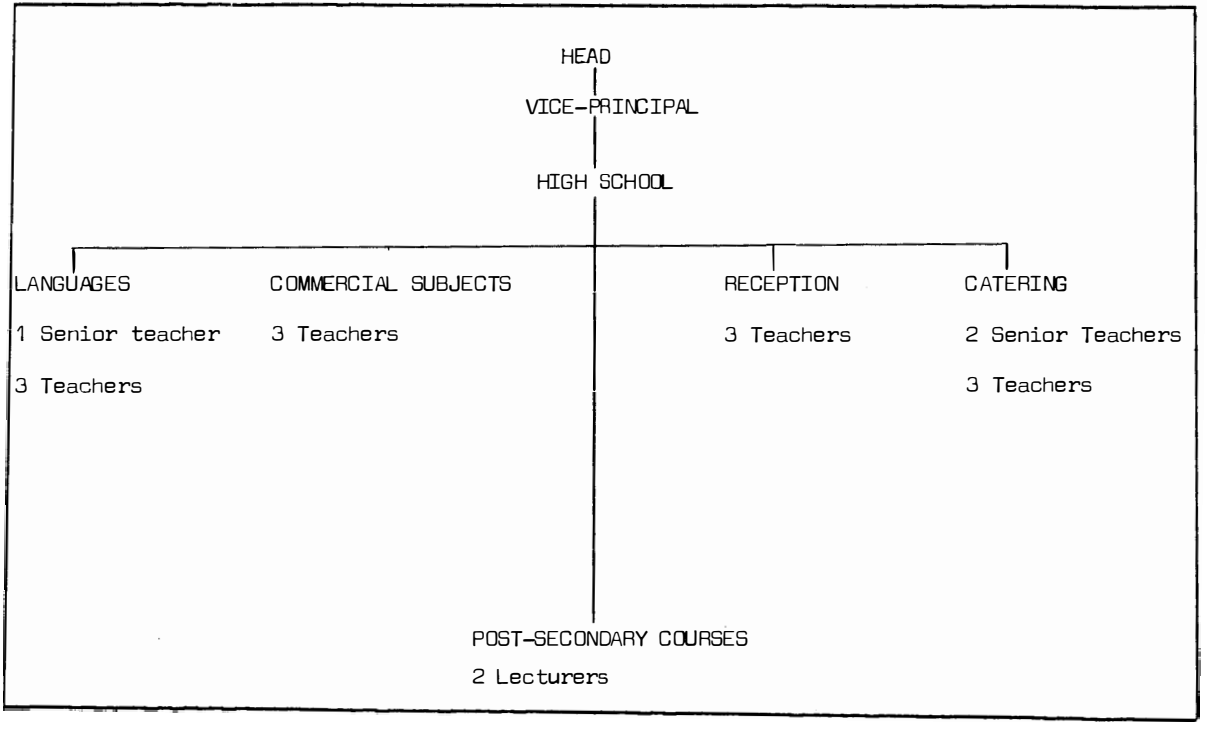
The entrance qualification for the National Diploma in Hotel Administration is a Senior Certificate and persons wishing to enrol for the day release classes must be employed in the hotel or catering industry. During 1977 a total of 22 students were enrolled for the National Diploma in Hotel Management while 19 students were enrolled for the induction courses for waiters or cooks. A further 39 students enrolled for the various other courses, bringing the total of students following post-secondary courses at the Division of Catering to 80. During 1976 there were 72 subject entries for the national examinations for the National Diploma in Hotel Management, of which there were 43 subject entry passes at the end of the year. During the same year there were 64 subject entries for the internal examinations in the induction courses, of which 48 were subject entry passes at the end of the year.

The staffing structure is explained in Figure 4.3, indicating a total of 17 lecturers, excluding the head and vice-principal of whom 15 are employed at the High School and the other 2 are devoted to post-secondary school courses. The equipment used by the Division of Catering includes refrigerators, microwave ovens, salamander griller, cake mixer, electric meat saw, slicing machine, mincing machine, electric urns, reception desks and dining room furniture while a cold-storage room is also available.

FIGURE 4.3 (SEE NEXT PAGE)

FIGURE 4.3

STAFFING STRUCTURE : DIVISION OF HOTEL AND CATERING, 1977



d. The Division of Home Economics

The tertiary courses offered by this Division are given in Table 4.24.

TABLE 4.24

TERTIARY COURSES OFFERED BY THE DIVISION OF HOME ECONOMICS

Course	Duration	Part-/full-time
National Diploma in Art and Dress/Textile Design	3 years	Full-time
National Diploma in Photography		Part-time
National Secretarial Certificate in Homemaking	1 year	Full-time
National Certificate in Ladies Hairdressing and Beauty Culture	2 years	Full-time
Certificate in Nursery School Assistance	2 years	Full-time
Certificate in Elementary/second year Drafting and Dressmaking		
Dressmakers Certificate		
Advanced Dressmakers Certificate		
Special courses in Interior Decorating/Window Display/Commercial Art		
Short courses in Making of Hairpieces/Executive Wives Course/Ceramics/Cake Icing/Floral Art/Baking for Adults/Baking for Teenagers/Beauty Care/Art for Children/Embroidery/Batik/Interior Decorating/Upholstery/Tie and Diebandaani/Crochet/Art for Adults/Indian Sweetmeats and Savouries		Part-time

The details of some of these courses are as follows:

1. The National Diploma in Art and Design (Dress design)

This course is designed to equip students of both sexes, after having obtained the National Senior Certificate, with the necessary skills to obtain employment as a designer of garments in the clothing industry. The course, which covers a period of 3 years' full-time study, incorporates a basic design training as well as practical factory methods and includes the following subjects:

First year	Second and Third year
Afrikaans	Afrikaans
Speech	Speech
Beauty Care	Creative Dress Design
Millinery	Fashion Drawing
Creative Dress Design	Dressmaking Cutting
Fashion Drawing	Dressmaking Practical
Dressmaking Cutting	Figure Drawing
Dressmaking Practical	History of Costume
Figure Drawing	
Anatomy	
General Drawing	
History of Costume	

2. The National Diploma in Art and Design (Textile Design)

Similar to the previously mentioned course, this course also covers a period of 3 years' full-time study and differs firstly in that it incorporates a basic Art Training with a specialised emphasis on design in its broadest aspect and secondly in the subjects offered, which are:

First year	Second and Third year
Afrikaans	Afrikaans
Mechanical Drawing	Art of Drawing A and B
Art of Drawing A and B	Ornamental Design
Anatomy	History of Art
Painting	History of Textiles
Colour	Textile Design
Weaving	Printing Practical
Ceramics	Illustration
Graphic Art	Theory of Textiles
History of Art	Speech
Basic Design	
Speech	

3. The National Certificate in Ladies Hairdressing and Beauty Culture

The minimum entrance qualification for this course is the Junior Certificate, but preference will be given to students with Std 9 or Std 10 qualifications. The course covers a period of 2 years' full-time study and includes theoretical as well as practical aspects of the work. The subjects offered include English, Beauty Culture Theory, Speech, Afrikaans, Beauty Culture Practical, Hairdressing Theory, Art, Physiology, Hairdressing Practical, Salon Science and Deportment, Cosmetology, Business Management, Physical Education and Science. To obtain the Certificate, students are required to pass both the National and internal (College) examinations.

4. Certificate for Nursery School Assistants

This certificate enables students to assist qualified nursery school teachers in the running of nursery schools. The minimum entrance requirements are the Junior Certificate, and patience and a love of children are regarded as essential human qualities of an applicant. The course covers a period of 2 years and includes lectures at the College and practical experience at selected nursery schools. The subjects for the examinations,

which are conducted only by the College, are English, Needlework, Woodwork, Art, Afrikaans, Child Development, Cookery, Music, Nature, Nursery School Principles, Speech and Physical Education.

The enrolment figures at the Division of Home Economics during 1977 are given in Table 4.25. With these figures as a criterion, it can safely be assumed that Drafting and Dressmaking is by far the most popular course, with a total of 235 enrolled students or 41 per cent of the total student enrolment at the Division.

