THE DESIGN OF A DIFFERENTIAL SELECTION MODEL FOR SPECIFIC STUDY DISCIPLINES AT A TECHNIKON

By

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SYNOPSIS

THE DESIGN OF A DIFFERENTIAL SELECTION MODEL FOR SPECIFIC STUDY DISCIPLINES AT A TECHNIKON

"It is in fact nothing short of a miracle that the modern methods of instruction have not yet entirely strangled the holy curiosity of inquiry; for this delicate little plant, aside from stimulation, stands mainly in need of freedom; without this it goes to wrack and ruin without fail." Albert Einstein

by

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In 1999 the Department Human Resources Management received 1 625 applications for admission to the National Diploma course in Human Resources Management and in 2000, 1 750. Only 70 students could be admitted. By comparison the Industrial Engineering Department received only 331 applications in 1999 and 430 in 2000 of which only admit 100 students could be admitted. To date senior certificate results are weighted (Swedish formula) and used as the only method of selection. Given the current problems in education and the environmental constraints of the majority of applicants, the Swedish formula can no longer be used as the sole selection mechanism.

The purpose of this research, therefore, is to design a selection model which can be utilised to select students for the abovementioned courses.

During the theoretical investigation the concept of selection and the compilation of selection models was emphasised in all the forms, as well as validity strategies to determine validity. The problems relevant to the criteria for success were also researched.

Three main categories of predictors were scrutinised, viz. –

- matric subjects,
- Swedish formula,
- traditional psychometric tests, and
- popular tests such as Discuss, Myers-Briggs and the Nowicki-Strickland & Lefcourt I/E scales.

Calculations of the relations between Technikon major subjects and these predictors were done.

A multiple hurdle model for selection is presented (refer to Figures 11.1 and 11.2) for the Human Resources Management and Industrial Engineering programmes.

The first hurdle in the both the selection models is the Swedish formula based on matric subjects.

The second hurdle is internal locus of control, which relates to both Personnel Management and Industrial Engineering subjects.

The third hurdle for Personnel Management applicants is the Discuss while for the Industrial Engineering applicants the Myers-Briggs is used to correlate results.

The aim of the study which has been achieved and has culminated in the presentation of two selection models for the different disciplines. These findings can be fine-tuned in the quest for an ultimate selection model.

CHAPTER 1

INTRODUCTION AND AIM

1.1 Introduction

Tertiary institutions are confronted daily with issues relating to the formulation of admission requirements for prospective students, in order to ensure academic success. If a valid measure were to be found to predict academic success, this would not only prevent personal failure, but also bring about financial savings for both the student and the tertiary institution. A further advantage for the broader community would be a reduction in the financial burden and their contribution towards proper training in accordance with the demands of the labour market.

In a changing South Africa, with its increasing emphasis on individual rights, fair and equitable selection techniques are a priority. Mitchell and Fridjhon (1987:559) also mention that only a small percentage of students with matriculation exemption attend universities or other tertiary institutions, therefore it appears that examinations that hold additional advantages for future achievements assist a minority of students rather than a majority. The most persuasive argument is that problem-solving skills and the capacity to relate the general to the specific, are skills which should be inculcated in tertiary training. However, these skills are generally highly valued by those students who do not attend tertiary institutions.

Admission tests will always be controversial. However, tests which do not discriminate will be less controversial if they lead to accurate predictions.

1.2 Problem

In 1999 the Department of Human Resources Management received 1 625 applications for admission to the National Diploma in Human Resources Management and in 2000, 1 750. Only 70 students could be admitted. By comparison the Industrial Engineering Department which received only 331 applications in 1999 and 430 in 2000, could only admit 100 students. To date senior certificate results are rated (Swedish formula) and used as the only method of selection. Given the current problems in education and the environmental constraints of the majority of applicants, the Swedish formula can no longer be used as the sole selection instrument.

1.3 Aim of study

The purpose of this research, therefore, is to design a selection model which can be used to select prospective students for the abovementioned departments.

The study aimes to create a selection model specifically for the Human Resources Management Department and the Industrial Engineering Department at the Technikon Pretoria's Economic Sciences Faculty.

A selection model will be of value to prospective Technikon students and the community at large.

1.4 Methodology

1.4.1 Theoretical research

During the theoretical investigation the concept of selection and the compilation of selection models was emphasised in all its forms, as well as validity strategies to determine validity. The problems relating to the criteria for success were also researched.

Three main categories of predictors were scrutinised, viz. –

- matric subjects,
- Swedish formula,
- traditional psychometric tests, and
- popular tests such as DISCUSS, Internal Locus of Control and Myers-Briggs Type Indicator.

1.4.1 Empirical research

The empirical research was limited to the following target groups:

- first-year Personnel Management students who were enrolled for the National Diploma in Human Resources Management,
- third-year Personnel Management students who were enrolled for the National Diploma in Human Resources Management,
- first-year Industrial Engineering students who were enrolled for the National Diploma in Industrial Engineering, and
- third-year Industrial Engineering students whom were enrolled for the National Diploma in Industrial Engineering.

The results of respondents were obtained arising from, viz:-

- matric subjects,
- the Swedish formula,
- Myers-Briggs Type Indicator,
- DISCUS, and

- Nowicki-Strickland & Lefcourt I/E scales.

These results were compared with the criterion of success i.e. academic success in major Technikon subjects.

1.5 Chapter outline

The relevant theoretical research is covered in chapters two to nine. Chapter two describes selection by a deviation from basic selection in an organisation and is focused on selection in tertiary institutions. Chapter three tries to establish the criteria for success and chapter four deals with matric results. Chapter five investigates traditional selection techniques and chapters six, seven and eight describe the instruments utilised in the research i.e. Nowicki-Strickland and Lefcourt I/E scales, the Discuss and the Myers-Briggs Type Indicator.

Chapter nine describes the method of investigation and chapter ten provides the results of the empirical study. Chapter eleven provides a differential model for selection, as well as conclusions and recommendations.

CHAPTER 2

SELECTION

2.1 Introduction

"Things are seldom what they seem,
Skim milk masquerades as cream"
(Gilbert 1878, HMS Pinafore act 1 as quoted in Oxford Dictionary, 1992:306).

Hall and Goodale (1986:236) start their discussion on selection with reference to Warren Lamb's techniques: *"The latest method for invading the privacy of someone's personality goes one step beyond body language. This is a way of interpreting a person's integrated body movements to come up with an action profile or body "signature". The theory is being promulgated by Warren Lamb, director of a British consulting firm that specialises in decoding these subtle body movements primarily for firms interested in recruiting and organising management teams".*

Selection is the device that determines the overall quality of an organisation's human resources. Therefore it will impact on the service and products which clients and customers receive from an organisation.

Matheson et al (2000:18) emphasise that *"claims of infallibility are equally as ridiculous as claims of fallibility"* when referring to selection tools. The key point is that selection tools, unlike, people should never stand-alone.

2.2 Definition and Description

Hall and Goodale (1986:236) explain their view on selection as "*... the process through which representatives of an organisation define a job to be filled, assess the people applying for that job, and choose the applicant with the greatest potential to perform the job successfully*". This definition is confirmed by Carrel et al (1999:174), Mondy and Noe (1996:180), Byars and Rue (2000:251), Muchinsky et al (1998:119) and Noe et al (1994:377) who emphasise that selection is choosing the person that is the best suited to a particular job.

Selection is judging an individual's compatibility to a specific position, to determine the ideal 'fit' between a person and a job. More than half of the people who resign within the first year of being employed were incorrect job placements. Currently there is no success recipe for selection. Subjectivity is an integral part of selection as there is no perfect test. The selection decision is a discriminatory decision as the employer discriminates between applicants on the bases of ability and suitability. The objective is to strive to increase the validity of measuring instruments according to Carrell et al (1995:301), Muchinsky et al (1998:119), Singer (1990:124), Corbridge and Pilbeam (1998:99), Steyn (1982:152), as well as Ivancevich (1995:119).

On the other hand Milkovich and Boudreau (1997:240) suggest that the only perfect test to determine the best applicant for a job is to hire everybody, let every applicant perform the job and then to keep the best employees, while this is highly impractical, there is in fact no selection.

Selection is viewed as a two-way process where information is provided by both the employer and potential employee. However, current practice which implies that the decision to employ is a management prerogative, is cited by Stoner and Wankel (1978:331), as well as Torrington and Hall (1991:283).

Cascio (1998:271) views selection as a process consisting of two elements eg:

- measurement, collecting information, and
- combining data in such a manner that the predictive error is minimal.

Cascio (1991:281) continues that *"in personnel selection the name of the game is prediction, for more accurate predictions result in greater cost savings (monetary as well as social)".*

DeCenzo and Robbins (1988:147) agree with Cascio that all selection exercises are prediction orientated therefore determining which applicants will be successful or not.

Selection entails decisions made about assigning individual's to specific jobs or predicting who will be more successful at a job. In order for organisations to maintain their competitive edge, the utmost care must be taken in its choice of staff according to Noe et al (2000:180) and Beardwell and Holden (1994:232).

2.3 Rationale of selection

If variability in physical and psychological characteristics were not so prevalent, there would be little need for selection of people to fill various jobs. The goal of a selection programme is to identify applicants who achieve high scores on instruments that purport to assess knowledge, skills, abilities or other characteristics that are critical to ensure job success. Yet the risk of making incorrect selection decisions is always probable. Selection errors come of two guises: selecting someone who should be rejected (erroneous acceptance) and rejecting someone who should be accepted (erroneous rejection). These errors can be avoided by using measurement procedures that are reliable and valid.

If an organisation purchases 100 new machines, it is reasonable to assume that they have been constructed identically and should therefore be identical in efficiency and production. A similar assumption cannot however, apply to a new group of employees that an organisation may employ. The reason for this is that each individual differs from another because of physical and psychological characteristics.

Justification for selection lies in the fact that in each individual is uniquely constituted. Certain differences can be identified by observation only e.g. the colour of someone's hair and eyes. However, other differences such as the individual's ability and skills that are not readily identifiable. This simple observation leads to the very important conclusion that people are not equally suited to all jobs, therefore procedures for matching people and jobs have important organisational benefits (productivity and job satisfaction) according to Arnold et al (1998:139), Muchinsky et al (1998:120).

In any organisation a particular job requires a certain number of these imperceptible qualities. To determine whether a person will function successfully in the particular job, one of two approaches can be followed, i.e.:

- place the individual in the job and see if he or she can manage or
- use selection techniques to determine the non-predictable qualities and place the individual according to her or his qualities.

The first approach is clearly a trial-and-error approach. However, if it is not successful, it can lead to exceptional problems for the organization, as well as for the individual, one of these is financial loss for the organization. The individual could influence the work group negatively. In the second approach, an assessment is made to determine to what extent a particular individual satisfies the requirements for a specific job. (Nieuwoudt et al, 1999:36).

If selection techniques satisfy particular requirements, the prediction can be made accurately within the determined parameters. Selection techniques are not infallible, and not accurate prediction will not always be made on the basis of the information. Flippo (1984:166) writes in this connection:
"There has not been developed as yet any test, or any battery of tests, that can fully capture the complex nature of the human being."

Generalizations cannot be made when selecting students for tertiary entrance as every tertiary institution has its own unique character, mission and vision, according to du Plessis (1988:49).

To a large degree, the effectiveness of a company depends on the effectiveness of its employees, according to Carrell et al (1995:13). Mediocre performance will result when the labour force is of a poor quality therefore recruitment and selection are critical human resource activities.

Dessler (1994:154) cites the following reasons for the importance of selection:

- a manager's performance is judged by the success of his/her subordinates;
- to provide the job performance the organisation needs to gain its objectives;
- costs involved in recruitment and staffing; and
- legal implications if not done correctly.

2.4 Value of selection

2.4.1 Organisation

Every organisation aims to increase production but decrease costs. Only through the application of scientific selection methods can an organisation be sure that the available worker source will be used maximally. The organisation needs to employ, from the available applicants, those persons

who have the particular skills required for a specific task. This will lead to increased effectiveness, which is essential for increased production.

Effective selection reduces business problems such as expenses arising from accidents, high labour turnover, training and absenteeism, which are direct consequences of maladjusted employees.

Hiring the wrong person can also cause friction among current employees, as they become resentful at having to take the rap for inept newly hired employees. Inadequate selection leads to lost time, and irritation, all of which have economic ramifications as cited in Gómez-Mejía et al (1998:159), Louw (1984:2) and Singer (1990:123).

2.4.2 Employee

Self-actualisation motivates people to work. An employee can, however, only experience self-actualisation and the accompanying happiness and satisfaction, if the work she/he performs involves all her/his potential, skills and energy. On the other hand the demands, should not be too high.

Ineffective selection results in the maladjustment of the employee with the accompanying fasctors of discontentment, boredom, restlessness, fatigue, frustration, conflict and emotional imbalance.

2.4.3 Society

It is incumbent upon organisations to utilise existing positions in such a way that the people in them are able to be maximally productive. Jobs are scarce and the creation of new jobs will largely depend on the country's ability to generate economic wealth. Society cannot afford people who languish in positions or studies in which they do not have an interest, for which they do not have the skills or abilities and in which they are not

motivated to be as productive as possible according to Jacobson (1996:30) and Brink (1999:517).

2.4.3.1 Micro-level

A happy, satisfied employee will display a positive attitude to life, which rubs off on his/her family, friends and colleagues.

Ineffective selection could lead to dismissal or resignation, both of which may result from the unsuitability of the employee for the job he/she occupies. The employee loses her/his job, her/his social status and becomes a burden to society.

2.4.3.2 Macro-level

The economic costs of maladjustment of employees are transferred to society by the organisation in the form of increased prices for products manufactured and services rendered. These result in increased inflation, rising living costs and a decline in the standard of living.

Efficient selection leads to optimal utilisation of limited resources of labour and capital in order to maximise the production of goals and services. Unemployment with the accompanying unused labour input leads to a loss in production (Muchinsky, 1993:172).

2.5 Scientific selection

A scientific character is the main requirement for effective selection. A distinction can therefore be made between scientific and unscientific selection methods. There are a large number of unscientific selection methods that are used, by many organisations even today, in spite of the enormous development in the field of personnel selection and administration. The uncritical acceptance of such selection methods leads to unfairness towards employees, and loss to the organisation.

Examples of such unscientific techniques are the prediction of individual *suitability for a post using intuition, prejudice, stereotyping, and* first impressions of the personnel manager.

A taxi corporation could refuse, to employ Italians as a result of their alleged predilection to accidents, while another corporation, hardly a mile further on, gladly employs Italians, but not Irishmen, because of their predilection to accidents. The popularity of pseudo-scientific selection methods such as graphology, phrenology and physiognomy (based on the alleged relationship between characteristics and personality characteristics), may be an indication of the need for more exact selection methods. The validity and the accompanying effectiveness of the above-mentioned methods are highly acceptable (Nieuwoudt, 1999:47).

Scientific selection implies the use of experimental validated methods of selection of which the prediction efficiency is known. A scientific selection method is therefore expected to be valid, reliable and based on three kinds of information, i.e.:

- Knowledge of the demands that a particular post requires of the employee and the abilities the individual must have at his disposal to satisfy these requirements;
- Knowledge of the qualities and abilities of the different applicants applying for a post, to determine which applicant's characteristics correspond best to the requirements of a particular post; and
- Knowledge of the success of the prediction made during selection. (This implies a standard of work success on the basis of which may be judged if the *successful applicant is also successful in the work situation).*

Arnold et al (1998:164) are of the opinion that more than one selection techniques should be used to ensure accurate prediction.

2.6 Designing a selection model

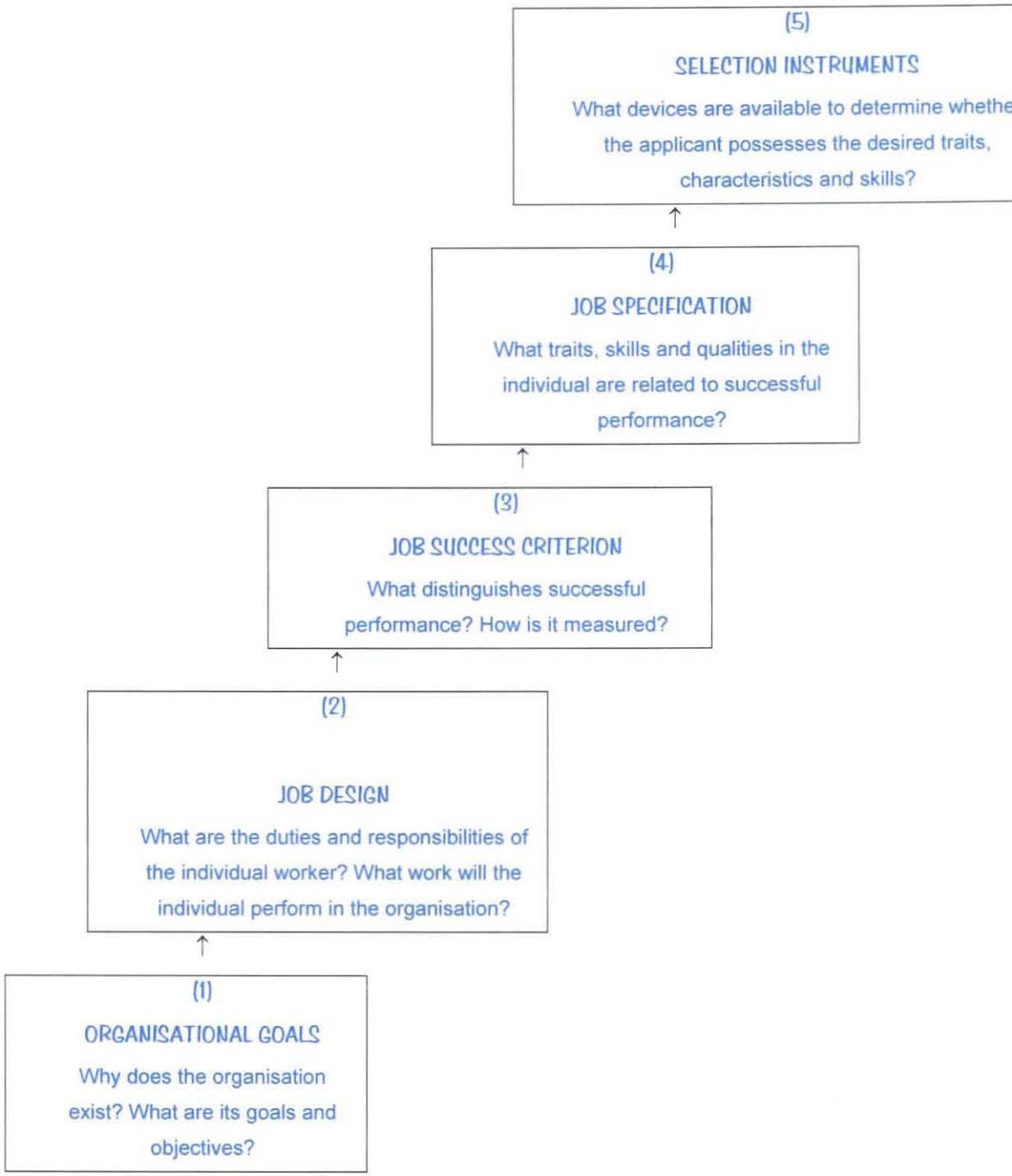
In the selection of measuring instruments, cognisance must be taken of any diversity in the work group to be evaluated, as well as of the criteria set out by the organisation if the new incumbent is to be successful. Solomon (1993:102) mentions that:

"Any test is of course biased by its maker – it can't be otherwise. Still, any test is legitimate for what it tests. The individual using the results merely has to have the perspective to use that information responsibly and understand what he or she is testing for."