At the end of 1975 the National Diploma in Art and Design (Dress Disign) was awarded to 3 students, the National Diploma in Art and Design (Textile Design) to 1 student while 1 student obtained the National Certificate in Photography and 6 students obtained the National Diploma in Community Health Nursing, a course which, incidentally, is not mentioned in the 1977 Prospectus of the College.

The staffing structure is laid out in Figure 4.4. Equipment being used includes hair driers, textile light tables and fittings, tropic steamers, an enlarger for silk screen, a spinning-wheel, folding screens and a lounge suite.

TABLE 4.25 (SEE NEXT PAGE)

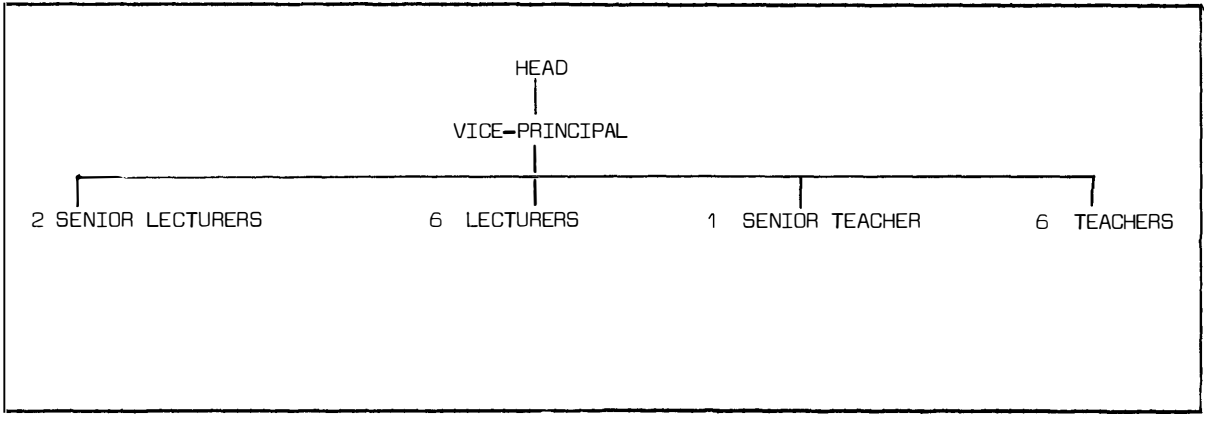
TABLE 4.25

ENROLMENT FIGURES AT THE DIVISION OF HOME ECONOMICS : 1977

Course	Number of students
Full-time:	
National Diploma in Art and Design (T/D) I	12
National Diploma in Art and Design (T/D) II	4
National Diploma in Art and Design (T/D) III	5
National Diploma in Art and Design (D/D) I	17
National Diploma in Art and Design (D/D) II	11
National Diploma in Art and Design (D/D) III	5
National Certificate in Hairdressing and Beauty Culture I	12
National Certificate in Hairdressing and Beauty Culture II	7
Nursery School Aides I	16
Nursery School Aides II	11
SUB-TOTAL	108
Part-time:	
National Diploma in Photography I	10
National Diploma in Photography II	2
Drafting and Dressmaking I	119
Drafting and Dressmaking II	48
Drafting and Dressmaking III	38
Drafting and Dressmaking IV	30
Men's Outerwear I	18
Men's Outerwear II	7
Men's Outerwear III	2
Women's Outerwear I	18
Women's Outerwear II	11
Women's Outerwear III	15
Interior Decorating I	10
Commercial Art I	19
Window Display and Design I	11
Hobby	105
SUB-TOTAL	463
TOTAL	571

FIGURE 4.4.

STAFFING STRUCTURE, DIVISION OF HOME ECONOMICS, 1977



e. The Division of Technology

The technical courses at tertiary level being offered by this Division are given in Table 4.26.

TABLE 4.26 (SEE NEXT PAGE)

TABLE 4.26

TECHNICAL COURSES AT TERTIARY EDUCATIONAL LEVEL OFFERED BY THE DIVISION OF TECHNOLOGY

Course	Entrance qualifications	Duration	Part-/Full-time
National Diploma for Technicians – chemical plant	Senior Certificate with Maths, Science	4 years day release	
National Diploma for Technicians – analytical chemistry	Senior Certificate/N3	2 years	Full-time
National Diploma for Technicians – analytical chemistry	Senior Certificate/N3	4 years day release	
National Diploma for Technicians – Chemistry	Senior Certificate with Maths, Science	2 years	Full-time
National Diploma for Technicians – Chemistry	Senior Certificate with Maths, Science	4 years day release	or Part-time
National Diploma for Technicians – civil engineering draughtsmanship	Senior Certificate with Maths, Science	3 years	
National Diploma for Technicians – electrical engineering (light current)	Senior Certificate with Maths, Science	4 years	
National Diploma for Technicians – civil engineering	Senior Certificate with Maths, Science	1 year	Full-time
National Diploma for Technicians – agricultural extension officers			
National Diploma for Technicians – horticulture	Senior Certificate with Science	40 weeks	Sandwich course
National Diploma in Community Health Nursing	Senior Certificate	1 year	Full-time
National Diploma in Medical Laboratory Technology (Intermediate)	Senior Certificate, Maths/Science/Biology	1 year	Full-time
National Diploma in Medical Laboratory Technology (final): Histology/Chemical Pathology	Senior Certificate		Part-time
National Diploma in Public Health	Senior Certificate	3 years	Full-time
National Diploma in Sugar Technology	Senior Certificate		Sandwich course
National Certificate for Technicians – Mechanical and structural draughtsmanship	Senior Certificate/ NTC 3	1 year	Full-time
National Certificate for Technicians – Mechanical and electrical engineering draughtsmanship	Senior Certificate with Maths	1 year	Full-time
National Certificate for Technicians – building	Senior Certificate/N3		Full-time/Sandwich
National Certificate for Technicians – electrical engineering (heavy current)	Senior Certificate with Maths/Science		Full-time/Sandwich

TABLE 4.26 CONTINUED

Course	Entrance qualifications	Duration	Part-/Full-time
National Certificate for Technicians - mechanical engineering	Senior Certificate		Full-time/Sandwich
National Certificate for Technicians - telecommunications	Senior Certificate		Sandwich course
National Certificate in Architectural Draughtsmanship	Senior Certificate/ NTC 3	1 year	Full-time
National Certificate in Electrical, Mechanical and Structural Draughtsmanship	Senior Certificate		Part-time
National Certificate in Horticulture and Landscape Planning	Std VI Certificate	3 years day re= lease	
Certificate in Textile Dyeing and Finishing	Senior Certificate with Maths	3 years day re= lease	
Certificate in Audiometry			
Certificate in Dairy Laboratory Technology			
Induction course for chemical technicians			

1. The National Diploma for Technicians - chemical plant

A wide range of chemical industries offers opportunities to qualified Process Technicians. A company generally pays a salary commensurate with the responsibility of the particular position. Process technicians are often in control of highly valued plants and equipment, and hence some of them may demand high salaries. A qualified technician may also assume duties as assistant tester or analyst in a company's quality control laboratory if necessary. This course is aimed at training a technician to meet the above requirements.

The entrance qualification for this course is the Senior Certificate with credits in Mathematics and Physical Science. Students who have passed Physics, Chemistry and Mathematics at N3-level after attending the Pre-technicians Certificate Course are also eligible. This is a 4 year course on the "day release" system, that is one day full-time study per week and a further minimum of 18 months' industrial in-service training is required before the diploma is finally awarded. The curriculum includes the following subjects:

First year	Second year	Third year	Fourth year
Physics T1	Analytical Chemistry T1 (Prac.)	Physics T2	Chemical Plant 1
Maths T (lab. tech.)	Analytical Chemistry T1	Unit Operation T	Chemical Works
Physical Chemistry 1	Inorganic Chemistry T1	Chemical Technology T	Organisation and Management T
Laboratory Organisation	Organic Chemistry T1	Instrumentation T	Engineering Drawing T1

External examinations of the Department of National Education have to be written.