Solomon (1993:102) continues to propose steps to be taken and aspects to keep in mind when diversity testing is done. Whatever the objective, in the final analysis, a specific person is assessed for a specific job in which she has to perform specific tasks. The nature of the tasks will determine the areas of testing and the test(s). The testing should also indicate the potential for integration into the workplace, so that both diversity and production are promoted and maintained. Tests should not weed out particular cultures. In fact, recruiters have difficulty in finding enough cultures to draw from.

When compiling a selection programme a number of steps can be listed. These steps usually follow a fixed order and determine the success and validity of the procedure that follows. The accuracy and methodology of the main steps will determine the eventual validity, reliability and success of the selection programme according to Nieuwoudt et al (1999:40), Stoner and Wankel (1978:332), Dessler (1994:157), Armstrong (1995:392) as well as Hall and Goodale (1986:239). Figure 2.1 describes the basic steps in a selection process.

FIGURE 2.1: BASIC ELEMENTS IN THE SELECTION PROCESS.



(Source: Carrell et al, 1995:305)

Figure 2.1 illustrates the elements in the selection process according to Carrell et al (1995:305):

- Organisational goals

  The hiring policy of the organisation is determined by the goals of the organisation. The choice is between employing the best person for the job at all costs or paying low salaries and not being concerned with labour turnover and employee satisfaction. A balance between cost and employee satisfaction must be established.

- Job design

  Job design determines the responsibilities and duties of each job.

- Job success criterion

  In order to distinguish between successful and unsuccessful employees, job success must be measurable.

- Job specifications

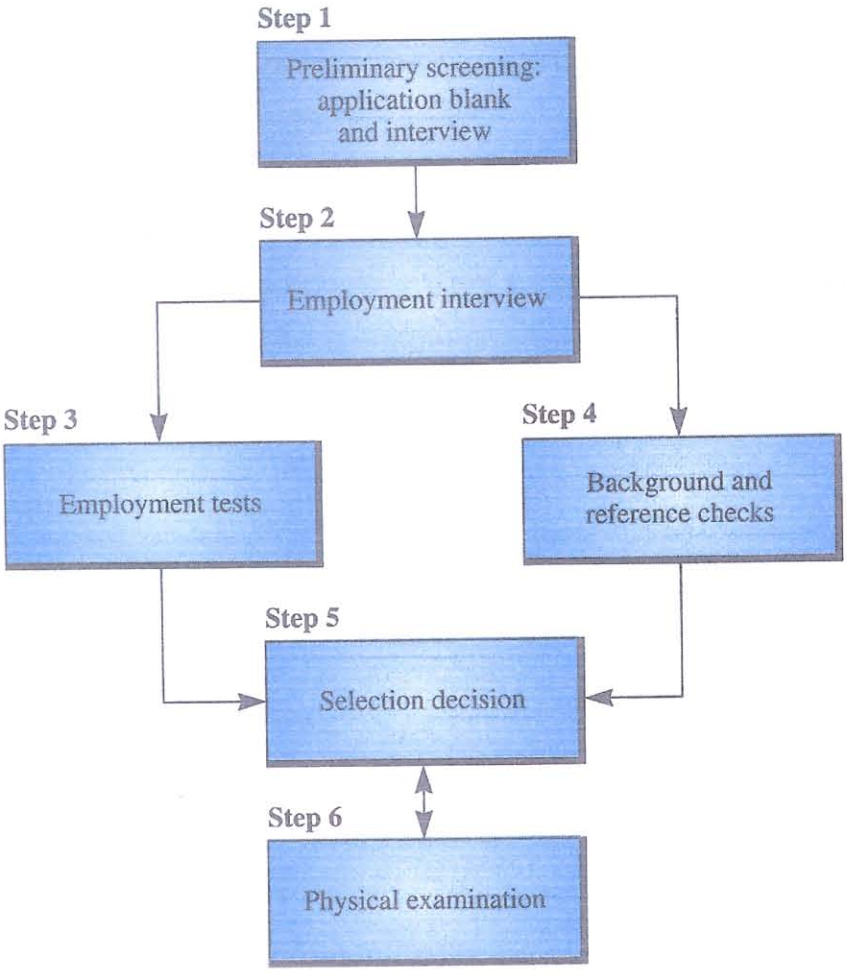
  Job specifications include a comprehensive description on the basis of the job description of the minimum requirements viz knowledge, skills and abilities a worker must have at his/her disposal to perform the specific work successfully. The requirements of the job description and specification become the predictors or standards of success.

- Selection instruments

  The last element is choosing the selection instruments eg interviews and tests.

In the selection procedure various methods can be used to gather significant information about an applicant, which can then be compared to the job specifications. Though there is no standard procedure a popular method is depicted in Figure 2.2:

FIGURE 2.2: TYPICAL SELECTION PROCESS.



(Source: Ivancevich, 1995;229)

- Initial or preliminary interview

Its object is the elimination of the unqualified applicants. If the applicant appears to have some chance of qualifying for existing job vacancies, he/she is given an application blank to complete.

- Application blank

Factual information such as qualifications, personal details and previous experience is obtained.

- References

The purposes are to obtain information about past performance of the applicant and to verify accuracy of information given on the application blank.

- Psychological testing

Certain tests are used to evaluate the applicant's personality, competence and skills against the job specifications.

- Interviewing

This is probably the most widely used method of selection. A substantial amount of subjectivity, and therefore unreliability, can be expected from the interview when used as a tool of evaluation.

- Physical examination

A physical examination is conducted to determine the applicant's physical abilities and to prevent communicable diseases from entering the organization.

➢ Criteria of work success

Before the efficiency of the tests can be determined, the present workers, on whom the tentative tests were performed, must be classified as successful and unsuccessful workers.

This division occurs according to the standard known in Business Psychology as the "criteria of work success" which must, if not already available, be prepared.

➢ Tentative validation of the test programme

The tests, chosen or prepared, are now validated according to the criteria of work success. Tentative validation is needed to -

- determine the prediction value (correlation) of the various predictors (tests);
- eliminate (intercorrelation) tests that measure the same factors or abilities as other tests in the test programme;
- find a basis for the allocation of weight for the test (by comparison of regression);

- determine the criteria to separate successful from unsuccessful workers.

➢ *Compilation of tests in a test battery*

According to the results obtained from the tentative validation, importance is attached to the chosen tests with regard to their prediction ability. The tests are then combined in a test programme known as a test battery to which applicants are subjected.

➢ Cross-validation

After the tentative selection programme has been prepared its validity must be established by applying it to a new sample. Such an independent determination of prediction validity is known as cross-validation.

Cross-validation involves the application of the process through which the selection programme is temporarily found valid in view of control, to a new sample (a group of applicants).

The motivation for the cross-validation of a selection programme is two-fold, viz-

- to determine whether the standards, or some of the standards, that possess prediction value according to the tentative validation programme, are not random;
- to determine whether the selection programme will maintain its effectiveness when it is applied to a new independent test group.

The process of cross-validation involves the following:

- subjection of all qualifying applicants to the test battery;
- separation of potential good and poor workers according to the test results;
- appointment of all the applicants, successful as well as unsuccessful, according to the test results;

- application of work success criteria to the appointed applicants after the expiry of an adaptation period and the separation of good and poor workers according to the criteria results;
- determination of the prediction validity of the test results by comparing them to the results obtained from the application of the work success criteria.

If it is found in the cross-validation that a high correlation exists between the prediction of work success (according to test results) and actual success (according to the results of the criteria application) the selection programme can be accepted as being valid.

- Follow-up study

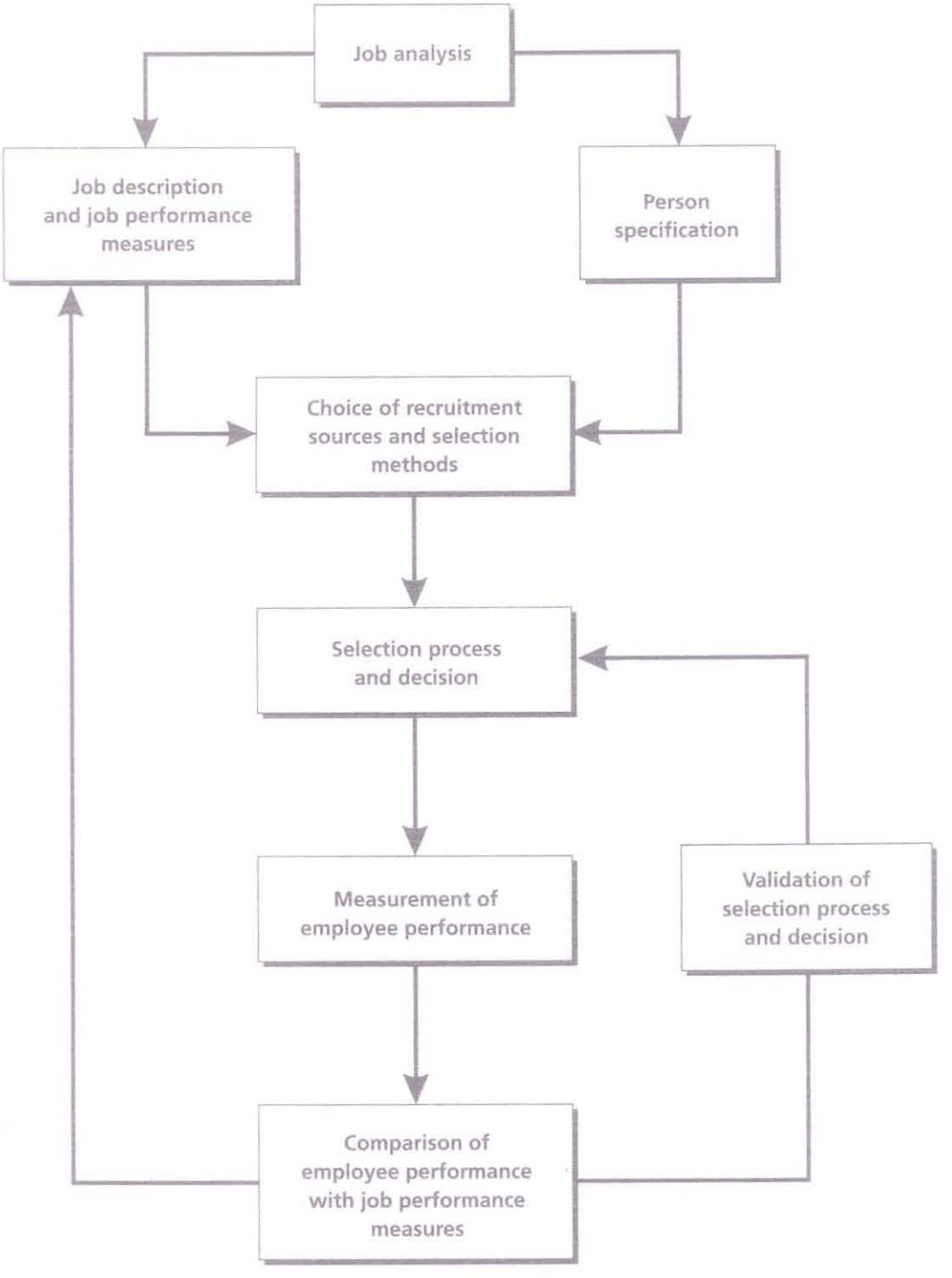
Although the follow-up study cannot be seen as a step in the compilation of a selection programme, it is an important aspect of the selection process that is often ignored.

The follow-up study is a periodic evaluation of the selection programme to determine whether it is still valid.

Follow-up studies are necessitated by the phenomenon that factors determining success in the work situation do not remain constant. Fluctuations in the worker pool may entail adaptations or the need for improvement can necessitate changes.

Figure 2.3 illustrates an example of the validation of the selection process.

FIGURE 2.3: VALIDATING THE SELECTION PROCESS AND DECISION.



(Source: Corbridge and Pilbeam 1998:103)

2.7 Selection decisions

Singer (1990:334) reports the types of errors that can be made during selection:

- rejecting an applicant who would have been successful - a false negative;
- selecting an applicant who fails - a false positive;
- selecting an applicant that should be hired - a true positive; and
- rejecting an applicant that should not be hired - a true negative.

The ultimate purpose of a selection procedure is its contribution to hiring successful employees.

Cherrington (1995:260) illustrates in Figure 2.4 the three factors that influence the usefulness of a predictor and gives an explanation:

- The selection ratio is defined by the following formula:

$$\text{Selection ratio} = \frac{\text{number of applicants hired}}{\text{total number of applicants}}$$

- The selection ratio indicates how many applicants are hired. This ratio will be 1,00 if everyone that applies is hired. If only one out of five applicants is hired the ratio will be 0,200.

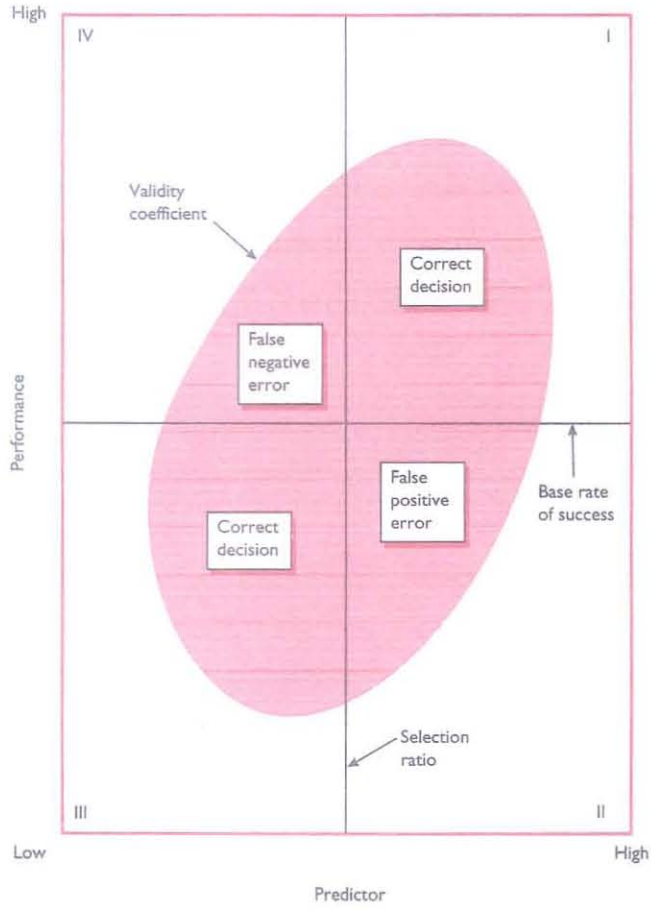
- Validity coefficient

  The validity coefficient is the correlation coefficient between the predictor and criteria.

- Base rate of success

  The base rate of success indicates the percentage of successful employees if they were to be hired at random without the use of a new predictor.

FIGURE 2.4: ASSESSING THE USEFULNESS OF A PREDICTOR.



(Source: Cherrington, 1995:261)

Apart from criterion-related validity, which is discussed in chapter three, Figure 2.5 lists a number of other features that must be considered when choosing selection methods. The expenses associated with selecting the wrong applicant are considerable, not only for the applicant but for society as well.

Irrespective of the method used for a selection decision, it must meet five criteria according to Arnold et al (1998:165) as reflected in Figure 2.5.

FIGURE 2.5: MAJOR EVALUATIVE STANDARDS FOR PERSONNEL SELECTION PROCEDURES.

1. Discrimination

The measurement procedures involved should be provided for clear discrimination between candidates. If candidates all obtain similar assessment (ie scores, if a numerical system is used), selection decisions cannot be made.

2. Validity and reliability

The technical qualities of the measurement procedures must be adequate.

3. Fairness/adverse impact

The measures must not discriminate unfairly against members of any specific subgroup of the population (eg ethnic minorities).

4. Administrative convenience

The procedures should be acceptable within the organisation and capable of being implemented effectively within the organisation's administrative structure.

5. Cost and development time

Given the selection decisions (eg number of jobs, number of candidates, type of jobs) involved, the costs involved and the time taken to develop adequate procedures need to be balanced with the potential benefits. This is essentially a question of utility.

(Source: Arnold et al, 1998:165)

2.7.1 Selection strategies

Guion (1991) as mentioned in Muchinsky et al (1998:128) emphasises that selection strategies assist with the decision because personnel selection always contains an element of judgement that no statistical procedure can eliminate.

After all the information has been collected, a selection decision is made and usually three methods are used according to Cherrington (1995:230):

- clinical judgement

refers to a subjective decision about the most suitable applicant after an informal examination of the information about applicants

- weighted composite

statistically combining weighted information into a composite score

- multiple cut-off

a sequential process where applicants must achieve satisfactory levels at each successful step.