2. The National Diploma for Technicians : Chemistry

The entrance qualification for this course is the Senior Certificate with credits in Mathematics and Physical Science although a credit in Biology may also be considered as an alternative. The course requires either two years' full-time study or four years on the "day release" system or it can be completed through part-time study. The curriculum for full-time study is

as follows:

First year (T1)	Second year (T2)
Inorganic Chemistry T1	Inorganic Chemistry T2
Organic Chemistry T1	Organic Chemistry T2
Analytical Chemistry T1 (theory)	Physical Chemistry T2
Analytical Chemistry T1 (practical)	Analytical Chemistry T2 (theory)
Physical Chemistry T1	Analytical Chemistry T2 (Practical)
Mathematics T	
Physics T1	
Laboratory Organisation and Management T	

The curriculum for the "day release" or part-time course includes the following subjects:

First year	Second year	Third year	Fourth year
Physics T1	Analytical Chemistry T1 (Practical)	Analytical Chemistry T2 (practical)	Physical Chemistry T2
Mathematics T	Analytical Chemistry T1		Inorganic Chemistry T2
Physical Chemistry T1	Inorganic Chemistry T1	Analytical Chemistry T2	
Laboratory Organisation and Practice T	Organic Chemistry T1	Organic Chemistry T2	

In addition to the completion of the above curricula, a minimum of 18 months industrial in-service training is required before the Diploma is awarded.

3. The National Diploma for Technicians: Civil engineering draughtsmanship

To enrol for this course, a student must have a Senior Certificate or its equivalent with passes in Mathematics and Physical Science or Physics. The total duration of the course is 3 years, consisting of three semesters of attendance at the College and 18 months of appropriate in-service training. The subjects in the curriculum are:

Part A	Part B	Part C
Mathematics (Survey) I	Mathematics (Survey) II	Theory of Structures
Drawing I	Surveying T2	Strength of materials
General Science	Mechanics and	Elementary Civil Engineering
Surveying T1	Hydraulics	
Afrikaans TB, whichever one of the two is the student's second language	Civil Engineering Drawing	

4. The National Diploma for Technicians : Electrical Engineering

The National Diploma for Technicians - electrical engineering (light current) is offered in order to equip students for employment in the electrical engineering industry, especially in the light current or television and electronics aspects. The entrance qualification is the Senior Certificate or equivalent with passes in Mathematics and Physical Science or Physics, preferably at the advanced level (higher grade). The course takes two years at the College and two years in-service practical training in industry with the first year being spent at the College and alternate trimesters thereafter being spent at both College and in industry.

The National Intermediate Diploma for Technicians is awarded after the successful completion of three trimesters of College attendance and one year of full-time appropriate in-service training. The National Diploma for Technicians is awarded

after successful completion of the following six prescribed T1, T2, T3 and T4 subjects together with two years of appro= priate in-service training:

First year		
First trimester (Jan.-Apr.)	Second trimester (May-Aug.)	Third trimester (Aug.-Nov.)
Mathematics T111	Mathematics T221	Electronics T2
Principles of Elec= tricity T111	Physics T111	Communication Elec= tronics T2
Applied Mechanics T111	Engineering Dra= wing T111	Physics T221
Workshop technology T111	Principles of Elec= tricity T221	Workshop Technology T221
General Studies T111	General Studies T221	
Second year	Third year	
Second trimester (May-Aug.)	First trimester (Jan.-Apr.)	Third trimester (Aug.-Nov.)
Mathematics T331	Electronics T321	Digital Techniques
Digital Techniques T312	Industrial Elec= tronics T411	Television T421
Television T311	Radio Communi= cation T411	Electronic Measure= ments T421
Electronic Measurements T311	Communication Elec= tronics T321	Audio Engineering T411
General studies T311		

5. The National Diploma for Technicians: Civil engineering

The entrance qualification for this course is the Senior Certifi= cate with Mathematics and Science at the higher grade. The course contains the following subjects:

First trimester	Second trimester	Third trimester
Mathematics (WF1) T111	Mathematics (WF2) T221	Building and Civil Engineering
Physics B (FA1) T111	Civil Engineering Drawing (SD2) T211	Construction (B12) T212
Engineering Drawing (ICI) T111	Applied Mechanics (TM1) T111	Surveying (OB2) T211
General Studies (AB1) T111	Workshop Technology (M+E) (WB1) T111	Civil Engineering materials (SB2) T221
		General Studies (AB2)
Fourth trimester	**Fifth trimester**	**Sixth trimester**
Mathematics (WF3) T331	Theory of Structures (SJ4) T421	Building and Civil Engineering Construction (B T431)
Theory of Structures (SJ3) T311	Structural Design (S14) T421	Hydraulics (HC4) T421
Structural Design (S13) T311	Hydraulics (HC3) T311	Main Drainage of Towns (SG4) T411
Surveying (OB3) T321	General Studies (AB3) T331	Civil Engineering Quantities, Specifications and Estimating (SC4) T411

During the first year students are at the College full-time and complete the first three trimesters' theory; the second year is devoted to practical training and the fourth trimester's theory. The third year is spent on the fifth and sixth trimesters' theory and practical training for the remainder of the year. The College assists students to obtain suitable practical training positions (60).

6. The National Diploma for Technicians: Horticulture

Students who have a Senior Certificate with at least Physical Science or Biology as subjects or a National Certificate in Horticulture, are allowed to enrol for this course which is run on a "sandwich" basis; this means that students will attend

lectures full-time for 20 weeks. In addition students are required to complete 20 weeks of practical training at an approved nursery. The curriculum includes the following subjects:

Part A	Part B	Part C
Horticulture T1	Horticulture T2	Horticulture T3
Landscape Planning T1	Landscape Planning T2	Landscape Planning T3
Plant Morphology T	Plant Physiology T	Plant Taxonomy T
Climatology T	Genetics T	Plant Pathology
Horticulture Science T	Insect Control T	Plant Breeding T
Entomology T	Soil Science T	Ecology T
	Afrikaans TA/B	English TA/TB

7. The National Diploma in Community Health Nursing

The objective of this course is to provide specialised skill in interviewing and counselling techniques regarding the physical, mental and social well-being of the individual and the family with a view to preventive and promotive health. Entrance is restricted to students who are registered with the South African Nursing Council as qualified general and midwifery nurses. The course has a span of one year full-time attendance culminating in four 3-hour examination papers on: Family Health, Social Science, Administration and Public Health, and Principles and Practice of Public Health Nursing. Furthermore, a project based on work assignments, ability to communicate and family studies, also has to be completed. A number of bursaries are available on application before June prior to the year of study.

8. The National Diploma in Medical Laboratory Technology (Intermediate)

Students who are in possession of a Senior Certificate with at least one science subject, that is Physical Science or Biology, and who want to follow a career in medical laboratory technology, should enrol for this course which is aimed at providing the necessary theoretical and practical background. Registered

medical technologists are allowed to practise throughout the country under supervision of a registered medical officer.

The course requires one year full-time study and the curriculum includes Physics, Chemistry, Anatomy and Physiology, and General Laboratory Technique. A limited number of free remission bursaries are available.

9. The National Diploma in Public Health

A student in possession of this qualification will be in a position to take up a post as a health or meat inspector anywhere in the Republic. The minimum entrance qualification to the course is a Senior Certificate or equivalent, and a knowledge of Physical Science and/or Biology is regarded as an advantage. The course has a minimum duration of three years full-time attendance of lectures conducted at the College in the following subjects:

First year	Second year	Third year
Building Science	Housing and housing Management	Social Psychology
Sanitary Science		Health Education
Health Science	Industrial Hygiene	Health Administration
Microbiology T	Environmental Hygiene	Meat Hygiene
Human Physiology T	Food Hygiene	
	Epidemiology	

The practical training during the course consists of four weeks of each study year at an approved Health Department or at a building section of a Municipality or at the Public Works Department, another 40 days at an approved abattoir and a course in first aid.