Selection strategies are different in respect of complexity and the assumptions made about the relationships between predictors and criteria. Cascio (1998:202) identifies five different approaches towards selection, viz:

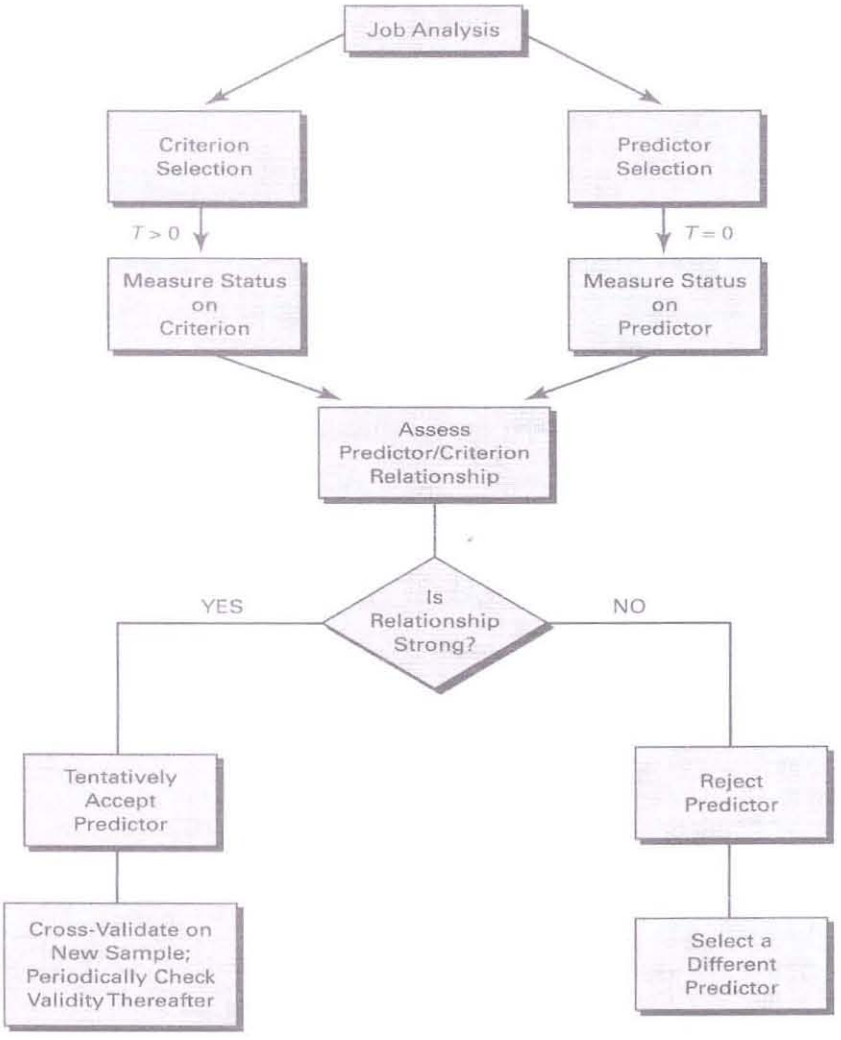
- Traditional approach
- Efficiency of linear models
- Moderator variables
- Suppressor variables
- Alternative prediction models

2.7.1.1 Traditional approach to selection

Figure 2.6 illustrates Cascio's (1998:203) traditional approach to selection. The job analysis is the cornerstone of the selection process and is embodied in a job description and job specification. Simultaneously criteria and predictors (eg aptitude, ability etc) are selected. The predictor

measures are administered to all applicants and is not used to make selection decisions at this time and the results are kept. The measurement of the criterion status takes place at a later stage (T>0). After the measures of the criterion and predictor become available the form and strength of the relationship between predictor and criterion can be determined. If the relationship is strong, the prediction will be more accurate and the predictor will be accepted provisionally pending the outcome of a cross-validation study on a different sample of applicants.

FIGURE 2.6: TRADITIONAL MODEL OF THE PERSONNEL SELECTION PROCESS.



(Source: Cascio, 1998:203)

2.7.1.2 Efficiency of linear models in selection

The general linear model (y = a + bx) is the basis of simple and multiple linear regression models. These models are used by decision-makers in a variety of contexts e.g. during an interview where various pieces of information are gathered and different weights are allocated in order to predict job success. (Cascio, 1998:204).

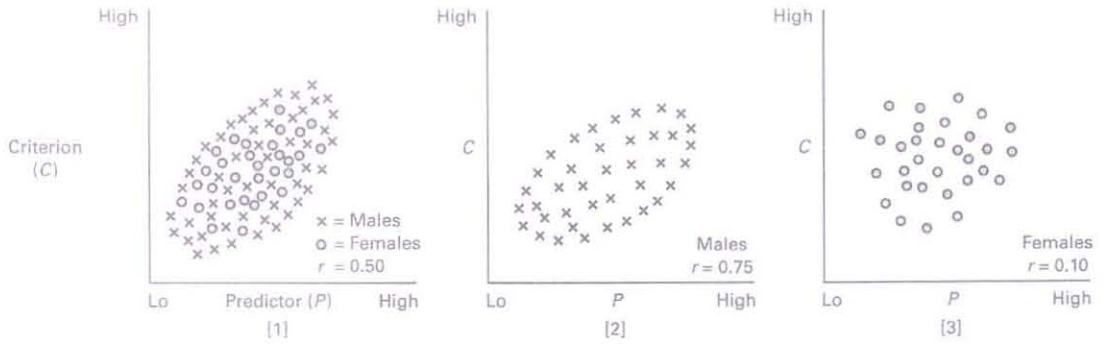
Dawes and Corrigan (1974) as mentioned in Cascio (1998:204) conclude that:

"a wide range of decision-making contexts have structural characteristics that make linear models appropriate. In fact, in some contexts linear models are so appropriate that those with randomly-chosen weights outperform expert judges!"

2.7.1.3 Moderator variables

When the relationship between a predictor and a criterion (r_{x1y}) varies as a function of classification on some third variable x_2, differential predictability exists and x_2 is termed a moderator variable. If the scoring patterns of job success of males and females differ, then gender is a moderator variable. Figure 2.7 illustrates this situation.

FIGURE 2.7: SCATTERPLOTS ILLUSTRATING THE EFFECT OF GENDER AS A MODERATOR VARIABLE.



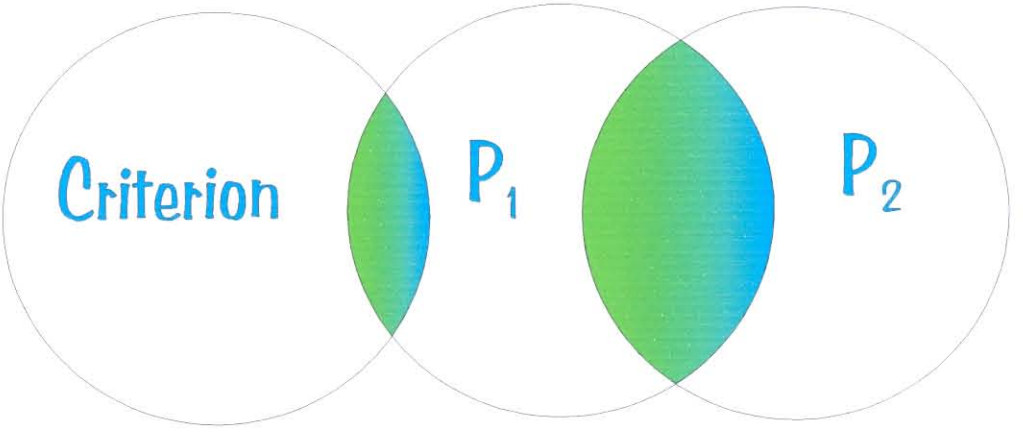
(Source: Cascio, 1998:205)

2.7.1.4 Suppressor variables

Supressor variables are related to moderator variables although they bear little or no direct relationship to the criterion that can affect the predictor-criterion relationship. Supressor variables are characterised by a lack of association with the criterion ($r_{Ys} = 0$) and high correlation with one or more predictors as illustrated in Figure 2.8. Cascio (1998:206) explains the operation of a suppressor variable as follows:

"In computing regression weights (w) for P_1 and P_2 using least squares procedures, the suppressor variable (P_2) receives a negative weight (i.e., $\hat{y} = w_1P_1 - w_2P_2$): hence, the irrelevant variance in P_2 is 'suppressed' by literally subtracting its effects out of the regression equation."

FIGURE 2.8: OPERATION OF A SUPPRESSOR VARIABLE.



(Source: Cascio, 1998:206)

2.7.2 Alternative prediction models

The following alternative prediction models are identified by Cascio (1998:207), Cherrington (1995:258) and Muchinsky (1993:165):

2.7.2.1 Simple regression

Breakwell et al (1995:362) refer to the selection decision as actually predicting who will be successful in the job, and this prediction is addressed by a class of multivariate methods known as regression procedures. As an example of simple regression the prediction of school achievement from IQ will be considered, refer to Figure 2.9.

FIGURE 2.9: SCATTER PLOT OF IQ AGAINST SCHOOL ACHIEVEMENT.

(Source: Breakwell et al, 1995:363)

In Figure 2.9 the relationship is positive, thus an individual with a high IQ score will most probably achieve high marks in school. The regression line is calculated in such a manner that the distance from the points to the line is minimised. If the IQ (X) of a potential individual is known, the school achievement score (Y) can be estimated by using the following formula:

$$Y = X\beta + \alpha$$

To predict the dependent variable optimally, β is a weight applied to the predictor variable and α is a scaling parameter to transform the scale of the of the predictor variable to that of the criterion variable (IQ score to scholastic achievement). An absolute correlation coefficient of 1,00 will result in all the points in the plot lying on the regression line and in a perfect

accurate estimate. Thus, whenever the correlation is less that 1,00 some inaccuracy occurs in prediction.

The correlation between IQ and scholastic achievement can also be presented as a ball of variance as illustrated in Figure 2.10.

FIGURE 2.10: SCHEMATIC REPRESENTATION OF A CORRELATION BETWEEN TWO VARIABLES.

(Source: Breakwell et al, 1995:364)

The overlap between IQ and scholastic achievement is 0,60 and the squared correlation (0,36) represents the overlapping or proportion of covariance between the two variables.

2.7.2.2 *Multiple regression*

When a given dependent variable is affected simultaneously by several independent variables, multiple regression analysis is applied. (Babbie, 1998:413). Given predictors $X_1, X_2, X_3, \ldots X_n$, the particular values of these predictors will vary widely across individuals, but the statistical weightings of each of the predictors will remain constant.

One of the advantages of this model is the minimizing of errors in prediction by combining predictors optimally in order to yield the most efficient estimate of criterion status. However, when the assumptions of multiple regression are untenable, then a different strategy must be applied for example the multiple cut-off approach.

2.7.2.3 Multiple cut-off

The multiple cut-off selection strategy is not limited by the problem of compensating predictors or linear relationship between predictors and criterion. This method assumes that a minimal amount of ability on all predictors is needed for job success and minimal passing score cut-offs are set for each predictor. Any applicant who scores below the cut-off on any predictor is rejected and all those scoring above the cut-off are accepted. Having a high score on one predictor does not compensate for having a low score on another predictor (McCormick and Ilgen, 1992:148).

2.7.2.4 Compensatory selection

In the compensatory selection process all applicants who pass the initial screening are submitted to all the selection techniques. For example all students applying for a course and adhere to the basic admission requirements of a senior certificate will then do all the different tests.

The advantages are that applicants are compared on the basis of all the selection information before a decision is made. One person can score low on a specific test and high on another, which benefits the applicant. For example a very nervous applicant with low self-confidence may receive low scores on the interview, but performs very well on the aptitude and internal locus of control test. A very high score might offset the low score in one area in another area (McCormick and Ilgen, 1992:148)

On the other hand the disadvantage of this process is its high cost, as a large number of candidates must undergo the complete selection procedure before a final decision can be made.

2.7.2.5 *Multiple-hurdles selection*

The multiple-hurdles approach requires the applicant to cross each hurdle and unsuccessful applicants are rejected after each hurdle. The applicant's matric subjects could be weighted and if the score is above the cut-off mark, the applicant will move on to the first test. The applicant has to cross every hurdle to be successful.

Muchinsky et al (1998:132) describe the multiple-hurdle approach to selection as using different evaluations in the selection process. They starts with the elimination of the obvious non-starters or least qualified people and continue evaluating the remaining applicants.

The advantages of this approach are:

- Not everybody is subjected to the total selection process;
- More accurate prediction - more evaluations will ensure better quality and confidence in selection and the odds of a false positive's surviving multiple evaluations are much lower than those who have survived one evaluation;

On the other hand the major disadvantage is the time and cost involved.

2.8 Selection in a 'new' SA

2.8.1 Introduction

Tustin (1992:1) mentions that *"organisations have the right even to be fairly stupid in their employment practices as long as they are stupid fairly"*. Tustin maintains that South Africa currently experiences the problem of being expected to develop personnel selection procedures in a non-racial

society, and making predictions of performance for multi-cultural groups, while there is very little empirical South African research available to facilitate the decision-making process.

Taylor (1992: 6) refers to selection in South Africa:
"at this time in South Africa's history, when attempts are beginning to be made to redress the sins of apartheid and the disadvantagement that it caused or intensified for so many people..... fairness is such a relative concept. One person's fair is another's foul".

With the quick changes in South Africa's labour situation it is to be expected that labour unions and individual employees will continuously question the fairness of present selection techniques.

The issue of fairness in testing relates to a concern for securing equality of opportunity for all, which is often interpreted as selecting those individuals who are most likely to be successful.

This Utopian idea can never be anything but an illusion according to Tustin (1992:2), because people are unique individuals in a societal make-up. The differences in attitudes, perceptions, values and socio-economic status will endure for as long as procreation continues. Yet, some of these differences between people can be addressed and, like the South African experience so clearly illustrates, middle ground can only be attained if all parties are willing to strive towards such attainment.

One obstacle in the way of this middle-ground attainment will remain the incredible differences that exist between people in terms of their abilities, aptitudes, personality traits, developmental opportunities, cultural backgrounds and employment potential.

In the Utopia of Equality, everybody will be equally endowed with talents; therefore everyone will occupy the same position, without any

discriminatory impediment. In the harsh reality of the Real World, however, people are not equal and can never be equal: neither in their human qualities nor in their personal development in the various strata of societal life, Taylor (1992:7).

The world discriminates between groups, nations and countries while societal structures discriminate between people. Discrimination is a fundamental and instinctive trait of the human race: To compare one to the other constantly and to find a way to choose only one.

Simultaneously, man has an incredible thirst for knowledge, discovery and invention. From the most basic of survival activities man created work for himself and others, all the time expanding it more and more, creating greater and more awesome structures and technology. The more complicated, the greater the operating skills required; the greater the skills, the more complicated the emerging demands; the greater the demands, the greater the costs, until finally man has to find substitutes to curtail the fruitless expense of gut-feel mistakes in the placement and full utilisation of employees.

Needless to say, in psychometry man has found one such a substitute, which, when used properly in conjunction with other methods of evaluation, does provide a tool to achieve the objectivity of selecting (in a scientific manner at least to some extent) the best person for the job on hand. The necessity for selecting the right person for the task became imperative in the two World Wars. Today, modern man cannot afford to be selective.

Economic realities force organisations to pay special attention to the economic viability of an enterprise and its systems. Political and labour demands place heavy burdens on an already faltering economy, forcing many organisations to close their doors after decades of providing whole communities with a livelihood. Surviving organisations are hard pressed to pursue effective and efficient management practices actively, while

simultaneously they strive to preserve the community, of which they form an inseparable part, by creating and maintaining employment opportunities.

The necessity of developing new test material is often seen as the panacea to the problems of modern industry's largely political problems. Perhaps in one's eagerness to find new, more fair, more equitable and more 'culture-free' tests, one has overlooked the many possibilities opened in the work of giants who went before current researchers. In a time when it has become fashionable to scorn psychometrics because it discriminates between people, people are losing an important aspect of being human: the uniqueness of every person as a separate entity working in unison with other equally separate entities, yet achieving a common goal representative of the sum of all those unique contributions made by the members of the group who set themselves that goal.

2.8.2 Selection at tertiary institutions

At tertiary institutions (eg technikons, universities, colleges) there are frequently more applicants than available vacancies as confirmed by Van der Vyfer (1984:1), Brink (1999:518), Gourley (1992:71), Engelbrecht (1993:1) as well as Singh (2000:5).

In addition not all applicants are likely to be successful in terms of academic success. In situations such as these, selection typically takes place on the basis of a selection instrument according to Smit (1992:1) and Zaaiman et al (1998:97).

Huysamen (1996:8), Gourley (1992:70), van der Vyfer (1984:1), and Huysamen (2000:146) predict that the applicants for admission to tertiary institutions will increase considerably in future. The likelihood of increasing State funding to tertiary institutions is diminishing. Stricter selection will therefore have to be applied.

After the abolition of separate tertiary institutions and job reservation for the various South African population groups, applicants with diverse academic backgrounds are competing for admission to the same tertiary institutions or for the same job vacancies. In view of the generally poorer quality of the school training that some of these groups have been exposed to, competing on an equal footing has placed members from such groups at a disadvantage (Bokhorst et al, 1992:59; Zaaiman et al, 1998:96; Botha and Cilliers, 1999:144; and Huysamen, 1999:132).

The recreation of tertiary institutions as institutions of the people, orientated towards addressing the process of knowledge manipulation for social change. Instead of nurturing cultural privileges and keeping institutions inaccessible or purely elitist to the majority of the population, laws are promulgated by Khotseng (1992:92).

Zietsman and Gering (1985:3) and Huysamen (1996:8) argue for greater representation of subgroups that have received inferior school training n the years of apartheid.

However, if selection tests are abolished, there is the real danger that we may resort to procedures that are even more biased than valid tests according to Tenopyr (1981:1125).

Bokhorst et al (1992:60) and Louw et al (1998:149) have expressed concern about tertiary institutions using a selection system which:

- concentrates on the prediction of academic success only, while proficiency with regard to a specific career should be emphasised; and
- is based on school achievement as the only predictor of success.

Mitchell and Fridjhon (1987:559) maintain that the mark obtained by a student at a tertiary institution is not a measure of excellence, but rather an indication of his ability to achieve educational objectives (unique to the specific institution) and this reflects the ability to optimise the relationship

between knowledge and assessment. In addition, there is no indication that successful matriculants possess those skills necessary for success on a tertiary level.