10. The National Certificate for Technicians: mechanical and structural draughtsmanship

The entrance qualification for this course is either the Senior Certificate or National Technicians Certificate III. The course requires one year full-time training at the College and one year practical in-service training and includes the following subjects:

First Trimester	Second Trimester	Third trimester
Engineering Drawing T111 Applied Technology (M) T111 One of: Draughtsmanship (Building) T111 Mathematics T111 Principles of Electricity T111	Engineering Drawing T221 Applied Technology (M) T221 Applied Mechanics T221 One of: Civil Engineering Materials T211 Civil Engineering Drawing T211 Surveying T211 Mathematics T211	Engineering Drawing T331 Applied Technology (M) T331 Strength of Materials T331 One of: Structural Design T311 Work Study T311 Machine Design T311 Production Planning and Control T311

11. The National Certificate for Technicians: Mechanical and electrical engineering draughtsmanship

The Senior Certificate or equivalent with a pass in Mathematics is required to enrol for this course, which requires one year full-time study at the College followed by one year of in-service training. The following are compulsory subjects:

First trimester	Second trimester	Third trimester
Applied Mechanics T111 Mathematics T111 Engineering Drawing T111 Applied Technology (Draughtsmen) T111	Engineering Drawing Practice T211 Applied Mechanics T221 Engineering Drawing T221 Applied Technology - (Draughtsmen) T221	Mechanical: Engineering Drawing Practice T321 Applied Technology (Draughtsmen) - Mechanical T311 Strength of materials T311 Machine Design T311 or Automotive Design T321

First trimester	Second trimester	Third trimester
		Electrical: Engineering Drawing Practice T321 Applied Technology (Draughtsmen) - Electric T311 Strength of Materials T311 Electrical Design (Draughtsmen) T311

12. The National Certificate for Technicians: Building

The entrance qualification for this course is the N3 or Senior Certificate. The course takes three trimesters to complete, each one of 12 weeks duration, and the Certificate is awarded after the successful completion thereof together with at least 2 years of suitable in-service practical training. The curriculum is as follows:

First trimester	Second trimester	Third trimester
Building Construction T111	Building Construction T221	Building Construction T331
Building Materials T111	Building Materials T220	Building Materials T330
Building Administration T111	Building Administration T111	Building Administration T331
Building Calculations T111	Building Calculations T221	Estimating and Pricing T311

13. The National Certificate for Technicians: Electrical engineering (heavy current)

The aim of this course is to provide further education to apprentices and other interested persons. This is a course at tertiary level, especially for students wishing to improve

their knowledge of electrical machines and power distribution, control and instrumentation. Students in possession of a Senior Certificate or equivalent with passes in Mathematics and Physical Science or Physics are allowed to enrol although students who have a Std 8 Certificate and who have obtained an N3-Certificate with passes in Mathematics and Applied Science are also accepted for registration.

The National Certificate for Technicians is awarded after 3 trimesters of successful study in twelve prescribed subjects, together with a period of two years in-service training. The curriculum contains the following subjects:

First trimester	Second trimester	Third trimester
Mathematics T111	Mathematics T221	Electrical Machines T311
Principles of Electricity T111	Principles of Electricity T221	Electrical Engineering T311
Applied Mechanics T111	Applied Mechanics T221	Electrical Measurements T311
Applied Technology (h.c.) T111	Applied Technology (h.c.) T221	or Strength of Materials T311
		Applied Technology (h.c.) T331

The Higher National Certificate for Technicians will be awarded to those technicians who already possess the National Certificate for Technicians and have been successful in qualifying in a further four subjects at the T4 level, namely: Electrical Machines T421, Electrical Engineering T421, Management T411 and Electrical Measurements T421 or Strength of Materials T421.

14. The National Certificate in Architectural Draughtsmanship

Consisting of one year full-time study at the College, followed by one year of practical training in an architect's office, this course is available to students in possession of either a Senior Certificate or an N.T.C. 3. The College endeavours to assist students in obtaining such practical training but does not accept any obligation to provide the positions for this training. Students are therefore advised to approach architects, municipalities and drawing offices to obtain employment as

trainee draughtsmen or arrange for the practical training before enrolling for the course which includes the following subjects:

First trimester	Second trimester	Third trimester
Draughtsmanship (Building) (TB1) T110	Draughtsmanship (Building): (TB2) T220	Draughtsmanship (Building) (TB3), T330
Building Construc= tion (BJ1) T111	Building Construc= tion (BJ2) T221	Building Specifica= tions (BJ3) T331
Building Materials (BK1) T110	Building Materials (BK2) T220	Drainage and Sani= tation (DB3) T331
Building Administra= tion and Organisation (BG1) T111	Building Admini= stration and Orga= nisation (BG2) T221	Measurement of Building work (M13) T310

15. The National Certificate in Horticulture and Landscape Planning

This course is aimed at enabling employees of local authorities and other approved institutions to obtain the certificate courses which give them the entrance qualification to proceed with the National Diploma in Horticulture. The minimum entrance qualification is a Std 6 Certificate, provided the student is in the full-time employment of an approved nursery. The course is run on a "day release" basis, that is, students attend lec= tures once a week for three years which is the minimum duration of the course. The curriculum includes the following subjects:

First year	Second year	Third year
Horticulture N1	Horticulture N2	Horticulture N3
Horticulture Science N1	Horticulture Science N2	Horticulture Science N3
Landscape Planning N1	Landscape Planning N2	Landscape Planning N3
Botany N1	Botany N2	Botany N3

16. Certificate in Textile Dyeing and Finishing

An Intermediate Certificate in Textile Dyeing and Finishing is awarded to students completing the first two years of study and the final diploma after completion of the third year of this year which has a duration of 3 years and is run on a "day release"system. In the first year practical demonstrations are given at the College and visits to the textile mills are arranged as part of the curriculum. In the second and third years laboratory dyeing trails are conducted in both industrial and college laboratories. The curriculum consists of the following subjects:

First year	Second year	Third year
Physics TS1	Organic Chemistry T1	Organic Chemistry T2
Chemistry T1	Physical Chemistry T1	Dyeing Technology T3 (theory)
Mathematics T (Laboratory Technique)	Dyeing Technology T2 (theory)	Dyeing Technology T3 (Practical)
Dyeing Technology T1	Dyeing Technology T2 (practical)	Fibre Technology T3 (theory)
Fibre Technology	Fibre Technology T2 (theory)	Fibre Technology T3 (practical)
	Fibre Technology T2 (practical)	

The enrolment figures in the various courses at the Division of Technology during 1977 are given in Table 4.27, from which it can be seen that the total number of part-time students (149) is exactly half the total of full-time students (298). As far as the diplomas are concerned, it would seem that the National Diploma in Analytical Chemistry is the most popular, with a total enrolment (full-time and part-time) of 96 students. Among the certificate courses, most students are enrolled for the National Certificate for Technicians - electrical engineering, with a total of 59 full-time and part-time students.

TABLE 4.27

ENROLMENT FIGURES AT THE DIVISION OF TECHNOLOGY : 1977

Course	No. of students
Full-time:	
National Diploma in Analytical Chemistry I	22
National Diploma in Analytical Chemistry II	13
National Diploma in Community Health Nursing I	7
National Diploma in Medical Laboratory Technique I	15
National Diploma in Public Health II	6
National Diploma in Public Health III	7
National Diploma for Agricultural Extension Officers III	8
National Diploma in Civil Engineering Draughtsmanship T1	14
National Diploma in Civil Engineering T1	18
National Diploma in Civil Engineering T3	14
National Diploma in Electronics and Television T1	24
National Diploma in Electronics and Television T3	10
National Diploma in Horticulture T2	5
National Certificate in Architectural Draughtsmanship T1	14
National Certificate in Electrical Draughtsmanship T1	4
National Certificate for Technicians:	
Electrical Engineering T1	38
Mechanical Engineering T1	34
Building T1	9
Instrument Technicians T1	14
Telecommunications T1	10
National Certificate in Mechanical and Structural Draughtsmanship T1	12
SUB-TOTAL	298
Part-time:	
National Diploma in Analytical Chemistry I	21
National Diploma in Analytical Chemistry II	13
National Diploma in Analytical Chemistry III	9
National Diploma in Analytical Chemistry IV	8
National Diploma in Chemical Plants III	3
National Diploma in Medical Technology (Final)	18
National Certificate for Pre-Technicians I	29
National Certificate in Textile Dyeing and Finishing II	5
National Certificate for Technicians:	
Electrical Engineering I	19
Electrical Engineering II	2
Mechanical Engineering I	3
Mechanical Engineering II	1
Building I	1
Building II	1
Building III	7
Electrical Draughtsmanship II	1
SUB-TOTAL	149
TOTAL: Full-time and Part-time	447

Table 4.28 indicates the number of students who have obtained diplomas or certificates at the Division of Technology during 1973, 1974 and 1975. As can be seen, these numbers are relatively small, with a total average of 37 students who obtained a Diploma or Certificate each year during the period 1973-1975. The staffing structure of the Division is laid out in Figure 4.5 which indicates a total teaching staff of 33 lecturers, excluding the head. The Division uses some highly specialised equipment which includes an incubator, a muffle furnace, microscopes, oscilloscopes, a jib crane, roll-tube spinners, an H.F. generator, digit-designers, a tacheometer, 6 scale plotting protractor, an aluminium telescope, micrometers, theodolites, a worm-hoist, torsion apparatus, fractional distallation apparatus, pyrometer, photographic equipment, colorimeter, low pressure demonstration apparatus, an impedance bridge and a voltage stabilizer. This equipment is, however, regarded as insufficient and/or inadequate (60).