As students meet the entry requirements they have the expectation that they will be successful in their studies, consequently their hopes are dashed when they discover that the brand of secondary education does not prepare them adequately for tertiary education as mentioned in Bargate (1999:139).

A shocking dropout rate of students was reported by Gourley (1992:71) as well as Bargate (1999:139) and serious questions need to be raised when a higher education system selects the best 120 000 students and then have more than 30 000 fail in their first year. Out of a total of 600 000 students in higher education the annual drop-out figure is more than 100000 according to Van Rensburg (2000:1).

2.9 Selection at technikons

Based on mission statements Technikons are seen as leaders in technical and technological education, therefore the pursuit and maintenance of the highest educational standards are of prime importance as mentioned in Louw et al (1998:151) and Engelbrecht (1993:24).

As a result of the career-focused orientation of Technikons the best academic achiever will not be be successful in a specific career according to van der Vyfer (1984:3).

In South Africa the past decade's sweeping political changes and the recent publication of documents like the "National Curriculum Framework for Future Education and Training" - draft document and "The Size and Shape" - document has urged tertiary institutions to re-evaluate their policies and methods used for student selection and access as reported by Botha and Cilliers (1999:144) as well as van der Walt (2000:4).

2.10 Selection and diverse cultures

Diversity and multicultural issues are not unique to South Africa, Turner et al (1999:27) report that inequities based on racial and ethnic differences continue to exist in the Midwest and therefore is an urgent need to re-examine the issues of recruitment.

Petersen and Novick (1976:3) indicate that more complex analyses are required in order to eliminate the cultural unfairness of some models of selection.

The Employment Equity Act as cited by Thomas and Robertshaw (1999:90) specifically states that the use of selection tests can be justified if the tests are scientifically proved to be:

- valid;
- reliable;
- applicable to all employees; and
- not biased against any employee or group.

Doubts have been expressed about the use of school results as a sole predictor for academic admission when blatant discrimination within the educational system has been evident in the past, Zietsman and Gering (1985:3), Bokhorst et al (1992:64) and Huysamen (2000:146).

2.11 Tertiary selection in other countries

Hohne (1969:8) conducted research at the request of the Commonwealth Universities' Commission and the University of Melbourne into the prediction of academic success. All first-year students were tested using a battery of psychometric tests. Intelligence was clearly found to be an essential, but not sufficient, condition for success. Factors such as interest,

study habits, personality and socio-economic factors appear to contribute to academic success. Yet, the main criteria for entrance remain the matric examination.

The last few years have seen a revival of interest into the study methods of tertiary students in Australia because of the difficulty in predicting tertiary performance (such as motivation, attitudes and personality) much beyond the level provided by intellective variables (such as IQ and tertiary entrance tests) alone, according to Watkins and Hattie (1981:384).

High-school matriculation scores continues to be the best predictor of success in all faculties but more so however in science, than in arts according to Biggs (1978:273) at the University of Newcastle.

According to Huysamen (1996:8) the most popular selection model, used by tertiary institutions in the United States, is a statistical prediction model consisting of school performance and entrance examinations combined in a multiple hurdles model. The representation of the selected group is investigated and if not fully represented the requirements is diminished.

The validity of school grades for predictions have scrutinised by McClelland (1973:2) and he concludes that researchers have in fact had great difficulty demonstrating that grades in school are related to any other behaviours of importance, other than doing well on aptitude tests, which are used for admission to tertiary institutions.

Tests have tremendous power over the lives of young people by labelling some of them as 'qualified" and others as 'less qualified' for college in the United States. Until recently these tests have served as a very efficient device for screening out black, Spanish-speaking and other minority-group applicants to college. Being a tertiary institution graduate gave one a qualification that opened up certain higher-level jobs, but the poorer

students did as well in life as the top students as reported by McClelland (1973:1).

Perna (2000:120) reports that differences in social class and race/ethnicity exists in the amount of cultural and social capital available, as well as the ability to convert this capital into educational attainment.

The association of African universities and the World Bank's report on universities in Africa (1998:6) concludes as follows:

- the quality of education in Africa has declined significantly;
- the balance between enrolments and resources must be maintained; and
- admission to universities should be made on a selective bases in order to reduce the injudicious use of resources.

2.12 Potential

Potential, together with other measurement instruments, requires investigation in order to create a more justifiable, valid and trustworthy selection instrument. Potential, as a psychological concept, is that which has been missing from earlier perceptions of man about man. It is not something which will remain constant long enough for scientists to establish it as an indisputable fact, because by its own definition it is changeable through its openness to mediation. Potential has to do with process, not product, with change, not stability; with human interaction, not individual genetic endowment. Potential is not a thing, but an operation...a course of action.... a series.....a journey ..... an ongoing experience!

Saunders (1995:7) defines potential as:
"possible, but not actual; having the capacity for existence, but not yet existing."

Take two children, each with the same 'mental horsepower'. Suppose that one is the offspring of relatively well-off educated parents (person A), who give him Lego and Meccano sets to tinker while he grows up. As an adolescent, he helps his father service his car. The other child is the offspring of poor parents who grew up in the country and he receives little education (person B). This child has received no toys as presents, nor has he ever got to look at an engine, because there were no motor vehicles in the family. Suppose that both children eventually pass matric (the son of the richer father probably having attended a better school). They then approach the HSRC (Human Science Research Council) for vocational guidance. One test is a test of mechanical insight. Almost certainly, person A who has had experience with mechanical toys and with engines will obtain considerably better results.

Is it fair to use such a test? Especially at this juncture in South Africa's history, when attempts are beginning to be made to redress the sins of apartheid and the disadvantages it caused or intensified for so many people? This question is not an easy one to answer, as fairness is such a relative concept. Certainly, person A who has had experience with mechanical equipment will be more readily trainable in a mechanical field. Thus, if the training institution is interested in improving its first-time pass rate and in reducing the load on lecturers, then it will be better to select person A who has had mechanical experience and done well on the mechanical insight test. However, such an approach certainly does not address the social inequalities and inequities of the past.

Person B, from the disadvantaged background, may well benefit from a programme of compensatory inputs and may even reach a level of mechanical skills comparable to that of the individual from the advantaged background. But obviously the challenge is greater. If the policy of educational institutions is not only to get the highest pass rate for the least teaching input, but rather to help redress the injustices of the past, then it should consider person B as well. But how is the educational institution to

know whether person B will benefit from additional inputs 'to bring him up to speed'? It is essential to think creatively in devising selection measures, since the conventional tests will probably not answer the questions which will need to be answered as move into a new era in this country, where fairness will be the watchword, but competence - or potential to attain it - is important according to Taylor (1992:12).

Taylor (1992:2) defines learning potential as the:
"capacity to acquire new concepts and skills, of a fairly cognitive nature, given cognitive meditation, teaching interventions and other feedback intended to promote learning."

Taylor (1992:2) identifies two important facets to learning potential:

- transfer - the capacity to apply knowledge and skills to problems which are new and to use feedback to improve performance; and
- automatisation – the process of becoming proficient and quick at doing a particular intellectual task.

2.13 Legislation

The Employment Equity Act, Act no 55 of 1998 clearly defines the requirements that any selection instruments should possess and states that:
"Psychological testing and other similar assessment of an employee are prohibited unless the test or assessment being used-

- *has been scientifically shown to be valid and reliable;*
- *can be applied fairly to all employees; and*
- *is not biased against any employee and group."*

De Jong and Visser (2000:17) state that the diversity of the South African population may lead to opinions that certain selection techniques impact adversely on members of different population groups, therefore objective

selection practices are a necessity. Boolsen and Theron (1996:7) emphasise the importance of fairness in selection.

2.14 Conclusions

In this chapter selection was investigated by a detour from basic selection in an organisation and then selection in tertiary institutions is the centre of focus.

Both in South Africa and abroad human resource management practice, policy and philosophy and therefore selection as well, are mainly determined mainly by the culture of the country. Countries that share similar cultures as classified by Hofstede and Laurent (in Gibson et al, 1997:63) clearly share similar human resource practices and selection methods.

Labour and employment legislation of countries that share similar cultures appear to be compatible as well.

Tertiary institutions in the United States are confronted with the problem of a declining number of applicants therefore they concentrate on marketing rather than on selection. This is confirmed by reports in the United Kingdom as well.

Models of other countries cannot be cloned and used in South Africa where the number of applicants is increasing and selection has become crucial. Culture, mileu-deprivation and inferior schooling should be considered and models must be adapted to fulfil South Africa's needs.

Saunders (1995:7) reflects that too many South African researchers and academics value the American research regarding test fairness unduly highly. Taking into consideration the vast differences in context between

that country and South Africa, this research should be treated with circumspection. Differences such as:

- educational advantage between blacks and whites in America are far less pronounced;
- the dimension of the problem of fairness in testing

In addition the school education system in South Africa specifically and even tertiary education encourage parrotry and focus on memory while Mpho (2000:20) refers to "empty vessel syndrome" when discussing current schooling systems.

Zaaiman et al (1998:97) cite that the Higher Education Act 101 of 1997 places the responsibility and accountability for selection of higher education students on every individual institution. Section 37 of this Act requires that admission policies be published and made available on request to ensure transparency. In addition the Bill of Rights contained in the Constitution of the Republic of South Africa 108 of 1996 prohibits unfair discrimination (directly or indirectly) against anyone on a number of grounds.

The White Paper on higher education transformation clearly states that higher education is the vehicle to achieve equity in opportunity and achievement for South African people.

The principle of equity requires fair opportunities to enter and to succeed at tertiary level and this implies fair, impartial and unbiased assessment of relevant qualities and capabilities during selection.

CHAPTER 3

CRITERION OF SUCCESS

3.1 Introduction

Before the efficiency of a test or any form of measurement can be determined, the present workers, on whom the tentative tests were performed, must be classified as successful and unsuccessful workers.

This division occurs according to the standard known in Business Psychology as a "criteria of work success" which must, if not available, be prepared.

Plug et al (1997:196) defines a criterion as a variable, which provides an acceptable indication of what a psychological test should measure, and it can be used to investigate the empirical validity of a test.

"Adequate and accurate criterion measurement is a fundamental problem in personnel psychology. Although criteria are sometimes used for predictive purposes and sometimes for evaluative purposes, in both cases they represent that which is important or desirable. Criteria are operational statements of goals or desired outcomes" according to Cascio (1991:50).

Every time an evaluation takes place criteria are used, thus standards to measure against, are set. When students decide whether a lecturer is a 'good lecturer' student A may be of opinion that a 'good lecturer' prepares well and provide clear instructions, while student B feels that a 'good lecturer' is someone who is enthusiastic, inspires students and possesses excellent communication skills. These two students use different criteria to define a 'good lecturer'. (Muchinsky et al, 1998:46)

Criteria comprise a wide range of evaluations and are:

"..... the evaluative standards by which objects, individuals, procedures or collectivities are assessed for the purpose of ascertaining their quality", according to Muchinsky (1993:61).

On the other hand McCormick and Ilgen (1992:53) define criteria as behavioural measurements to be used for administrative as well as research purposes.

3.2 Conceptual versus actual criteria

A good starting point is a conceptual criterion, which is a theoretical construct of an abstract idea that can never be measured. Muchinsky (1993:61) defines conceptual criteria as *"... an ideal set of factors that constitute a successful person (object or collectivity) as conceived in the psychologist's mind"*.

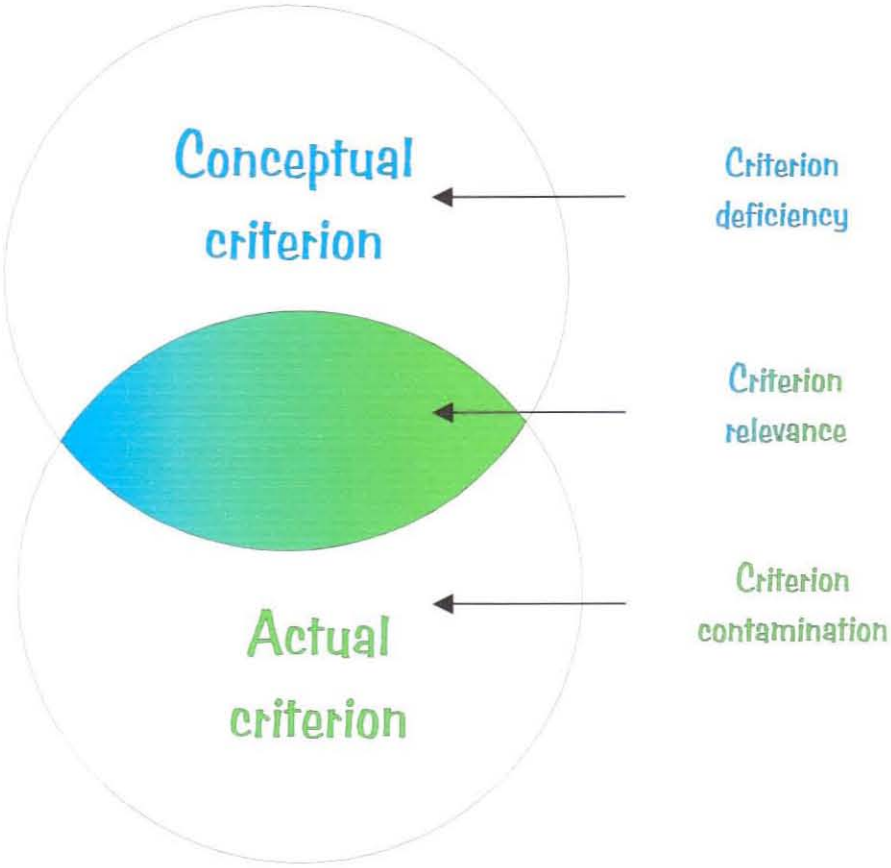
Conceptual criteria must be transformed into actual criteria, which can be measured. The variables that will serve as criteria must be established.

According to Muchinsky et al (1998:48) three concepts present the relationship between actual and conceptual criteria:

- deficiency;
- relevance; and
- contamination.

Figure 3.1 illustrates the relationship between conceptual and actual criteria.

FIGURE 3.1: CRITERION DEFICIENCY, RELEVANCE, AND CONTAMINATION.



(Source: Muchinsky et al, 1998:48)

How much the circles overlap cannot be determined because the conceptual criterion is a theoretical abstraction. There will always be a certain unspecified amount of deficiency, relevance, and contamination because the actual criteria selected are never totally equivalent to the conceptual criteria.

The degree to which the actual criteria fail to overlap with the conceptual criteria is known as criterion deficiency. Criterion deficiency can be reduced through careful selection of the actual criteria, but never eliminated Cascio (1991:53).

Criterion relevance is the degree to which the conceptual criteria and actual criteria coincide. The criterion relevance will be greater if the match between the conceptual criteria and the actual criteria is closer.

That part of the actual criteria that is unrelated to the conceptual criteria is the criteria contamination, therefore this measures something other than the conceptual criteria. Contamination can be divided into:

- bias, the degree the actual criteria consistently measure something other than the conceptual criteria, and
- error, the degree to which the actual criteria are not related to anything at all. (Muchinsky et al, 1998:49).

3.3 Distal versus proximal criteria

Distal criteria refer to the standard used to make long-term decisions about quality while proximal criteria refer to the standard used to make short term decisions about quality according to Muchinsky et al (1998:50).

3.4 Composite versus multiple criteria

Cascio (1998:53) argues that job performance is multidimensional in nature therefore to measure it adequately multidimensional criteria are needed.

Composite criterion:

"..... should provide a yardstick or overall measure of "success" or "value to the organization" of each individual" according to Cascio (1998:53). Although the criterion dimensions are separately treated in validation such a single index is necessary when making decisions and comparing individuals.

Researchers as mentioned in Cascio (1998:53) who prefer multiple criteria argue that:

"..... measures of demonstrably different variables should not be combined."

Combining dimensions, or various criterion elements into a single index does not imply that a single underlying dimensions of job performance exists. Each criterion reflects a separate dimension of job behaviour according to McCormick & Ilgen (1992:64).

3.5 Errors and criterion of success

Errors are a fact of life and statements like: "To err is human, to forgive divine" reflect this.

The results of human error can be minimal in certain cases while in others these can reach alarming proportions in terms of human safety, efficiency of operations, physical damage and economic losses.

Human error can occur in different forms but it is generally defined in terms of poor quality of work. In certain tasks it is simple to determine it through observation. The quality of many tasks varies on a continuum from poor to good. In these cases a cut-off point between poor and good job execution must be fixed.

Peter (1962) as mentioned by McCormick and Ilgen (1980:47) defines human error as:

" Any deviation from a previously established, required or expected standard of human performance that results in an unwanted or undesirable time delay, difficulty, problem, incident, malfunction or failure".

The interest in the systematic analysis of errors as a criterion evolved mainly as a result of engineers involved in the design of equipment and systems to be used by people, thus in the field of ergonomics. The focus was to design equipment without defects.

The fact that work-related variables are generally caused by the individual or the situation it is logical (theoretical) that error will feature in either one or both of these determinants. Meistner (1967) as mentioned in McCormick and Ilgen (1980:48) classifies it as follows:

- work space
- design and lay-out of working environment
- hand equipment
- handling methods
- transport
- storing
- inspection of equipment
- information regarding the planning of work
- operating instructions

These aspects can be categorised as follows:

- work characteristics
- system organisation
- test characteristics
- physical environment

The individual variables that are associated with high rates of error cover the entire spectrum of human behaviour.

Ware (1964) as mentioned in McCormick and Ilgen (1980:48) argues for greater recognition of the difference between situational and individual variables as sources of error as both these sources mediate human performance and act as intervening variables although they do not control performance. The difference between these two variables is the degree of directness with which they influence human performance.

The situational variables set the parameters for the individual variables. These variables influence the probability of successful performance. Individual variables are the foundation for predisposing individuals toward certain behaviours, that in turn increase the odds of error-free performance or the reverse.

The primary interest in human error is in those areas where the human element is present. In these areas the general human intention with reference to error producing behaviour does not necessarily lead to a large number of errors, but the effect creates the possibility of an increase in errors.