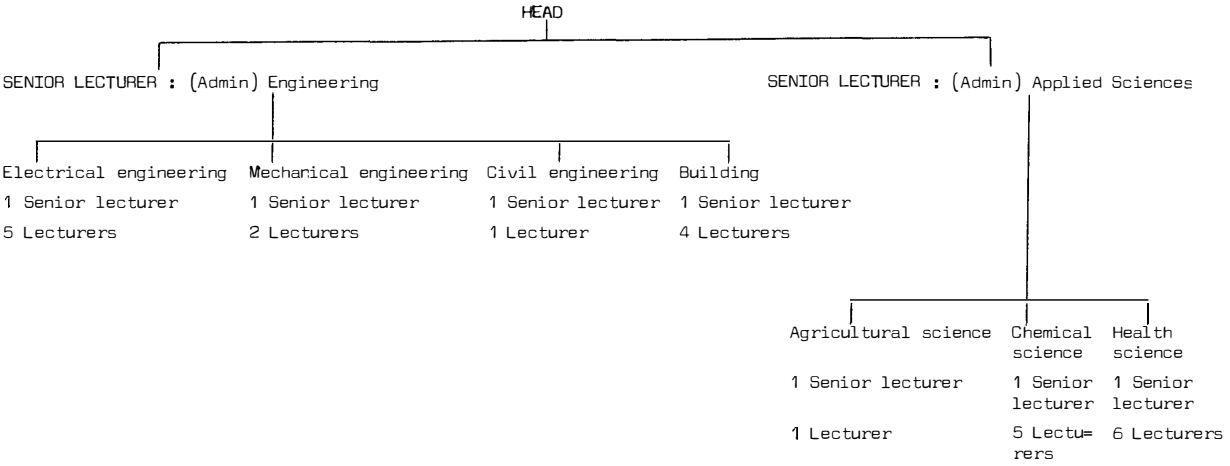
TABLE 4.28 (SEE NEXT PAGE)

TABLE 4.28

THE NUMBER OF STUDENTS WHO HAVE OBTAINED DIPLOMAS OR CERTIFICATES AT THE DIVISION OF TECHNOLOGY DURING 1973, 1974 AND 1975

Course	1973	1974	1975
National Diploma for Health Inspectors	5	9	4
National Diploma in Health Education	8	4	-
National Diploma in Laboratory Technique (Intermediate)	9	6	6
National Diploma in Medical Technology (Microbiology)	-	-	1
National Diploma in Medical Technology (Blood Transfusion)	-	-	1
National Diploma for Technicians - analytical chemistry	-	1	5
National Diploma for Technicians - civil engineering	-	-	2
National Intermediate Diploma for Technicians - civil engineering	-	-	3
National Technical Diploma	3	-	-
National Diploma in Tropical Hygiene	-	-	7
National Certificate for Orthopaedic Technicians	7	-	-
National Certificate for Technicians - civil engineering	-	9	-
National Certificate for Technicians - building	-	-	3
National Certificate for Technicians - building surveying	-	8	-
National Certificate in Architectural Draughtsmanship	-	6	-
National Certificate for Builders' Foreman	-	-	3
TOTAL	32	43	35

FIGURE 4.5 : DIVISION OF TECHNOLOGY : STAFFING STRUCTURE 1977



4.3.5 General information on the M.L. SULTAN TECHNICAL COLLEGE

Thus far in paragraph 4.3, attention has been given to a brief historical background of the M.L. Sultan Technical College and the three levels of adult Indian technical education being provided by the various divisions of the College, the courses and subjects offered, enrolment figures, examination results, staffing structure and some of the equipment being used. There are, however, some aspects of the College which still need attention and this is discussed accordingly.

a. Appointment of teaching staff

The staffing structures (teaching staff) of the various divisions at the College have already been discussed in paragraph 4.3.4 and 4.3.5. However, seeing that the appointment of teaching staff is a major problem at the technical high schools, it would only serve a useful purpose by giving attention to the way in which the problem is approached at the College.

Staff vacancies of the College are advertised in the local press and in most cases the advertisement are circulated to other Colleges for Advanced Technical Education. A short list of eligible applicants is then compiled by the heads of the respective divisions at the College in consultation with the deputy rector and the rector. The appointments committee, which consists of the rector (chairman) and certain members of the College Council then interviews these applicants and submits a final recommendation to the College Council for its approval. Senior positions, that is from vice-principal upwards, also require the approval of the Department of Indian Affairs.

As far as salaries are concerned, the College has what are known as "personal scales". These are salary scales which are of such a nature that they are attractive enough to persons in the private sector whenever a post at the College is advertised, though they are subject to approval of the Department of Indian Affairs. Reportedly, these "personal scales" have to a large extent ensured that vacant posts are filled by highly qualified persons, thus enhancing teaching standards at the College (60).

b. Accommodation

According to reports accommodation at the College is a major problem and restricts the annual intake of students. The College is proceeding towards a fully-fledged Institution for Advanced Technical Education, which means that the College will

require a much larger centralised campus to be able to function efficiently as a College for Advanced Technical Education (60).

At present there are 8 main buildings, including "pre-fabricated" buildings, on the College campus, which include 71 classrooms, 85 specialist rooms, 25 workshops, 32 offices, 14 staff rooms, 22 storerooms, 1 hall, 1 council chamber and 1 library. In addition, on a different site, there is a hostel for both male and female students which can accommodate a maximum of 96 males and 64 females. At present the male residence is filled to capacity and additions to the hostel are regarded as urgent (60).

c. Finance

The running expenditure of the College is made up from state subsidies and income from fees. All income excluding fees, is transferred to the Capital Development Fund or the Students' Amenities Fund as the case may be. If there are any surpluses at the end of each financial year, they are transferred to the Reserve Fund which at the moment consists of the Reserve Fund for the replacement of equipment, the Staff Annuity Fund for the payment of pension gratuities on the death or retirement of staff and the Leave Gratuity Fund for the payment of leave gratuities on the death or retirement of staff.

All capital projects involving equipment and furniture which are approved by the Department of Indian Affairs are financed on a 75 : 25 or 3 : 1 basis by the Department and the College respectively. The state also subsidises all full-time and part-time salary increases whereas expenditure on the technical high school at the College, the courses from Std 6 to 10 in the catering sphere, the Nursery School Aides course and the course for hairdressers, all of which are known as "special secondary education" is fully subsidised by the Department of Indian Affairs. The whole financial system is illustrated in Figure 4.7 (60).

d. Promotion of the College

It is evident that technical education for Indians is still at an early developing stage and that there is a lack of motivation among them to take up technical education. A question which is frequently asked in this connection is: What is being done to promote or encourage technical education, especially at post-secondary level, among the Indians of South Africa? At the M.L. Sultan Technical College, various social and other functions are held from time to time and the public are then invi-

FIGURE 4.6

THE FINANCIAL SYSTEM OF THE M.L. SULTAN TECHNICAL COLLEGE

Running expenses of college except on special secondary education		Expenses on "special secondary education"	Expenses on approved items of buildings, furniture and equip=ment
Income	Expenditure		
State: 1. General pur=poses subsi=dy based on fee income 2. Special sub=sidy on all full-time and part-time sa=lary increa=ses with effect from 1969-04-01 in=cluding non-pensionable allowances 3. Housing subsi=dies 4. Contribution to pensions College: 1. Fee income	All expenses paid by College except: 1. Expenditure on "special secon=dary education" 2. All approved capital expendi=ture 3. Bursaries financed by special funds 4. Pensions and leave gratuities as well as replace=ment of items which are financed from the respective reserve funds. Surpluses are appropriated to the reserve funds.	All expenses paid by the state.	75 per cent of expenditure on approved capital works is fi=nanced by the state and 25 per cent from the College's Capital Develop=ment Fund which is an accumulation of donations received and non-fee income.

ted to view the activities of the College. Examples of such functions are the founder's day celebrations, prize giving functions, diploma ceremonies and sports meetings.