3.6 Standards for criteria

Blum and Naylor's (1968:182) listing is the most representative of what criteria should be:

- reliable
- realistic
- representative
- related to other criteria
- acceptable to the job analyst
- acceptable to management
- consistently applied in any situation
- predictable
- inexpensive
- able to understand
- measurable
- relevant
- uncontaminated and bias-free
- sensitive

Three main criteria questions should be asked:

- When should criteria be obtained?
- How are criteria selected? and
- What level of performance is acceptable?

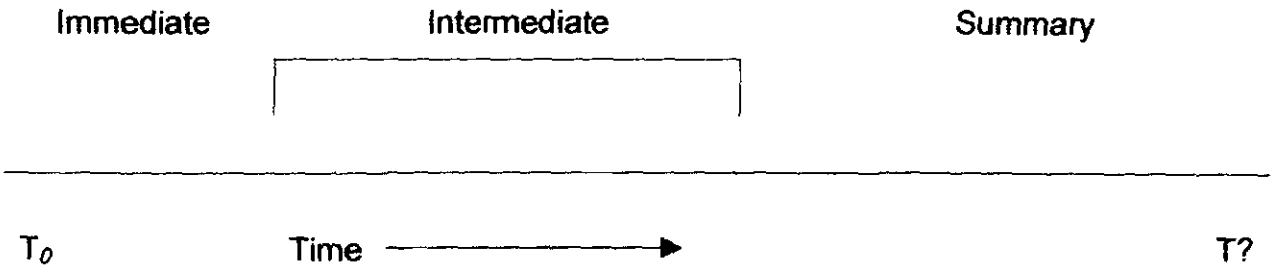
3.7 Criteria dimensions

Several dimensions of conceptual criteria may exist. The interpersonal skills of a nurse could be included in a psychological dimension, rand costs of errors, an economic dimension, and a person's relationship with the environment or an ecological dimension as stated by Cascio (1998:43) as well as McCormick and Ilgen (1980:59).

3.7.1 Temporal dimensions

Temporal dimension refers to the time when a criterion measurement is taken. The best time varies depending on the situation as reflected by Cascio (1998:43) in figure 3.2.

FIGURE 3.2: THE TEMPORAL DIMENSION OF CRITERION MEASUREMENT.



(Source: Cascio, 1998:44)

Immediate criteria are near-term measures such as final examination marks of a student. Intermediate criteria are usually obtained after some time has elapsed. This could be a performance rating after 6 months. However, summary criteria are longer-term averages or totals which counteract the short-term effects and errors of observation and measurement. The

average of a student's two-weekly tests and assignments could used here. (Cascio, 1998:44).

Ghiselli (1956) as mentioned by Cascio (1989:44) identified three different types of criterion dimensionality:

- Static dimensions

A static dimension is a 'snapshot' of performance at a single time using a single criterion, which necessarily reflects overall employee performance.

- Dynamic dimensions

A dynamic dimension refers to criteria being adapted over a period of time as an employee develops and learns.

- Individual dimensions

Although two people are performing the same job, the value they add to the organisation may differ. Cascio (1998:45) quotes Kingsbury (1933) to illustrate:

"Some executives are successful because they are good planners, although not successful directors. Others are splendid at co-ordinating and directing, but their plans and programs are defective. Few executives are equally competent in both directions. Failure to recognize and provide, in both testing and rating, for this obvious distinction is, I believe, one major reason for the unsatisfactory results of most attempts to study, rate and test executives. Good tests of some kind of executive ability are not good tests of the other kind".

3.8 Types of criteria

A variety of measures are used in the different fields of psychology to determine types of criteria. McCormick and Ilgen (1980:47) and Muchinsky (1993:80) classify job-related behaviours as follows:

3.8.1 Objective criteria

Objective criteria or 'hard' criteria refer to records or statistics that do not involve any type of subjective evaluation. These include:

- Production
- Job level and promotions
- Sales
- Tenure and turnover
- Absenteeism
- Accidents and
- Theft

3.8.2 Subjective criteria

Criteria such as the evaluation or judgement of performance of a subordinate by her supervisor are defined as subjective criteria. Human judgment leans towards various kinds of biases according to Cascio (1991:75).

3.8.3 Performance criteria

Berry and Houston (1993:177) as well as McCormick and Ilgen (1980:46) define criterion as situational, in other words the condition, context and objective will determine the definition of a criterion. For example:

- in the work situation it can be work-related behaviour;
- in research it will be those variables which can predict another set of variables; and
- in administrative functions it will be the need exist to measure work related behaviour.

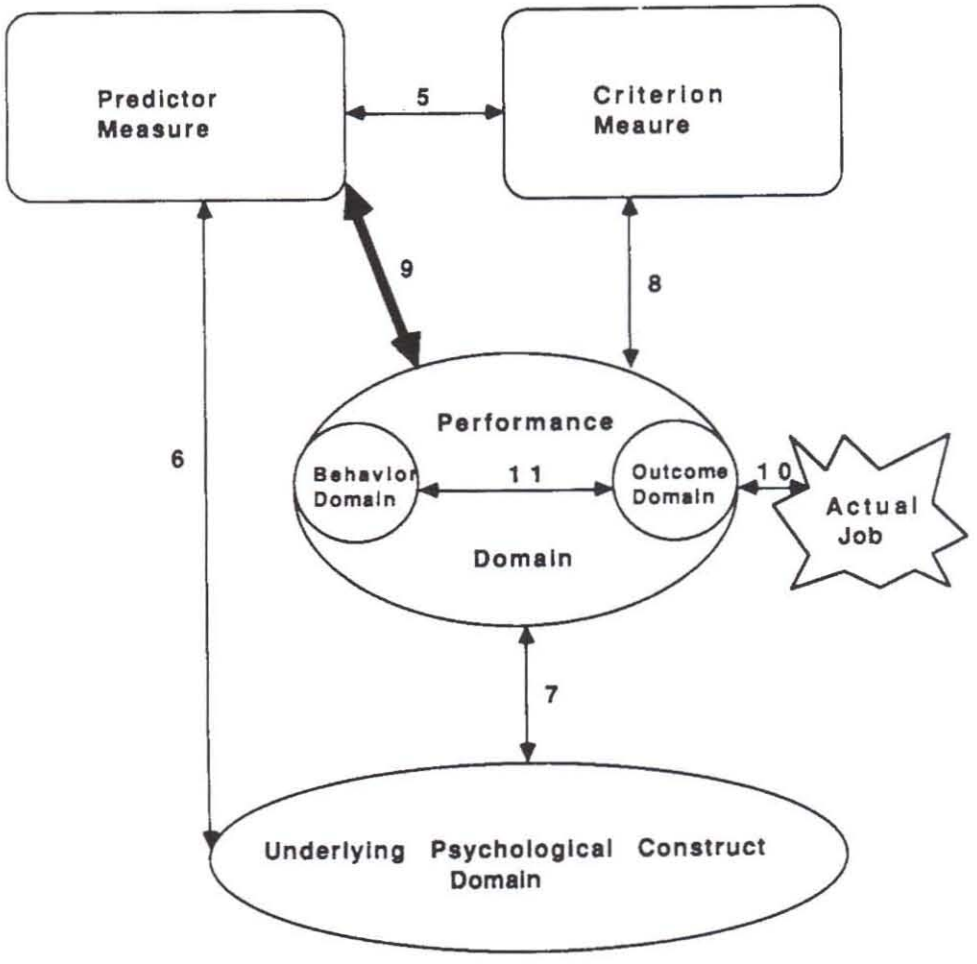
The measurement of specific work-related behaviour is very often dualistic and can serve as a criterion for both administrative and research purposes.

3.8.4 Research design and criterion theory

"Traditionally, personnel psychologists were guided by a simple prediction model that sought to relate performance of one or more predictors with a composite criterion" according to Cascio (1991:70).

A more complete criterion model is provided by Cascio (1991:70) as presented by Binning and Barrett (1989) in Figure 3.3.

FIGURE 3.3: A MODIFIED FRAMEWORK THAT IDENTIFIES THE INFERENCES FOR CRITERION DEVELOPMENT.



(Source: Cascio, 1991:70)

Inferences one (1) to four (4) indicate critical linkages in the theory-building process. Inference nine (9) would be direct empirical evidence that assessment scores relate to valid measurements of job performance. Inference five (5) is the one which raises most concern among researchers. The term criterion-related was developed to denote this type of evidence. To have utter confidence in inference nine (9) both inference five (5) and eight (8) must be justified. Inference eight (8) represents the process of criterion development. Job analysis provides the basis for inferences seven (7), ten (10) and eleven (11). Construct validity is represented by inferences six (6) and seven (7). When grasping and validating criteria inferences seven (7), eight (8), ten (10) and eleven (11) are critical.

Figure 3.3 enables the identification of probable locations for a criterion problem.

Hardly any attention is given to intervening variables. Managers involved in personnel decisions are most concerned about the extent to which assessment information will allow accurate predictions about job performance.

Selection decisions involve judgement - not of the applicant, but of the fit between a specific person and a specific job. More than half of the employees who quit their jobs within the first year indicate a wrong fit as the reason according to Carrell et al (1995:300).

There is unfortunately no guaranteed recipe to determine whether an individual will be successful either in a job or in tertiary studies. No perfect test exists and ongoing research has to continue to obtain objectivity and validation of the process.

3.9 Criteria for tertiary selection

Academic performance according to Fourie (1992:1) is not easily defined and cannot be expressed by a single mark or symbol. There are no valid norms to evaluate academic achievement. Rademeyer and Schepers (1998:36); Fourie (1992:1) as well as Combrink (1970:3) refer to academic performance in a number of related definitions:

- success in a subject;
- failure in a subject;
- over or under-achievement; or
- poor or no progress at academic level.

Academic achievement is influenced by the:

- ability of a specific person although ability is not necessarily an indication of achievement;
- aptitude of a person, which correlates with situations, opportunities, challenges etc;
- interpretation of achievement by the achieving person. The value that is attached to the achievement, what amount of input led to achievement and the levels of self actualisation experienced; and
- norm or measuring instrument according to which achievement is measured. This norm is usually determined externally (by another person) and influences the level of recognition and value attached to a specific achievement.

Academic achievement is a complex and multi-faceted phenomenon, which encompasses numerous aspects. Knowledge of the factors influencing academic achievement sheds little light on accurately describing academic achievement.

Tertiary achievement in contrast to school achievement is more complex. School achievement is defined as the achievement at school in the results of a final examination according to Monteith (1988:23). At school level a student either passes a grade year or fails it. At tertiary level a student

accumulates credits for individual subjects, although the student may not necessarily be promoted to the next academic year.

As a result of this more complex promotion system, at tertiary institutions, academic achievement is not easily measured. Add to that the problem of:

- diverse study fields;
- differences in requirements and standards in diverse study fields; as well as
- differences existing in different faculties.

Generally tertiary academic achievement is defined as the ability of a student to obtain her degree or diploma within the prescribed period as indicated by the institution according to Fourie (1992:3) and confirmed by Stoker et al (1985:26).

If the method that a student uses in his/her studies could be based on a criterion scale, tertiary achievement could be tuned in more detail. This will result in canvassing the limitations of the pass versus fail dichotomy and a better usable norm will be established. Diverse study fields, differences in evaluation measurements and promotion systems and especially different perceptions of tertiary achievement contribute to the difficulty to lay down a generally accepted norm according to which a student's tertiary achievement can be expressed in a qualitative manner. Different perceptions of what should be used as a point of reference when a norm for tertiary achievement is determined, inevitably result in different norm scales. Examination results obtained in different subjects are the traditional criterion according to which academic achievement is evaluated according to Fourie (1992:4) and Louw et al (1998:150).

Although examination results do not offer a complete representation of academic progress and adaptation, it is regarded as the most significant aspect of these processes. Examination papers in different subjects cover the work of a semester or year. These are meticulously compiled,

administered and marked therefore it is fair to accept that examination results provide a valid and reliable indication of academic achievement.

Kruger (1972:130) suggests the use of examination results as criteria in the following manner:

- The information of pass and fail can be used as dichotomous criterion for academic achievement. The disadvantage is that this criterion does not include all the information about academic achievement;
- The information about the number of subjects passed can be used as criterion. When the requirements of study fields differ the information of candidates is not always comparable; and
- The marks obtained in different subjects can be used as an average or as a total. Once again the different subjects may compromise comparability.

Different methods can be described to utilise examination results as an index for tertiary achievement for example the dichotomy of pass and failure; combining academic achievement; standard marks; and achievement in every subject separately. The practical problem is to manipulate subject results in such a manner that these are comparable because it is important that the standard of different subjects is comparable according to Gouws (1957:49) and Kruger (1972:129).

As a result of the variety of study fields, differences in evaluation measures and other factors it will not always be possible to reach an agreement that will be acceptable to everyone. It is therefore necessary that specific points of departure or assumptions be formulated to use as a basis for the formulation of a criterion for tertiary achievement.

The assumptions used in this study are the following:

- The percentage of a student's final mark in an examination, and specifically the major subjects, is an objective measurement of tertiary achievement;

- A mark obtained in a specific subject is equal to the same mark obtained in another subject, provided the subject level is equal. Factors such as evaluation standards or differences in complexity between different subjects are not taken into account but condoned, because the pass mark is 50% for every subject.;
- The degree of difficulty of different subjects on the same level is the same therefore Personnel Management 1 is not more difficult than Industrial Engineering 1; and
- The prescribed syllabi in one faculty are weighted equally to that of another faculty consequently a first-year course in Environmental Sciences earning 12 credits is equal to a first-year course in Economic Sciences consisting of 14 credits;

Smith (1979:42) confirms the above assumptions as a point of departure in formulating criteria for tertiary selection.

Smit (1992:5) focuses on career success using more objective aspects such as income, job title, promotion and awards as well as more subjective criteria such as the levels of career satisfaction experienced by job incumbents. Louw et al (1998:150) and Gattiker and Larwood (1988:569) declare that career satisfaction correlates with career success.

3.10 Conclusions

Linn (1973:139) states that within a context of predicting a specific criterion, such as academic achievement, the major focus of concern is the predictive validity of the test. This assumes that an acceptable criterion variable is available. This assumption that an acceptable criterion is available obviously involves a giant leap. The use of a criterion variable to investigate the fairness of a test places a very heavy burden on the assumption that the criterion variable is fair.

One of the limitations of this research is that all the definitions of academic performance, as criteria, cannot be covered in the study. Add to this the differences between subjects (some more complex than others), different lecturers (in terms of evaluation and standards) and different study courses, the decision of criteria becomes ever more complex.

Nisbet and Welsh (1976:266) state that:
"The attempt to devise a method of perfect separation of good students and bad students suggests the calculation of the orbit of a satellite: if one knows the student's velocity, direction and density, his path is assumed to be predictable".

CHAPTER 4

MATRIC RESULTS

4.1 Introduction

It seems that proficiency together with aptitude is a reasonable indication of an individual's ability. Aptitude is an indication of potential and proficiency and refers to acquired skill and knowledge according to Malan (1987:42).

School performance according to Smit (1992:8) refers to a pupil's performance in the different exams during his/her high school career with specific reference to the performance in the matric or senior certificate exam. This performance is used as the criterion for Technikon entrance.

General admission requirements differ from one tertiary institution to another, and within one tertiary institution there may also be different requirements for every faculty or learning programme, according to Kotze et al (1996:44).

4.2 Matric results as a predictor of academic success

Fourie's (1989:1) investigation shows that successful first-year students at RAU (Rand Afrikaans University) had obtained significant better (higher) matric symbols as those of unsuccessful students. Behr (1985:108), Biggs (1978:273), Watkins and Hattie (1981:384), Bokhorst et al (1992:64), Van Wyk and Crawford (1984:9) as well as Stoker et al (1985:7) confirm this finding.

As opposed to this the research of Zietsman and Gering (1985:3), Kotze et al (1996:39), van der Walt (2000:4), Botha and Cilliers (1999:144), Brink (1999:522) and Jooste (1988:60) shows that although matric symbols are a

poor predictor of academic success, these are the most often used criteria to determine entrance to tertiary institutions according to Bargate (1999:139).

Mitchell and Fridjhon (1987:555) state that the difference between matric results and first-year performance depends on the particular matric examination that was written.

Zietsman and Gering (1985:3) refer to the influence of milieu disability, which leads to matric results being a poor predictor of academic performance. Miller (1992:98), Gourley (1992:71), Monteith (1988:23) as well as Huysamen and Raubenheimer (1999:171) question matric performance as a predictor of academic success as a result of the difference in instruction approaches between schools and tertiary institutions.

Mitchell and Fridjhon (1987:555), as well as Botha and Cilliers (1999:144) mention that the matric average is still the conclusive criterion. While matric standards of White and non-White schools are not comparable neither are those of European schools in different provinces. Potential testing to determine additional criteria should be investigated by tertiary institutions.

Miller (1992:100), Jacobs (1996:37) as well as Zietsman en Gering (1985:3) are adamant that matric results cannot be used as the sole predictor for entrance to tertiary institutions. Douglas (1971) and Travers (1949) have focused attention on the poor relationship between:
"the pattern of high school subjects and success in university, with the requirements for specific high school credits and courses barring as many superior as inferior students from university" as mentioned in Perkins (1971:106).

According to Jooste (1988:59) the results of matric examination are the only criteria considered to provide entrance to UNISA (University of South Africa).

Much has been said and written about the inadequate high-school training offered by especially the former Department of Education and Training and

about the disadvantages of pupils from this department when they compete for admission to tertiary institutions on an equal footing with pupils from other education departments. Zietsman and Gering (1985:184), Bokhorst et al (1992:59), Mitchell and Fridjhon (1987:555), and Huysamen (2000:146) not only show the discrepancy between academic success and different schools, they also show the discrepancy between the results of the different matriculation boards, eg Transvaal in relation to Natal, etc.

Research conducted by Mitchell and Fridjhon (1987:555) reveals differences in results of first-year students and matrics. This difference is linked to the specific matric examination that was written. It was observed that the previous Joint Matriculation Board's examination and the Indian senior certificate examination produced students who were better equipped for tertiary study than those with a Transvaal senior certificate and, in certain cases, the Natal senior certificate.

Those educational authorities who place a high priority on obtaining a high admission rate to tertiary institutions, without considering whether the scholars will indeed be successful in their tertiary studies, do the tertiary institutions and ultimately the community, an injustice.