Furthermore and more important, at least once a year vocational guidance seminars are held when school counsellors, the staff of various high schools, are given an insight into the activities of the College. Secondary school principals are also invited to similar meetings, whereas persons involved in the political, social and educational welfare of Indians, such as the South African Indian Council, also pay regular visits to the College. Occasionally, staff of the College visit high schools and address the staff and pupils on aspects of the College. The Division of Indian Education also assists in the distribution of literature on the College at its various schools. At the College itself, the Heads of the respective divisions and their representatives guide and counsel students at the time of their registration (60).

e. Liaison between the College, the University, commerce and industry

As mentioned elsewhere, the College carries out a job survey before any course is introduced. This is done, amongst others, by means of various consultative committees which afford a common forum where educationists and prospective employers discuss the various matters pertaining to the education, training and employment of students. Such committees are the Consultative Committee for Commercial and Professional Studies, the Consultative Committee for Technician Training, the Consultative Committee for Apprentice Training and the Hotel and Catering Advisory Committee.

In addition to these, representatives from the Durban Chamber of Commerce, the Natal Chamber of Industries and Die Durban Afrikaanse Sakekamer serve on the College Council. As far as the University of Durban-Westville is concerned, there is reciprocity in the membership of the respective councils. The Rector of the College serves on the Council of the University whilst a representative of the University serves on the College Council. The College is also invited to all meetings of the Association of Colleges for Advanced Technical Education (60).

f. General administration

To assist in the general internal administration of the College, various committees have been formed. The College Council controls the functions of the College within the Indians Advanced

Technical Education Act, Act no. 12 of 1968, and the rules and regulations of the Council, all of which have been approved by the Department of Indian Affairs. The Council has various committees, vested with certain powers of the Council, such as the executive committee in which is vested most powers of the council. This committee meets more frequently than the College Council itself and attends to routine matters and those requiring urgent attention between Council meetings. The Board of Studies at the College is responsible for educational matters and others pertaining to organisation and control within the College. The Board has two sub-committees, namely the magazine committee which attends to the editing and publishing of the annual college magazines and the B.M. Patel Memorial Library Committee which attends to all matters relevant to the library. In addition there are various other committees which attend to matters suggested in the name, such as the Finance Committee, the Staff Appointments Committee, the Building Committee, the Capital Development Fund Raising Committee and various other consultative committees (60).

CHAPTER 5

MOTIVATION AND RECOMMENDATIONS

5.1 MOTIVATION AND RECOMMENDATIONS REGARDING SECONDARY TECHNICAL EDUCATION FOR INDIANS IN THE RSA

5.1.1 Introduction of fully-fledged technical education

a. Motivation

With reference to what has been discussed so far, it is obvious that despite the large degree of progress which has been made in secondary technical education for Indians since its introduction, there is still ample room for improvement. In fact, it would seem that in some respects improvement seems long overdue. This is especially obvious when considering and applying the fundamentals of effective technical education, depicted in Chapter 3 as criteria. It has been stated that to be effective, technical education (in fact all education) should be able to guide the child so that his possibilities and capabilities, under his particular circumstances, come to optimal development in adulthood so that he can participate in society by knowing, understanding and differentiating. Technical education should therefore be formative. While it is in itself quite difficult to ascertain whether technical education for Indians is in fact satisfying this criterion, it can be stated that, as far as can be inferred from the various interviews conducted with people concerned with technical education for Indians, the syllabi for the different subjects do make provision for this to be achieved.

It must, however, be remembered that fully-fledged adulthood implies, inter alia, that a person should be vocationally orientated. This is especially true for the contribution, made by the school, towards a pupil's adulthood. Therefore the aims of the specific education that the child receives in the school must be achieved. The child who receives technical education should at the end of his school career, to a great extent, be technically orientated.

In view of the fact that secondary technical education has been introduced to satisfy the need specifically for education in the technical field, it may well be stated that a pupil who has undergone such training should to a certain extent also show

signs of vocational preparedness. In the light of the findings of this investigation, the question may be raised whether secondary technical education for Indians does comply with the aspect of technical orientatedness of its educational aims. In other words, is the technical education provided by these schools sufficiently vocationally directed?

Furthermore it was mentioned that technical education should be aware of and cater for the manpower needs of the country as far as the technical field is concerned. This implies that technical education should at all times take into account the variety of technical occupational fields and what is more, technical education should be able to cope with any changes that may take place within the socio-economical sphere.

With reference to the above-mentioned, it has been stated officially (58; 59) that the Division of Education of the Department of Indian Affairs does not regard the technical schools as "vocational schools". This means that these schools are <u>not</u> vocationally directed and they are <u>not</u> aware of the manpower needs of the country.

It is therefore quite evident that secondary technical education for Indians in South Africa does not meet the fundamental requirements for effective technical education as set out in Chapter 3 of this study. In the light of the recommendations of the Committee for Differentiated Education, it can safely be stated that not one of the four technical high schools for Indians is, in fact, a fully-fledged technical high school, owing to the fact that whereas according to the recommendations of the Committee, the technical direction of study should be the only direction of study at a technical high school, it is but one of several directions of study being offered at the technical high schools for Indians - in fact, only one of these schools is offering more than two out of a possible nine acknowledged technical subjects, the rest having to make place for non-technical subjects.

There are various factors which play a role in the problems encountered in secondary technical education for Indians and its failure to comply with fundamentals as set out in this report. During the interviews with prominent members of, and people closely connected to the Indian community, it was repeatedly stated that there is a general antipathy towards the technical field of labour and education among Indians, and that preference is given to an academical field of study leading to the medical or legal professions for instance. No objections are apparently raised to sending a pupil to a technical high school where he/

she can follow an academical field of study in any case, which explains why most of the Indian pupils matriculating at a technical high school are, according to reports, not interested in the technical field of study at all.

As shown in this report, the majority of Indian pupils, at least those at the four technical high schools, leave school at an early stage and according to informed sources these pupils are representative of either the average income group or, more generally, the lower income group among the Indians. It is an acknowledged fact that Indian parents from these two income groups cannot, in most cases, afford to keep their children at school while the latter could already be earning a living.

According to reports, the technical high schools are unable to give sufficient guidance to their pupils regarding job opportunities in the technical field. A pupil is, unfortunately quite often, led to follow a course of study which is either outside his sphere of interest or his capabilities, or even both, and what is even worse, when he does eventually matriculate there is no absolute guarantee that he will obtain suitable employment. In addition to all this, the serious shortage of qualified teachers for the technical subjects serves to aggravate the position even more.

b. Recommendations

With reference to the above and to all information disclosed in this report, the following is recommended:

(1) Technical high schools for Indians should be made specifically vocationally directed, so that vocational preparedness may be achieved. In this respect there are at least two alternatives. Firstly the recommendations of the Committee for Differentiated Education can be followed according to which all technical high schools for Indians as is the case for Whites (12) may offer only technical courses. This means, therefore, that all other courses of study will have to be discontinued at these schools. In the light of the number of pupils following non-technical courses at these schools, the lack of facilities for technical subjects and the teacher-shortage problem, this simply does not seem to be the solution to the problem or at least not within the near future.

The second alternative seems to be, reportedly, more acceptable although it still cannot guarantee absolute

success. It is virtually identical to the concept of comprehensive high schools and it is, in fact, only a modification of the current system of secondary education for Indians. An example of this is the new school at Clairwood which is to offer technical as well as non-technical courses of study. The important fact to bear in mind is that should comprehensive high schools be preferred to purely technical high schools, then the technical courses must not be regarded as of less importance than the other courses but they should receive equal attention. This means, inevitably, that all the acknowledged technical subjects must be offered and the necessary facilities and equipment must be available at every such comprehensive high school. This will also have to be done should the recommendations of the Committee for Differentiated Education be followed. A major problem that will be encountered is the provision of suitably qualified teachers for the technical subjects. This problem is dealt with at a later stage in this report.