Mitchell and Fridjhon (1987:555) mention that only a small percentage of students with matriculation exemption attend university, and it appears, therefore, that examinations that hold additional advantages for future achievements at university, assist only a minority of students. The most persuasive argument is that problem solving skills and the capacity to relate the general to the specific are those skills that should be inculcated during tertiary training. Ironically, those skills are also of value to those students who choose not to attend tertiary institutions.

Taylor and Radford (1986:80) postulate that apartheid practices such as *"..... unequal per capita government spending on educational and social facilities, statutory and informal restrictions on the occupational and geographic mobility of certain groups, and various other consequences of*

the political dominance by one ethnic group of others in a heterogeneous society, are considered likely to have contributed to a differentiation in opportunities for cognitive development...." for different population groups.

Such opinions constitute the reason for calls for affirmative action. In the name of affirmative action, appeals are made for the admission of a greater number of applicants from among those who have completed their high-school training under the former department of Education and Training. Because of the poorer selection-test performance of this very group, calls are frequently made for the abolition of such selection tests. However, test bias does not necessarily have to be synonymous with predictive bias and or selection fairness. There are models to ensure unbiased and fair selection procedures when valid tests with significantly different means for different demographic groups are used according to Huysamen (1995:5).

Essentially the demand for the admission of more applicants from underrepresented groups entails a call for assigning higher utilities to the correct acceptances and incorrect acceptances of applicants from these groups than to those from other groups.

Usually a combination of predictors, which may include matriculation performance and biographical variables, is developed in an effort to increase the multiple correlation with criterion performance. All models require that the variable or combination of variables that have the maximum correlation with the criterion for a particular group be used with that group and that these variables or combinations of variables may be different for various groups.

4.3 Swedish formula

4.3.1 Introduction

Several tertiary institutions have introduced an admission rating system, known as the Swedish formula, in which the symbols obtained in the matric examination, are weighted according to Behr (1985:107) and Phala (1992:73).

Fourie (1989:1) stipulates that matric symbols should be interpreted in an effective and simplistic manner in order to predict academic success and therefore the Swedish formula, also referred to as the M-mark, was developed.

4.3.2 Technikon Pretoria

Technikon Pretoria uses the Swedish formula and weights are additionally allocated to specific biographical information as well as positions of leadership. The formula allocates different weights for different matric subjects, see Tables 4.1, 4.2 and 4.3.

Elements of the Swedish formula for Human Resources Management students currently being used at Technikon Pretoria (1993:1) are reflected in Tables 4.1, 4.2 and 4.3.

TABLE 4.1: CONVERSION TABLE 1 FOR THE SWEDISH FORMULA - TECHNIKON PRETORIA.

MATRIC SUBJECTS	WEIGHT	
	Higher Grade	Standard Grade
Mathematics	15	10
Accountancy Business Economics Economics	12	6
Afrikaans English Mercantile Law Biology	10	5
Other	8	4

TABLE 4.2: CONVERSION TABLE 2 FOR THE SWEDISH FORMULA - TECHNIKON PRETORIA.

MATRIC SYMBOL	WEIGHT
A	5
B	4
C	3
D	2
E	1

TABLE 4.3: CONVERSION TABLE 3 FOR THE SWEDISH FORMULA - TECHNIKON PRETORIA.

VARIABLE	WEIGHT
Chairperson SportS captain Editor Army officer Junior Counsellor Head girl/boy Vice head boy/girl	10*
Library leader Leader Vice chairperson Vice head girl/boy Class captain Junior city counsellor Other leadership positions Cultural involvement Sports achievements Previous studies	5*
Previous study subjects passed	2

* All items added up to a maximum of 15 marks

Students with a total score of 100 or more are unconditionally accepted.

4.3.3 Natal University

Natal University introduced the Swedish formula in 1984 according to Behr (1985:108). The maximum mark is 48 and applicants with a mark of 32 and higher are unconditionally accepted. Selection is done according to the ranking order-method until the quota has been reached according to Jacobs (1996:3).

TABLE 4.4: CONVERSION TABLE FOR THE SWEDISH FORMULA – NATAL UNIVERSITY.

MATRIC SYMBOL	WEIGHT	
	Higher grade	Standard grade
A	8	5
B	7	4
C	6	3
D	5	2
E	4	1
Lower than E	3	0

4.3.4 RAU (Rand Afrikaans University)

Table 4.5 reflects the application of the Swedish formula at RAU and research conducted by Zietsman and Gering (1985:185) concludes that the Swedish formula is a good predictor of the first-year subjects, physics and chemistry. Fourie (1989:2) who adapted the Swedish formula refers to it as the M-mark. Fourie (1989:2) concludes that all first-year students with a M-mark of nine or above are accepted.

Basson (1981:18) on the other hand mentions that an adapted Swedish formula specifically for the selection of nursing students has been found to be valid.

TABLE 4.5: CONVERSION TABLE FOR THE SWEDISH FORMULA RAND AFRIKAANS UNIVERSITY.

MATRIC SYMBOL	WEIGHT	
	Higher grade	Standard grade
A	5	4
B	4	3
C	3	2
D	2	1
E	1	0
Lower than E	0	0

4.3.5 University of the Witwatersrand

Table 4.6 reflects the Swedish formula used by the University of the Witwatersrand. Different faculties use variations of the Swedish formula according to Behr (1985:108). The Swedish formula is used in the Faculties of Arts, Medicine and Science (Jacobs 1996:31). Weights are allocated to six matric subjects and the numerical value for Mathematics, Science, Biology and Geography are doubled. Students with a mark of 42 and higher are accepted for a three-year course; those with a mark between 38-41 are accepted but have to distribute their subjects over a period of four years; those with a mark between 33 and 37 are only accepted pending a recommendation from their school principals, while those with a mark of 33 and lower are not accepted according to Jacobs (1996:31).

TABLE 4.6: CONVERSION TABLE FOR THE SWEDISH FORMULA – UNIVERSITY OF WITWATERSRAND.

MATRIC SYMBOLS	WEIGHT	
	Higher grade	Standard grade
A	8	6
B	7	5
C	6	4
D	5	3
E	4	2
Lower than E	3	1

4.3.6 University of Durban–Westville

Table 4.7 reflects the Swedish formula used by the University of Durban-Westville. Different cut-off points are used for academic programmes. Behr (1985:109) found that at least 72% of success in first-year studies was attributable to background knowledge gained at school.

TABLE 4.7: CONVERSION TABLE FOR THE SWEDISH FORMULA – UNIVERSITY OF DURBAN-WESTVILLE.

MATRIC SYMBOLS	WEIGHT	
	Higher grade	Standard grade
A	8	6
B	7	5
C	6	4
D	5	3
E	4	2
F	2	1

4.4 Conclusion

Huysamen (1996:8) emphasises that it would be unfair to apply matric results or use results of aptitude tests for those applicants who had inferior schooling as well as for those of who had privileged schooling. This is confirmed by Zietsman and Gering (1985:3), Jacobson (1986:16), Taylor and Radford (1986:80), Mitchell en Fridjhon (1987:555), Jooste (1988:60), Monteith (1988:23), Malan (1989:198), Gourley (1992:71), Bokhorst et al (1992:59), Louw (1997:2), Miller (1992:98), Kriel (1997:15), Kotze et al (1996:45), Rademeyer and Schepers (1998:33), Huysamen (1999:132), Huysamen and Raubenheimer (1999:171), Huysamen (2000:147) as well as Mpho (2000:20).

Koen (1980) as mentioned by van der Vyfer (1984:17) states that school achievement and school subjects should not carry the most weight when selecting students for admission to Technikons.

Under the previous government, each population group had its own Department of Education which followed its own curriculum. White schools had one teacher for about 13 pupils as opposed to 32 at black schools. Although the number of adequately qualified teachers in white schools was low (especially in mathematics and science), there were almost none in black schools. Tertiary institutions were blissfully unaware of these differences, and of the effect it would have on tertiary education, until the wave of inadequately trained black students hit them in January 1996.

Tertiary education, however demands specific acquired skills from applicants such as a basic understanding of functional language, especially English, (Barnard, 1992:5) and (Kilfoil, 1999:46). Whether it is the responsibility of tertiary education to re-train applicants of inferior school training or not is debatable. Du Plessis (1992:6) clearly states that it is not the duty of tertiary education to re-train the products of inferior schooling.

However, Huysamen (2000:146) opines that tertiary institutions should embark on presenting bridging courses to cater for historically disadvantaged students who have had inferior high school education.

If tertiary education is perceived as the right of every citizen then tertiary institutions have to re-train, but in reality, not every citizen has the potential to acquire a tertiary education. Samuelson (1991:50) and Du Plessis (1992:5) confirm this. Tertiary education is a privilege which is not accessible to everyone according to Smit (1992:1) and Grobbelaar (1992:5).

The greatest challenge is to select those applicants that have the ability, regardless of their deprived backgrounds and school training for admission. Only then can re-training be done successfully.

The criteria for establishing the validity of new measures ought really not to be grades at school, but 'grades for life' in the broadest theoretical and practical sense.

Shochet (1986) as cited in Bokhorst et al (1992:60) and Botha and Cilliers (1999:144) states that scholastic performance usually provides little information on the intellectual potential and aptitudes of especially black applicants and their ability to succeed in tertiary studies. It therefore becomes clear that it is paramount that additional information on tertiary applicants should be obtained.

Kilfoil (1999:47), Botha and Cilliers (1999:144) and van der Walt (2000:2) confirm the unreliability of school results and stress that assessment of tertiary applicants is becoming increasingly important.

The National Commission on Higher Education (NCHE) recommends that additional selection criteria in addition to the Further Education Certificate (FEC) be implemented according to Louw et al (1998:149).

Kotze et al (1996:46) and Barnard (1992:5) suggest that the following components be measured to determine whether students do have the necessary learning and developmental potential to complete their studies successfully:

- Language proficiency in the preferred language of instruction;
- Learning potential; and
- Other cognitive aspects.

CHAPTER 5

SELECTION TECHNIQUES

5.1 Introduction

Predictive validity lies at the heart of the issue of fairness in testing. If identical distributions existed on predictor and criterion variables for all possible groups with equivalent correlations, there would be no dispute about the fairness of using scores on the predictor variables as a basis for selecting candidates across the board with a view to maximising achievement on the criterion variable, provided the same decision rule has been used. However, these ideal circumstances do not exist.

5.2 Traditional tests as selection techniques

Organisations use psychometric tests to assist in making decisions about the prediction of future work success according to Taylor and Radford (1986:79). These tests are defined as traditional tests.

Saunders (1995:7) declares that traditional psychometric tests measure such aspects as:

- general reasoning;
- abstract thinking;
- algebraic ability;
- arithmetical ability; and
- ability to comprehend written English.

Taylor & Radford (1986:84) suggest that South African population groups obtain significantly different mean scores on a variety of psychological tests which are not necessarily reflected in relevant criterion measures. It is

generally accepted that tests should not be used as the only method of selection, but there are few alternatives left to assess potential applicants as accurately.

"Most test makers acknowledge responsibility for providing general evidence of the instrumental value of the test. The terminal value of the test in terms of the social ends to be served goes beyond the test maker to include as well as the decision-maker, policymaker and test user, who are responsible for specific evidence of instrumental value in their particular setting and for the specific interpretations and uses made of the test" alias Messick (1980:1025).

Many South African psychometric test manuals reveal a lack of information on the development of the test and the biographical details of the norm groups. As the norms are not applicable to all relevant groups this questions the use of the same material according to Taylor and Radford (1986:86). In addition Saunders (1995:6) advocates a radical movement away from traditional psychometric tests.

South African research on a cross-cultural bias in testing has included the investigation of item bias and construct and predictive validity. Not only does ethnicity account for variations in personality tests performance, but the language spoken by the testees and language of test administration also influence results according to van Eeden (1997:151).

Owen (1998:37) and Prinsloo (1998:41) state that the Employment Equity Bill prohibits psychometric tests unless the test used meets the following requirements:

- validated through scientific research to be applicable for the objective;
- fairly utilised on employees irrespective of culture; and
- not biased towards designated groups or previously disadvantaged people.

5.3 Traditional tests in the United States

Testing in the United States is included because of the cultural diversity that is present in South Africa.

Testing is considered to be far more objective than other selection techniques and has often proved to be the most valid selection procedure. Research in the United States confirms that, in general, standardised tests do not discriminate against blacks, although blacks, Hispanics and Native Americans as a group do not score as well as white applicants. The reasons for this, Carrell et al (1995:317) explain, are a lower level of education as well as social factors. Manufacturers in the United States are increasingly turning to tests for selection.

DeCenzo and Robbins (1988:151) declare that organisations in the United States historically relied on traditional tests such as intelligence, aptitude, ability and interest to assess applicants. As these tests did not deliver graphology and polygraphology have been used to gather more information about individuals. In recent years the use of traditional tests has decreased considerably for various reasons such as legal considerations, time constraints and costs. Many organisations have eliminated testing as a selection device.

Tests are clearly discriminatory against those who have not been exposed to a specific culture, entrance to which is guarded by the tests according to Mclelland (1973:6).

Fleming and Garcia (1998:493) report that the mean senior aptitude test (SAT) scores of white students, in the United States, were significantly higher than those of black students in white schools; and these were significantly higher than those of black students in black schools. This is contrary to psychometricians results in general regarding standardised tests.

The use of personality tests has declined considerably in the United States and Carrell et al (1995:319) identify three problems related to personality tests:

- they are usually not valid or reliable predictors of job performance;
- to be of use the job applicants must have sufficient insight to describe themselves accurately. This is generally an unjustified assumption;
- applicants' desire to do well although there are no right or wrong answers means they may give false responses.

Linn (1973:151) compares various studies on test scores of college students, from different cultural groups in the United States, and concludes that differences do not exist between these cultural groups only but between males and females as well. Traditional psychometric testing should therefore be handled with the utmost care.

McLelland (1973:3) debates whether intelligence tests tap abilities that are responsible for job success and concludes that no consistent relationship exists between scholastic scores (school grades and tertiary grades) and actual accomplishments in social leadership, the arts, science, music, writing and, speech and drama.

Thorndike and Hagen (1959) as cited by McClelland (1973:3) obtained 12 000 correlations on over 10 000 respondents between aptitude test scores and various measures of later occupational success and concluded that the number of significant correlations did not exceed what would be expected by chance. The tests were rendered invalid. Yet psychologists continue using them, thinking that the poor validities must be due to restriction in range due to the fact that occupations do not admit individuals with lower scores. But even here it is not clear whether the characteristics required for entry are, in fact, essential to success in the field. It is assumed that manual dexterity is essential for dentistry therefore applicants should obtain a minimum test score for entry. However, Thorndike and Hagen (1959) found this related negatively to the income of a dentist.

On the other hand Ghiselli (1966) as mentioned by McClelland (1973:3) concludes after 50 years of research that general intelligence tests correlate 0,42 with trainability and 0,23 with proficiency across all the job spectrum. The basic problem with many job proficiency measures for validating ability tests is that they depend heavily on the credentials the person brings to the job (the habits, values, accent, interests etc), and whether the person is acceptable to management and to clients. Since it is common knowledge that social class background is related to higher test scores, as well as to possessing the right personal credentials for success, the correlation between intelligence test scores and job success may be an artifact - the product of their joint association with class status.

Resistance to the use of psychological tests started in the United States in 1975 when the then president of the Association of Black Psychologists declared that a psychological test is a quasi-scientific instrument used to enhance racism on social and economic levels and to prevent the admission of black people to education, employment and housing. In 1968 the Black Psychologist Manifesto declared that psychological tests were inherently biased and this gave rise to the banning of group intelligence tests in schools in New York, California and Washington DC as cited in Owen (1998:37).

Employers for example, may have the right to select salespeople who have gone to the right schools and tertiary institutions because they do better, but psychologists do not have the right to argue that it is their intelligence that makes them more proficient in their jobs Owen (1998:38).

5.4 Testing for competence

McClelland (1973:7) suggests the following as an alternative approach to traditional tests:

- The best testing is criterion sampling

If you want to know how well a person can drive a car (the criterion), sample the individual's ability to do so by giving him/her a driver's test. There is ample evidence that tests, which sample job skills, will predict proficiency in the job. (Berry and Houston, 1993:178).

Criterion sampling means that testers have got to get out of their offices where they play endless word and paper-and-pencil games and into the field where they actually have to analyse performance into its components.

According to Arnold et al (1998:176) criterion sampling, in short, involves both theory and practice. It requires real sophistication. This is not an easy task as it will require new psychological skills not ordinarily in the repertoire of the traditional tester and moving away from word games and statistics toward behavioural analysis.

- Tests should be designed to reflect changes in what the individual has learnt

It seems wiser to abandon the search for pure ability factors and to select instead tests that are valid so that scores on them change as the person grows in experience, wisdom, and the ability to perform effectively various tasks that life will present.

- How to improve on the characteristics tested should be made public and be explicit

Traditionally answers to many tests are kept as well-guarded secrets, lest people practise in order to obtain better scores or fake high scores. How much simpler it is, both theoretically and pragmatically, to explain to the learner what the criterion behaviour is that will be tested. The psychologist, teacher and students can collaborate in trying to improve the student's score on the performance tests.

To do otherwise is to engage in power games with applicants over the secrecy of answers and to pretend knowledge of what lies behind correlations, which does not in fact exist. (Arnold et al, 1998:177).

➢ *Tests should assess competencies involved in clusters of life outcomes*

Some of these competencies may be traditional cognitive ones involving reading, writing and calculating skills. Others should involve what traditionally have been called personality variables, although they should rather be labelled competencies e.g. communication skills, ego development, patience, moderate goal setting etc.

➢ Tests should involve operant as well as respondent behaviour

One of the greatest weaknesses of nearly all the existing tests is that they structure the situation in advance and demand a response of a certain kind from the test taker. They are aimed at assessing the capacity of a person to make a certain kind of response or choice.

Respondents generally do not predict operants. Tests should require more lifelike operant behaviour in generating alternative solutions. Therefore theses should have more predictive power in a variety of situations where, what the person is expected to do is not as highly structured as is the case in standard tests.

➢ Tests should sample operant patterns to maximise generalisability to various action outcomes

The profile of achievements should be reported not only on entry but also at various points throughout the schooling to give teachers and students feedback on whether growth in desired characteristics is actually occurring. Test results then become a device for helping students and teachers to redesign the teaching-learning process to obtain mutually agreed-on objectives. Only then will educational testing turn from the sentencing procedure it now is to the genuine service it purports to be.

5.5 Conclusion

Research concerning cross-cultural applicability of personality tests in South Africa is very limited. Taylor and Boeyens (1991:87) investigated the comparability of the scores of blacks and whites on the South African personality questionnaire and concluded that questionable construct validity on some of the scales was found.

Cronbach (1970) as cited in McClelland (1973:6) states that a traditional test for admission to a tertiary institution gives realistic information on the presence of a handicap. Those in power in a society often decide what a handicap is, and psychologists should recognise this and be more cautious about accepting as the ultimate criteria of ability the standards imposed by whatever group happens to be in power.

If a well-educated South African English-speaker visits Jamaica's poorer region he/she will find that the people speak a variety of English that is almost entirely incomprehensible to him/her. These Jamaicans will speak slowly so that one should understand but one feels like a slow-witted child. How well would he/she do in Jamaican society if this kind of English were standard among the rich and powerful (which, by the way, it is not) and therefore required by him/her to gain admission to better schools and tertiary institutions? He/she will feel oppressed, not less intelligent, as the test would doubtless decide he/she was too slow to comprehend and knowledge of the ordinary vocabulary too limited.

In future psychologists will have to account for their actions in a court of law as illustrated in a dispute between the South African Allied Workers' Union and the Continental China Group. The union objected to the use of psychometric tests as a basis for re-employing workers who had been summarily dismissed. This has focused the spotlight on the validity of tests. Organisations will have to be able to prove that their selection models are validated specifically according to the needs of their specific industry. Generic "old" psychometric tests developed by research institutions for

general testing of ability, personality, aptitude, cognitive ability, etc will not *measure up in the new dispensation.*

Mclelland (1973:6) concludes that neither tests nor school grades seem to have much power to predict real competence in many life outcomes, aside from the advantages that credentials bestow on the individuals concerned.

Making a paradigm shift from traditional selection tests to an approach blended with scientific and political facets, places the highest premium on identifying potential among those formerly deprived of opportunities in terms of access to education, training and better jobs. Modern psychological assessment should be applied to identify individuals who have the potential to benefit from equitable opportunities according to Prinsloo (1998:41).

Taylor (1992:12) as well as Rademeyer and Schepers (1998:33) emphasises that en route to a new South Africa, where equity is the goal, conventional psychometric tests will fail to provide the solutions to those questions that require answers.

Traditional psychological tests are clearly discriminatory against those who have not been exposed to the specific culture, entry to which is guarded by the tests. A wider array of talents should be assessed for tertiary entry and reported as a profile to the institutions.

CHAPTER 6

SELECTION TECHNIQUE: DISCUSS

6.1 Introduction

Discuss is a completely computerised assessment tool, designed to produce a detailed profile of a personality. It provides powerful tools for interpreting and evaluating this profile.

The explanation of the Discuss is a summary of the manual according to Brookhouse (1994).

The Discuss indicates different traits of a person:

- Strong traits are particularly evident elements within the candidate's personality. These are the kinds of behaviour that are often seen in the candidate's style.
- Weak traits are the opposite – these are personality elements that are not naturally present in the candidate's style, and they will not normally be obvious in the candidate's behaviour.
- Simulated traits are traits that candidates try to display in their style, usually because they believe that these are necessary to present the correct image in their present environment. These might be traits that are already relatively strong being further emphasised, but more commonly they are factors that are not naturally associated with the candidate's style. Because simulated traits are based on a candidate's perceptions of the environment, the levels of these traits in the personality can be expected to change as the environment changes.

The Discuss further indicates stress levels that candidates currently are experiencing. This is a generalised measure of the amount of stress present in the personality. Stress in this context is different from 'pressure' in that it will normally persist over the medium to long-term periods.

Certain more resilient personalities have a 'Stress Threshold'. Below this level, stress can actually have a positive effect, helping to motivate and challenge the person concerned.

The Discuss summarises the profile of a candidate in ten sections containing the following information:

- Considerations which point out any technical discrepancies in the candidate's profile. Certain configurations indicate that a candidate may have attempted to 'dupe' the test, or may not have understood its requirements. Other types of results may point to particular problems in the personality. In either case, Discuss will still attempt to analyse the results, but the comments in this section should be taken into account when interpreting it. The 'Considerations' section will also highlight any major shifts in the personality (that is, particularly prominent factors that the candidate is attempting to display, but which are not native to the candidate's personality). Shifts of this kind are relatively common, and you should not be surprised to see one or more referred to in a report.

- Overview is a set of general comments about the candidate's personality style, identifying the main factors of their personality.

- Advantages and disadvantages explain the relative strengths and weaknesses associated with the candidate's personality style.

- Interpersonal skills and relationship management look at the ways in which the candidate relates to other people, and where their particular skills lie in social matters. Unless otherwise stated, the term 'relationship management' relates specifically to relationships with colleagues, rather than general social interaction.

- Decision-making reflects the fact that different personality-styles approach the decision-making process in radically different ways. In the 'Decision Making' section the candidate's basic approach to this question is explained.

- Organisation and planning cover the ways in which the candidates look at planning their actions and organising their time.

- Motivation explains the motivational needs of the candidate. This is designed to be helpful to the manager who wishes to motivate his/her staff, but these motivational factors can also be used to help persuade the candidate to follow a certain course of action.

- Managing style discusses the ways in which the candidate will relate to subordinates when placed in a position of authority.

- Style of management required, contains suggestions and pointers to the candidate's manager about getting the best from the candidate, and also cites approaches to avoid.

6.2 Background

The Discuss (DISC) is based on the work of Carl Gustav Jung who defined personalities as belonging to one of four different types: sensing, intuitive, feeling and thinking according to Möller (1993:77). He was one of the first psychologists who seriously attempted to map the human personality.

It was Jung's opinion that people instinctively understand the personality in terms of a set of four elements according to Bergh & Theron (1999:514). These groups of four (technically called tetralogies) underlie a very large number of personality assessment techniques, and DISC is no exception.

6.3 Personality

Robbins (1998:50) declares that:
"when psychologists talk of personality, they mean a dynamic concept describing the growth and development of a person's whole psychological system. Rather than looking at parts of the person, personality looks at some aggregate whole that is greater than the sum of the parts."

The Discuss defines personality in terms of their profiling system and at the core of this definition lie the ideas of stimulus and response. Sets of circumstances or individual events (stimuli) cause people to act or react (respond) to them. Different people, however, have different responses to particular stimuli. In any given situation, we expect that different people will react in different ways. DISC defines a 'personality' as the sum of all a person's varying response styles to varying stimuli.

In practical terms, it is impossible to measure and evaluate every one of a person's possible responses to every possible stimulus, therefore different kinds of responses are grouped together in 'traits'. Bergh & Theron (1999:375) define a trait as a disposition or tendency to act in a certain kind of way when faced with a certain situation, and consequently people who have similar traits should behave similarly.

In common use, the word 'personality' often includes a person's skills and abilities in its definition. This is not the case as far as the DISC system is concerned. Factors such as 'intelligence', or skills such as 'driving' or 'knowledge of zoology', are not properly part of the personality in DISC terms.

6.4 The development of the Discuss

In the early 1920s, an American psychologist named William Moulton Marston postulated a theory to explain people's emotional responses. Until that time, work of this kind mainly confined itself to the mentally ill or criminally insane, and Marston wanted to extend these theories to cover the personalities of ordinary individuals.

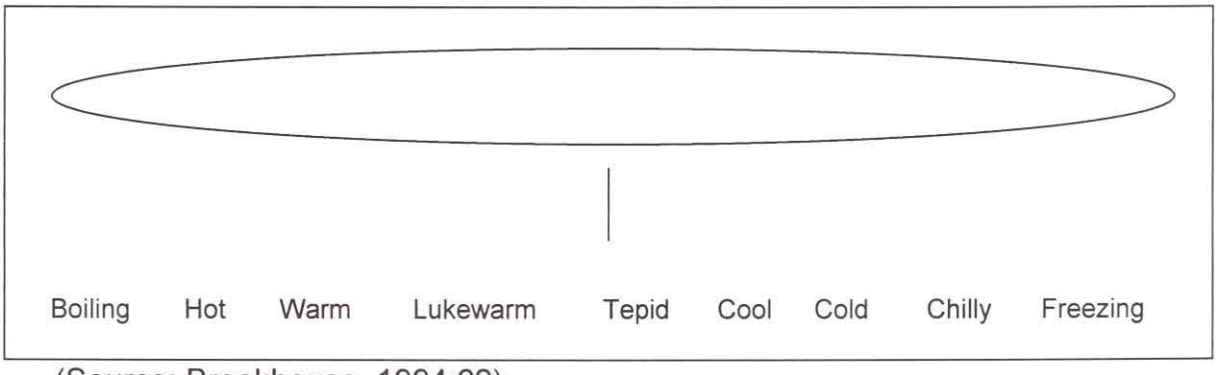
In order to test his theories, Marston needed some way of measuring the personalities he was trying to describe. His solution was to develop his own personality test to measure four important personality factors. The factors he chose were dominance, influence, steadiness, and compliance, from which the test takes its name – DISC (Marston, 1989:37).

In 1926, Marston published his findings in a book entitled "The Emotions of Normal People", which included a brief description of the personality test he had developed. From these humble beginnings, the DISC test has grown to become probably the most widely used personality assessment tool in the world according to Brookhouse (1994:62).

6.5 Two axes of the personality

This section introduces a new concept: the personality axis. An 'axis' in this sense is simply a continuum between two opposites. To illustrate, the image of an axis between the opposites 'hot' and 'cold', is used:

FIGURE 6.1: AN ILLUSTRATION OF THE DISCUSS CONTINUUM.



(Source: Brookhouse, 1994:62)

At the extremes of the axis are very hot and very cold temperatures. Moving along the axis from one extreme to the other, a variety of different temperatures exist, each blending into the next.

A personality axis is very much like this. The opposite ends of the axis refer to two opposite traits in the personality, while the axis itself represents the different shades and moods of the trait, as a person moves from one extreme to another. There are as many possible personality axes as there are potential opposites in the personality, but most assessment systems use only a select few.

This is possible because, by choosing particularly appropriate axes, a very wide-ranging picture of different personality styles is achievable. Different assessment techniques use different axes, but the basic principle remains constant.

The DISC personality axes lies between the opposites of assertiveness and passivity, and the axis between openness and control. The meanings of these terms, and the ways they are used to construct a DISC profile, are explained in the following sections with reference to Brookhouse (1994).

6.6 Assertiveness and passivity

The first point of the DISC personality axis lies between the opposites of assertiveness and passivity. This section discusses these two important elements of the personality.

The Assertiveness/Passivity axis measures the ways in which people react to their environment, and specifically whether they engender a pro-active or reactive approach.

6.6.1 Assertiveness

Assertive people are pro-active and direct. They lead rather than follow, and like to take immediate action whenever they can. They believe in grasping opportunities and making their own way. Often independent and commanding, they prefer to give orders rather than to take them, and will issue instructions rather than ask for co-operation.

6.6.2 Passivity

As the opposite of assertiveness, passivity describes people who are patient and cautious. They prefer to avoid taking risks, and rarely take definite action unless the pressure to do so is unavoidable. They dislike change or surprise, and will seek calm, predictable situations.

6.6.3 Openness

The second of the DISC personality axes extends between Openness and Control. In this section the focus is on the two extremes of this axis. Openness and Control are measures of a person's social attitudes, and describe different approaches to interaction with other people.

Extremely open people are friendly, trusting and ingenuous. They express themselves easily and value strong relationships with other people. Open individuals tend to work on an emotional level, revealing their feelings to others and being ready to sympathise with those around them.

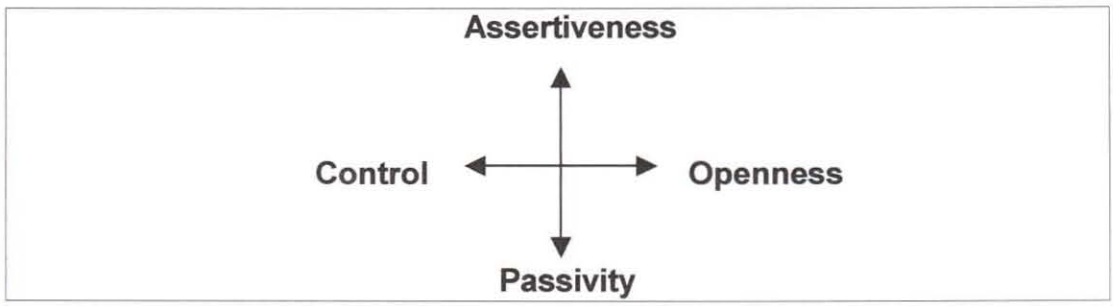
6.6.4 Control

Controlled individuals are practical and somewhat cynical in style. They value hard facts and rational argument above emotional considerations, and prefer to follow their own ideas, rather than rely on those of other people. At times, they can be distrustful or suspicious, and will rarely volunteer information about themselves to other people.

6.7 The biaxial model of DISC

The two axes of Assertiveness/Passivity and Openness/Control lie at the heart of the DISC profiling system. It might not, at first sight, be obvious how these two axes are related to the DISC profile, which contains four factors illustrated in figure 6.2.

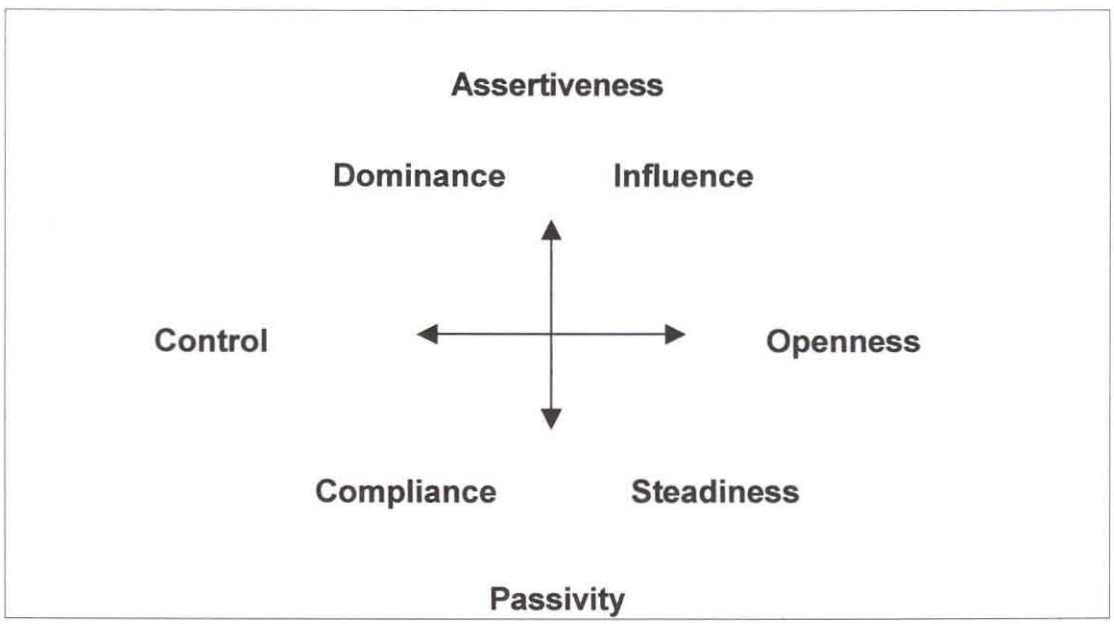
FIGURE 6.2: THE BIAXIAL MODEL OF THE DISCUSS.



(Source: Brookhouse, 1994:65)

The link between the axes and DISC is the so-called *Biaxial Model* (i.e. a model with two axes). This is formed by the two fundamental axes when placed at right angles to one another (*see diagram, above*). The result is a cross shape with four empty spaces between its arms. These spaces correspond to the four DISC factors, as shown below.

FIGURE 6.3: DISCUSS FACTORS.



(Source: Brookhouse, 1994:65)

Each of the four factors is defined as a meeting point between two of the axes. Dominance can be defined as Assertiveness and Control therefore Dominant individuals will show aspects of Assertiveness and Controlled behaviour in their approach to life. The four factors shown on this diagram are the same four factors that are shown on a DISC graph.

The DISC test does not measure the underlying axes of the personality, and then extrapolates the DISC factors but rather measures Dominance, Influence, Steadiness and Compliance directly. In these cases, the Biaxial Model provides a theoretical underpinning of the system, but this is not used directly to derive the results.

6.8 The basics of DISC graphs

Having collected an individual's responses to a DISC questionnaire, collated and calculated the results, the final outcome is a set of three graphs. Each of these three graphs (or 'profiles') describes a particular side to the candidate's personality. In combination, the set of three is known as a DISC 'profile series'.

6.8.1 The internal profile

This graph describes a person's 'inner' personality style, the type of behaviour that can be expected when the person feels completely at ease. Conversely, this style can also sometimes be seen when people are placed under severe pressure, because such pressure limits their capacity to adapt their personality style. The Internal Profile tends to remain more constant over time than the other two graphs. Other names sometimes used for the Internal Profile include the 'Pressure' Profile and the 'Underlying' Profile.

6.8.2 The external profile

Very few people maintain the same personality regardless of circumstance; instead, they adapt to situations and others' requirements. The purpose of the External Profile is to describe the style of personality that an individual feels is appropriate in their current circumstances. The External Profile can change considerably over time, as a person's situation and environment change – such modifications often accompany major life-style changes, such as starting a new job or moving house. The External profile is also known as the 'Work' Profile or the 'Mask' Profile.

6.8.3 The summary profile

The Internal and External Profiles provide valuable information about a person's attitudes and perceptions. In reality, however, a person's behaviour is rarely based completely on one or other of these styles. The Summary Profile combines information from the other two to present a view of a person's actual behaviour. Among the many variant titles of this profile are the 'Basic' Profile, the 'Composite' Profile and the 'Snapshot' Profile which can be described as follows:

6.8.3.1 *D for Dominance*

The first of the four DISC factors is Dominance, or simply 'D'. The colour red is often used to represent this factor and its associated type on the Style Card, the Driver. This is appropriate because, as its name suggests, Dominance is the factor indicating directness, assertiveness and control. The Greeks would have associated Dominance with blood and fire, a fitting combination for this tempestuous personality factor.