(2) Technical education at each comprehensive or technical high school should be specifically vocationally directed, that is, a pupil taking a technical course must be studying for at least one specific technical vocation, for instance a welder, a motor mechanic, etc., or the course must enable him to follow a technical course at a tertiary level of study.

(3) Each school must have a well-organised vocational guidance and counselling system, which can provide the pupils with the necessary advice so that a choice of subjects and direction of study can be made in accordance with the pupil's abilities, interests and possibilities, in other words, that a responsible and justifiable choice of subjects and direction of study can be made with a view to a later meaningful choice of occupation. In this connection, the following aptitude tests, compiled by the Institute for Psychometric Research of the Human Sciences Research Council, can be utilized:

1. The Junior Aptitude Tests for Indian South Africans (Standards 6-8).
2. The Senior Aptitude Tests for Indian South Africans.

(4) Owing to the fact that the majority of pupils leave school at the end of, or even before, Std 8, they should derive the maximum benefit from their time at school in this particular field of study. During his first two years at

a technical high school, that is Std 6 and 7, a pupil at present spends some of his time studying Industrial Arts and Technical Drawing. When he leaves school at the end of Std 8 he has spent only one year studying a technical subject other than Technical Drawing and Industrial Arts, of which the latter subject is not recognized by the Apprenticeship Board, so that a pupil with a Std 8 Certificate has, in fact, only one year of experience in an acknowledged technical subject to his credit. The value of Industrial Arts as a subject can therefore be questioned. It is appreciated that a pupil should first be given the opportunity to prove his ability in the various trade subjects, but to spend two years in the process is not acceptable any more. There are pupils who are quite aware of their interests and capabilities in technical subjects and these pupils should be offered the technical subject of their choice at least from Std 7, but preferably even from Std 6, onwards. Those pupils who are uncertain of their capabilities and interests should be allowed a maximum of one year in technical subject orientation and be aided by writing aptitude tests, but they should, as from Std 7 onwards, take only the acknowledged technical subject of their choice in addition to the other non-technical subjects. Technical Drawing should, naturally, at all times be related to the practical work being done in that specific subject. Pupils planning to go on to Std 10 in either the higher or standard grade courses, should also follow the above-mentioned schedule, that is, they should also be allowed to take the technical subject of their choice at least from Std 7, but preferably even from Std 6 onwards. These are the pupils who, if they are really interested in the technical field of study or labour, will after matriculation possibly go to a university and study engineering for instance, or they will go to a technical college, and, for instance, follow an artisan course.

5.1.2 Solving the qualified teacher shortage problem

a. Motivation

It has often been mentioned in this study that while fulfilling his teaching task the teacher also assists the parents to bring up the child. Acknowledgment of the necessity of this task is to be found, inter alia, in the curriculum of the different training courses for teachers and true educationists throughout the world never cease to stress this fact. This is a matter

which should not be overlooked when the training of teachers is considered and it is valid for every level of education as well as all the different fields of study for teachers. Therefore no exception may be granted for teachers of technical subjects.

Although it may be deemed satisfactory rather to have an academically qualified but professionally unqualified teacher in the classroom than none at all, this is in view of the above-mentioned by no means a final solution to the problem of the shortage of teachers who are qualified to teach technical subjects. Furthermore it may never summarily be assumed that the person who is qualified in the technical field of study is also capable of successfully passing on his knowledge to the unqualified. Especially in the school situation adequate knowledge of pedagogical and didactical principles is a necessity. Therefore proper teacher training is a prerequisite.

Another relevant point should, however, also be raised. Every person who intends becoming a teacher must choose a specific field of study of which he should have a thorough knowledge at the completion of his studies. In all honesty it may be stated that at the completion of his study a teacher who has chosen a specific field of study complies with the minimum qualifications needed to successfully teach (a) certain school subject(s). Should he be required to teach other subjects than those for which he has met the minimum requirements through study, he then should further his studies in that particular field. Again he should eventually at least meet the minimum requirements in order to fulfil his new teaching task with success. Therefore, for example the qualified teacher of History who has no knowledge of Geography will not be able to teach the latter properly unless he has made a thorough study thereof during his initial training or by a de nova study of this subject. As regards technical education this boils down to the fact that the teacher, who is for example qualified to teach the necessary technical subjects to future electricians may not teach the technical subjects required to become a plumber unless he has himself successfully completed such study.

b. Recommendation

With reference to the foregoing motivation it is recommended that the shortage of qualified teachers for the technical subjects should receive immediate attention.

Three different means of attempting to solve the problem have come to light so far, one of these being the system of so-called

"crash-courses" which involves the training of a teacher in a specific subject within a very short time span. For various reasons these courses have failed to live up to expectations and there is some degree of controversy concerning the matter. This does not imply that these courses should summarily be scrapped. On the contrary, consideration should rather be given to the problems that have been encountered and solutions to them sought. One of the main objections that has been raised against the system is that while extensive trade experience is said to be an essential prerequisite for a teacher of trade subjects, a "crash-course" is said to be inadequate for qualifying a person without trade and workshop experience as a teacher of trade subjects and that private enterprise and industries are adamant that apprentices should be trained by persons with extensive trade experience. In answer to this it has been stated that the syllabuses for the trade subjects at a technical high school and at a technical college or apprentice school are identical and that the same type of teacher is needed for both institutions. In other words a teacher of trade subjects at a technical high school has to be just as experienced and qualified in the trade as a teacher at a technical college. It has therefore been suggested that the time span of the "crash-courses" be lengthened according to demand, and that the teachers following these courses in technical subjects be sent to either Clairwood High School where they can be trained in the workshops by lecturers from M.L. Sultan Technical College at times that will not interrupt the normal activities at the school, or that the workshops at the M.L. Sultan Technical College itself be used as a training centre. It has also been suggested that the teachers following these courses should at least be brought up to artisan level and that afterwards they should even do the trade tests at Olifantsfontein. These suggestions can only be endorsed here.

As alternative to the system of giving qualified teachers a "crash-course" in the trade subjects, it has also been suggested that qualified artisans be recruited and given professional training to become teachers of trade subjects. It is said that especially in view of the present economic recession, suitable persons could, in fact, be drawn from private enterprise to be trained as teachers. This is, however, doubtful. In this respect it can only be recommended that recruitment be placed under control of a recruitment committee, consisting of members of the Division of Education and persons concerned with technical education, which must decide on suitable requirements and qualifications of the applicants. Either the same or another committee should then decide on the training programme of these people.

In addition to the above-mentioned two schemes, there is also a third which can be implemented, but which has apparently not enjoyed much attention. This scheme simply involves the training of Indian pupils who have passed matric as teachers of technical subjects at a teachers' training college. There are, however, three major problems involved in this scheme. Firstly, as shown in this report, very few Indian pupils follow a technical course up to Std 10 and those who do are in most cases not interested in the technical direction of study at all and therefore they do not continue their technical education at post-secondary school level. Secondly it has been found that students enrolling at a college of education are more inclined to take academical subjects such as Physical Science or commercial subjects such as Bookkeeping. According to reports this can be ascribed to the tendency among many students at a college of education to qualify themselves in a direction which will also be of use to them in the private sector and it should therefore not be surprising that Industrial Arts bottoms the list of subjects. The current system of aspirant teacher selection seems to be promoting this tendency because, according to this system, the number of teachers to be trained in a particular subject is determined by the number of pupils taking that particular subject. However, it stands to reason that if a particular subject is not being offered at one or more of the schools, then there will be very few, if any, pupils taking that subject. It cannot summarily be assumed that there are no pupils interested in such subjects. On the contrary, it has been reported that should a subject, currently not being offered at a particular school owing to the teacher shortage, in fact be offered, that subject will prove to be the most popular subject. It is therefore recommended that the number of teachers to be trained in a particular subject should not only be determined by the number of pupils actually taking that subject, but consideration should especially be given to the demand for that subject among pupils whether it is being offered or not.

It is realised that there are virtually no facilities available at the colleges of education for training teachers in technical subjects other than Industrial Arts, but this is certainly no excuse and it is recommended that the possibility be considered seriously of making use of the facilities at either Clairwood High or at the M.L. Sultan Technical College. Should it be found that there are few or no students interested in following a course in a technical subject and should there prove to be a "surplus" of teacher candidates in one or more non-technical subjects, then it can be put to them that vacancies still exist in the technical subjects, should they be interested. It should be realised that, whatever scheme for solving the teacher

shortage problem be followed, once teachers have been recruited and trained, it must be ensured that they are kept in the teaching profession. In this connection it is recommended that close attention be paid to the system of employment at the M.L. Sultan Technical College which has, reportedly, proved to be very successful largely owing to the fact that the benefits offered are keeping pace with the stiff competition of the private and other sectors.

5.2 MOTIVATION AND RECOMMENDATIONS AS REGARDS ADVANCED TECHNICAL EDUCATION FOR INDIANS

5.2.1 The formative value of technical education for adult Indians

a. Motivation

For reasons previously mentioned in this report, all technical education given at institutions other than the four technical high schools under jurisdiction of the Department of Indian Affairs, to Indian students who have reached the age of 16, is regarded as advanced technical education. Seeing that some of the emphasis is placed on the age of the students, it may be quite true that most, if not all, Indian students who have reached this age can be regarded as adults, at least in the biological sense of the word. It cannot, however, summarily be assumed that all these students are adults, pedagogically speaking, because while it may be quite easy to determine whether or not a person can biologically be regarded as an adult, it is more difficult to ascertain whether he can, pedagogically speaking, be regarded as an adult. Landman distinguishes the following criteria for adulthood which are considered generally valid:

"An adult person living a meaningful life, realises that he may not make demands on (ask questions of) life ..., that all his choices and actions are justified by a knowledge that life is meaningful, that life thus has a particular meaning for him... in particular, that he feels destined (called upon) to actualise values. An adult is capable of active and critical self-judgment ... consequently he is capable of self-understanding ... (and) furthermore, is able to interpret this self-concept in terms of the demands of propriety and occupation which life makes on him. An adult is aware of his dignity as a person, (and) thus that he must act according to what is expected of him as a person. An adult stands by his resolutions, irrespective of the consequences. An adult realises that a sense of

responsibility is a fundamental principle of being a person. An adult does not behave respectably because others expect it of him; he behaves as he should for the sake of propriety itself, that is to say, he lives according to the authority of norms since he has identified himself with those norms: he is capable of a norm-oriented identification which reveals a responsible, accountable sense of propriety" (65, pp. 36-37). (Translation.)

These points are mentioned here because should it be assumed that all Indian students at technical education institutions, other than the four technical high schools for Indians, can in fact be regarded as adults, pedagogically speaking, then of course the formative task of technical education in this case may not be an indisputable essential although it may not be totally ignored. The latter statement is made because it is a pedagogically accepted fact that although the forming of a child by means of his upbringing by an adult comes to an end when the child reaches adulthood, the personality of the adult continues to be moulded during his continuous contact with the world around him. This is illustrated by the fact that adults often give proof of, inter alia, a change in willpower and/or an acceptance of new values or a strengthening of those already accepted. It can, however, safely be assumed that although there are some of these students who have reached adulthood, there are others who have as yet to reach adulthood. It is because of the latter that technical education as provided for them will also have to comply with all the required foundations for effective technical education as previously explained in this report. According to interviews with leading Indian educationists these foundations (criteria) are incorporated in technical education for adult Indians specifically at the M.L. Sultan Technical College. This is proven, firstly, by the fact that advanced technical education, comprising the various courses offered at the M.L. Sultan Technical College, is specifically vocationally directed. All courses offered lead to a specific qualification in a specific vocational field and no course of study leading to a specific qualification is offered unless assurance is given that there is a demand for persons in possession of that qualification in the field of labour. This point is clearly illustrated in this report. Secondly, as proved by the various consultative committees of which the M.L. Sultan Technical College is a member, the College is sparing no effort in ascertaining the manpower needs of the country especially in the technical field. This is done to ensure that the courses offered are, in fact, vocationally directed and in demand by employers.

b. Recommendation

It is recommended that in all the particular fields of study which are catered for in technical education for adult Indians, the formative value of technical education should receive adequate acknowledgement.

5.2.2 Solving the problems in connection with accommodation, facilities and equipment

a. Motivation

The M.L. Sultan Technical College is not only striving to be aware of the manpower needs of the country, but is also attempting to cater for them. In this respect, the College is seriously hampered by at least two major problems. Firstly, as mentioned in this report, inadequate accommodation at the College is a major problem which naturally also confines the annual intake of students. The situation is aggravated by the fact that the College is to become a fully-fledged Institution for Advanced Technical Education, requiring a much larger centralised campus. The hostel facilities at the College are also regarded as inadequate, the male residence at present being filled to capacity. Secondly, the equipment used at the College is, reportedly, in some cases, either out-dated or in short supply or both, the situation varying from one division to another.

b. Recommendation

When recommendations concerning the shortage of accommodation, facilities and equipment at the M.L. Sultan Technical College are made, the present repressed economic climate in the country must be borne in mind, because to solve above-mentioned problems will, inevitably, demand a flow of capital, either from College funds or from state subsidies. It can therefore only be recommended that, if not already in existence, a committee should be formed to ascertain how the existing facilities and equipment can be utilized to their maximum, for instance possible rearrangement of timetables so that existing facilities are in constant use instead of being unused for one or more periods per day.

The possibility of using facilities other than those at the College, at various factories for instance, for the training of students should also be investigated. When it has been proved

that existing accommodation and equipment are being utilized to maximum capacity, then the possibility of acquiring new or additional facilities at the lowest possible cost while still meeting the requirements, should be investigated.

It should be realised that it would be needless, if not futile, to recommend that new accommodation and equipment should summarily be acquired because there is an endless number of factors which should be taken into consideration, of which but one, the repressed economic climate of the country, has been mentioned thus far. A feasible recommendation is that a committee be appointed to investigate these problems and that it should consist of persons who may in some way or another play a decisive role in solving them. This committee should consist amongst others of members of the College staff (administrative and teaching), government officials and the local municipal authority such as the town planner. Only when persons actually concerned with the matter are made aware of existing needs, demands and limitations, and discussions held in this connection, does the possibility arise that lasting solutions to the problems will be found.

5.2.3 Improving the usefulness of the Prospectus of M.L. Sultan Technical College

a. Motivation

Another aspect which needs to be commented on concerns the Prospectus of the College. As mentioned in this report the Prospectus tends to be confusing and somewhat inadequate. There are, for instance, courses being offered by the College which are not mentioned in the Prospectus. The Prospectus must be regarded as a direct link between the College and the Public (including schools) and it should at all times rather be assumed that a person wishing to acquire information about the College is completely ignorant of the required information. Therefore the Prospectus should be compiled in such a way that it will supply answers to most, if not all, possible questions.

b. Recommendation

In view of the above-mentioned it is recommended that the minimum information disclosed in the Prospectus should include the following:

1. The year for which the Prospectus is valid.

2. All courses of study offered and as regards each of these, the following: the basis on which it is offered, e.g. part-time and/or full-time; the entrance qualifications; the promotion requirements; the subjects included; the duration, including a roster indicating the semesters, of the academic year, lecture hours, and fees.
It is imperative to note that this information should be given for every course offered at the College.

3. Auxiliary services available to students, e.g. the library, and how it can be utilized.

4. Boarding facilities available to students, not only at the hostels but possibly at private homes too.

5. A description of the documents required when enrolling and mention of the registration fees.

6. A plan of the campus indicating the various faculties and/or divisions.

7. Any other relevant information, such as a list of the names of lecturers.

The Prospectus should be regarded as a means of promoting technical education amonst Indians and no effort should be spared in this attempt because as proved in this study, technical education for Indians still has a long way to go towards optimal development. This can only be achieved with the full co-operation of the Indian community in South Africa.

5.3 CONCLUSION

In this report an effort has been made to give an indication of, inter alia, job opportunities in the technical vocational sphere for Indians, the status quo as regards technical education for Indians and motivations and recommendations for the improvement and promotion of technical education for Indians, where and if needed.

The hope is hereby expressed that this report will prove to be of considerable use to those persons concerned with the welfare of the Indians in South Africa, as well as to any other interested parties.

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