Dominance is the factor shown on the extreme left of a DISC graph. Like all the factors, D is a blend of positive a negative traits. On the positive side, highly Dominant individuals are independently-minded, motivated to succeed, and generally very effective at getting their own way. They can,

however, also be hot-tempered and even aggressive under certain conditions.

Dominance can be summarised as the factor of control. People with this factor prominent in their DISC profiles focus on the need to achieve and maintain a measure of authority and power over other people and, more generally, the environment in which they live and work. Competitiveness and ambition are also associated with the D factor, and people showing this element in their personality will strive to achieve their aims in life against great odds. Indeed, they seem to enjoy challenge, and rarely retreat from a difficult or risky situation.

6.8.3.2 I for Influence

Dominant individuals are not naturally trusting of others – they will seek to attain success on their own merits, without asking for or expecting help or support from those around them. Should a situation arise where the assistance of others is an unavoidable necessity, they tend to issue orders directly, rather than asking for co-operation. After Dominance, the next DISC factor is Influence, also known simply as I. Influence is associated with a sunny, friendly and extrovert personality, warm and open towards other people, sociable and gregarious. Influence connects with the Style Card type described as a Communicator. As might be expected from this, personalities with a high Influence score (called 'High-Is') are gregarious and sociable, and often possess well-developed social skills and an urge to meet and talk with other people.

Influence is the second factor described by a DISC graph, reading from the left. The communicative and socially confident style of those with high Influence tends to be balanced by a rather impulsive and sometimes irrational approach to life. The urge to relate to and impress those around them can lead such a person to act in ways that other less socially oriented personalities find very difficult to understand.

The hardest thing for a High-I to accept is rejection. They need to interact positively with those around them, and their friendly, open style usually helps them to maintain relations of this kind. The socially active nature of the highly Influential personality is often an important factor in bringing other less gregarious personality styles together.

By their nature, High-Is are extremely trusting and ingenuous. Their desire to be open with other people can lead them at times to reveal information or express feelings that more staid personality types might prefer to conceal. For this reason, they are sometimes viewed as being tactless. Nonetheless, their natural communicative abilities often permit them to talk themselves out of any difficult situation brought about by their lack of diplomacy.

6.8.3.3 S for Steadiness

Third of the four factors is Steadiness, abbreviated to 'S'. As its name suggests, personalities showing a high level of Steadiness adopt a measured, steady approach to life. They are patient and undemanding, often showing sympathy for and loyalty to those around them. In Style Card terms, Steadiness corresponds to the 'Planner' personality type.

Being the third of the DISC factors, Steadiness is shown third from the left on a DISC graph. At least in Western countries, Steadiness is relatively rare in comparison with the other three factors. While Dominance, Influence and Compliance are evenly spread throughout the population, Steadiness tends to feature less frequently. This is perhaps because the unassuming, amiable type of personality associated with this factor tends to be less valued by society than those representing the other three DISC factors. When Steadiness does appear in a profile, it is more commonly found accompanied by high Compliance.

Despite this, there are a number of strengths linked to the Steadiness factor. People of this kind are patient and sympathetic listeners, with a real interest in the problems and feelings of others, and are particularly capable of fulfilling support roles. They also have a persistent approach, with powers of concentration that allows them to keep on working steadily at an assignment. While other profile types might become bored or distracted, the High-S (i.e. personality with high Steadiness) will continue to work until they have completed an assignment.

High-S personalities are resistant to change, and prefer to settle into a predictable and constant environment. They have an intrinsically passive approach, and work best when given clear instructions and a high level of support. Because of this, they avoid conflict or confrontation if at all possible, and will instead seek to adopt the role of peacemaker if a dispute should break out.

6.8.3.4 C for Compliance

The final DISC factor is compliance, or simply 'C'. This is perhaps the most complex of the four factors. Traditionally, High-Cs (people showing a high level of Compliance) were categorised simply as 'rule-oriented'. Recent investigation, however, has shown that this is only part of the story, and that the factor represents a far more sophisticated element of the personality. As the root of this complexity lies in the combination of Control and Passivity, the Compliance factor is associated with the Style- Card 'Analyst' type.

Compliance is the factor shown on the extreme right of a DISC profile. It is the factor of structure, detail and fact, and personalities displaying high levels are interested in precision and accuracy. Because they are naturally passive and reticent to speak out unless called on by others, it is often imagined that High-Cs lack ambition. In fact, this is not the case. In this specific sense, they are similar to highly Dominant individuals in their desire to control their environment. Because of their passive style, however, they

will try to obtain this control through the use of structure and procedure, insisting on rules and defined codes of conduct to achieve their ends. This is the root of the 'rule-oriented' style mentioned above.

Individuals with high levels of Compliance dislike pressure and tend to adopt an evasive style when confronted with difficult circumstances. In extremely difficult situations, they are apt to disregard problems or to delay actions until these become completely unavoidable. The rule-oriented aspect of the High-C personality often encompasses wider aspects of life than simply corporate rule-structures or established procedures. Personalities of this kind usually have personal codes of behaviour, and tend to regard etiquette and tradition as important. Because of their inherent desire for fact and detail, it is also common to find that Compliant styles have a relatively broad general knowledge, or specific knowledge or skills. This interest in the way things work means that Compliant personalities are often drawn to technical work, or jobs involving the organisation of information, specific situations in which their personal talents can come to the fore.

6.9 Stress

Stress is a very broad and complex issue, and a detailed examination of all its aspects lies beyond the limits of the DISC system. Nonetheless, by closely examining an individual's personality profile, and especially the variations between the External and Internal Profiles, it is possible to glean some information about the amount of stress a person is currently experiencing, and the likely reactions. An assessment can also be made of the source of this stress.

In terms of the DISC system, this term has a meaning different from, but related to, 'pressure'. While pressure results from a short-term problem, stress is considered to be related to longer term problems, persisting over weeks, months or even years. Examples of sources of stress might be a

personality conflict in the workplace, difficulties at home, or ongoing financial commitments.

6.10 Validity and reliability

The Discuss manual does not refer to the validity or reliability of the instrument. Research conducted by Roodt and Robert (1996) reports as follows:

- Criterion-related Validity

Seven factors from Cattell's 16-PF were used to correlate with the four Discus dimensions. The Bravais Pearson product-moment correlation reported that two dimensions indicate a significant correlation namely dominance and influence with factors E (dominant) and A (outgoing). No correlation was reported with regard to 16-PF factor G (expedient) L (trusting), Q1 (conservative) and C (emotional stability) with steadiness and compliance.

- Reliability

The Bravais Pearson product-moment correlation coefficient indicated correlation scores of 0,728 (dominance), 0,645 (influence), 0,730 (steadiness) and 0,550 (compliance). These correlations conclude that the Discus instrument is reliable.

6.11 Conclusion

Research on the Discuss is not freely available although it is used widely in South Africa as a selection technique. The Discuss was examined as part of this study in order to investigate the possibility of including it in the design of a differential selection model for technikon students.

CHAPTER 7

SELECTION TECHNIQUE: NOWICKI-STRICKLAND & LEFCOURT I/E SCALES

7.1 Introduction

Locus of control is a personality variable that has been defined as a generalised expectancy that rewards, reinforcements or outcomes in life are controlled by one's own actions (internally) or by other forces (externally) according to Spector (1988:335).

The concept "locus of control" was created by Rotter (1966:2) who described the internal-external locus of control construct as a generalised expectancy, relating behaviour to reinforcements in a variety of situations as mentioned in Lefcourt (1981:15). The internal pole of this continuum refers to the individual's belief that outcomes are a consequence of own striving, ability and initiative. The external pole, on the other hand, refers to the individual's belief that outcomes are independent of own behaviour according to O' Brien (1986: 134) and confirmed by Le Roux et al (1997:2).

7.2 Definition and description

Internal locus of control is a generalised expectancy that a person's own attempts will result in a positive reward. If a person perceives that external factors such as luck, faith or other influential people, are responsible for rewards it points to an external locus of control according to de Kock and Roodt (1995:12), Thebe (1992:12), as well as James (1957:84).

Gibson et al (1997:113) defines locus of control as:
"a personality characteristic that describes people who see the control of their lives as coming from inside themselves as internalizers. People who believe that their lives are controlled by external factors are externalizers".

The largest body of empirical data about perceived control is provided by Rotter's (1954) social learning theory. The role of reinforcement, gratification and regard plays a crucial role in determining behaviour. Brewin (1988:110) argues that this construct reflects the degree to which individuals believe that reinforcements, such as the good and bad things that happen to them, are within their own control or subject to the control of external factors such as chance.

Rotter (1966:1) formulates the following definition of locus of control:
"When a reinforcement is perceived by the subject as following some action of his own but not being entirely contingent upon his action, then, in our culture, it is typically perceived as the result of luck, chance, fate, as under the control of powerful other, or as unpredictable because of the great complexity of the forces surrounding him. When the individual interprets the event in this way, we have labelled this a belief of external control. If the person perceives that the event is contingent upon his own behaviour or his own relatively permanent characteristics, we have termed this belief as an internal control."

The attribution theory has given rise to the concept of locus of control. The attribution theory stems from the relationship between person-perception and internal behaviour. Both internal and external forces combine to cause behaviour. People's behaviour will be determined by the discrepancy in their perception of internal attributes and of external attributes according to Heider (1958:171), as well as Deci and Ryan (1985:166).

The construct of locus of causality is related to locus of control and Deci and Ryan (1985:166) state that:

- locus of causality refers to the perceived source of behaviour while

- locus of control refers specifically to whether people believe that outcomes are controllable.

The critical questions asked in research on locus of causality revolve around what factors energise and direct behaviour and how these factors relate to self determination. On the other hand locus of control revolves around who and what is believed to control these reinforcements or outcomes. Thus, locus of control seeks answers to what controls the person's outcomes, while locus of causality centres on why the person behaves as he/she does.

De Champs (1968:337) argues that locus of control refers specifically to beliefs about the source of control over reinforcement. A person is internal twhen he/she feels responsible for the consequences of his/her actions. Therefore, in order to control level of work performance a manager will control his/her actions by the achievement of his/her work objectives, creative thinking, initiative, leadership skills and other factors determining work performance. The manager will not feel that he/she controls his/her subordinates, organisational structures, superiors, but rather that there is a direct link between control and achievement of objectives, and personal performance.

High-need achievers have an internal locus of control and the strategies for maintaining control and for achieving are very similar according to Beck (1978:335).

Locus of control is not an expectancy concerning a particular type of reinforcement but rather a problem solving generalised expectancy, addressing the issue of whether behaviours are perceived to be instrumental to goal attainment regardless of the specific nature of the goal or reinforcer. It focuses on the belief that a response will, or will not, influence the attainment of a reinforcement according to Deci and Ryan (1985:167).

Hammerschlag (1984:24) postulates that locus of control relates to expectancies about the outcome of actions and views the phenomenon as a continuum of expectancy belief, ranging from extremely external views to extremely internal views. Brewin (1988:110) and Spector (1988:335) believe that these expectancies relate to how outcomes, rewards and reinforcements in life are controlled by either some other external forces or by one's own internal actions.

Bothma and Schepers (1997:2) cites that since the appearance of Rotter's Locus-of-Control-Questionnaire, viz the I-E scale, various other instruments have been developed to measure the construct, which include the Health-Locus-of-Control-Scale of Walston, Walston, Kaplan and Maides (1976), the Multidimensional Health-Locus-of-Control-Scale of Walston, Qalston and de Vellis (1978), the Nowicki-Strickland Scale of Nowicki and Strickland (1973) and the economic Locus-of-Control-Scale of Furnham (1986).

Locus of control refers specifically to beliefs about the source of control over reinforcements and not to beliefs about:

- control of personal actions;
- the competence to do tasks; and
- self control

according to O' Brien (1986:168) and Theron (1994:1).

Thebe (1992:20) states that the focus is not on being responsible for one's actions, but rather on the results or consequences of one's actions. Being in control does not imply that all problems can be solved by ability or will-power, but that a person feels responsible for the reinforcements and will therefore feel in control of the behaviours that produce these reinforcements.

Lefcourt (1976:26) states that a person's actions are predicted on the basis of values, expectancy, and the situation. The formula for prediction of behaviour at a specific time and place is:

$$BP_{x,\ s_1,\ R_a} = (E_{x,\ R_a,\ s_1}\ \&\ RV_{a,\ s_1})$$

This formula reads:

the potential behaviour $_x$ *to occur in a situation 1 in relation to a reinforcement* $_a$, *is a function of the expectancy of the occurrence of* reinforcement a following behaviour $_a$, in situation 1, and the value of reinforcement $_a$ in situation 1. In this formula the importance of expectancies is not secondary to values. This equal emphasis upon value, expectancy of reinforcement and situational specificity makes Rotter's theory unique among learning theories which, more commonly, accentuate only the value or motive end of predictive formulas.

The more general formula of Rotter's theory explains the place of perceived control within social learning theory and reads as follows:

$$NP = f\ (FM\ \&\ NV)$$

The potentiality of occurrence of a set a behaviours that lead to the satisfaction of some need (need potential) is a function of both the expectancies that these behaviours will lead to these reinforcements (freedom of movement) and the strength or value of these reinforcements (need value).

Perceived control is defined as a generalised expectancy for internal as opposed to external control of reinforcements. Freedom of movement is a generalised expectancy of success resulting from one's ability to remember and reflect upon a lifetime of specific expectancy behaviour or outcome sequences.

7.3 Locus of control and influence

Lefcourt (1976:36) examines locus of control and the resistance to influence and refers to research done by Arendts (1963) regarding Eichmann in Jerusalem: A report on the banality of evil which exposed at length a man who clearly supported the fact that the most horrendous acts

derive more from obedience or compliance to social order than from sadistic impulse.

"At that moment, I sensed a kind of Pontius Pilate feeling, for I felt free of all guilt. Who was he to judge? Who was he to have his own thoughts in this matter?" Arendt (1963) as mentioned in Lefcourt (1976:37).

In other words, the horrors perpetrated by the Nazi officials were legitimate, conforming to acceptable standards, and men like Eichmann felt that it was not for them to question, since what they were asked to do was legitimate. Evil in Nazi Germany had lost the aura by which most people recognize it,- a unique quality of temptation to violate standards; and the common man, such as Eichmann, no longer felt able to judge what was right on a transcendent scale of values.

Lefcourt (1976:37) continues the examination of influence and locus of control by scrutinising Milgram's (1963) experiments concerning obedience. Milgram, in the name of science, required subjects to administer a series of increasingly severe electric shocks to the hand of a respectable-looking middle-aged man. While no actual shocks were delivered, to the naïve subject it appeared as if he was administering painful shocks to the victim.

Milgram varied several elements in the experimental situation in the hope of deterring subjects from an easy compliance. While some variability in the subjects' behaviour was obtained, the overall results were such as to lead Milgram (1965) to conclude:

"With numbing regularity, good people were seen to knuckle under the demands of authority and perform actions that were callous and severe. Men who are in everyday life responsible and decent, were reduced by the trappings of authority, by the control of their perceptions, and by the uncritical acceptance of the experimenter's definition of the situation into performing harsh acts."

Lefcourt (1976:50) concludes that when a person believes that she is the responsible agent of her own life's fortunes, she will resist influence attempts which aim to bypass her own sense of moral justice, and will only respond to those appeals that address themselves to her own values and beliefs, thus the internaliser will not experience the "Pontius Pilate" feeling – a surrender of a sense of responsibility when one succumbs along with others to manipulation.

7.4 Locus of control and stress

Ivancevich and Matteson (1987:663) states that the traditional assumption is that to the extent that an individual has personal mastery, the less likely he/she will be to perceive a situation as threatening or stress inducing, and thus manifest stress related reactions. The locus of control stress relationship is a function of environmental realities en personal beliefs. When an individual's beliefs about where control resides are congruent with the actual locus of control in a given situation, there is less likelihood that stress will result, thus when realities and beliefs are not congruent, the likelihood of experiencing stress increases. Judelmann (1987) and Marino and White (1985), as cited in Thebe (1992:18), confirm this.

Lefcourt (1983:265) concludes that various research that has been conducted on stress, states that it is obvious that beliefs about one's ability to alter or change one's circumstances are meaningful. Stress is often found to be moderated by beliefs concerning efficacy and control. The belief that the adverse situation, which a person experiences, is controllable is limited by the fact that one can act to alleviate duress.

The more anxious or depressed an individual is, the more external locus of control tends to manifest itself according to Strickland (1978) as cited in Brewin (1988:111) and Magwaza and Bhana (1991:162).

7.5 Locus of control as an enduring attitude

Lefcourt (1976:25) concludes that perceived control is positively associated with access to opportunity. Internal control expectancies are held by those who are able, through position and group membership, to attain more readily the valued outcomes that allow a person to feel personal satisfaction. It follows that minority groups and previously disadvantaged communities who do not enjoy as much access to opportunity as do the predominant caucasian groups in different societies are apt to hold fatalistic, external control beliefs. (Lewis (1961); Gurin et al (1969); Griffin (1962); Lewin (1940); and Frazier (1962) as mentioned in Lefcourt (1976: 17)).

7.6 Locus of control and the process of modernisation

Modern individuals are less likely to believe that life is essentially a game of chance and that man has little control over his fate. Nagelschmidt and Jakob (1977:103) distinguish between:

- 'traditional individuals' who
  tend to manifest fatalism which appear to be parallel to external locus of control; and
- 'modern individuals' who
  tend to manifest personal efficacy, which appear to be parallel to internal locus of control.

7.7 Locus of control and culture

Parson and Schneider (1974:460) researched the differences between students from Eastern societies and Western societies regarding locus of control. The following countries are included in the research:

- Eastern countries - Japan and India
- Middle Eastern country – Israel
- Western countries

- North America
- United States of America
- Canada
- Western Europe - France, Italy and Germany.

Japanese students had significantly higher external locus of control than all the other countries. Indian students rated significantly lower than those of France, Canada and Japan.

Beliefs and values are shaped differently across cultures and this is confirmed by studies by Hofstede (1980), Tannenbaum (1960), Danziger (1963:31), Weisz, Rothbaum and Blackburn (1984), as mentioned by O' Brien (1986:288). However, holding an extreme belief in external control would have similar consequences in North America and Japan. There is substantial evidence that the effects of job contentment on personal control and psychological distress are similar across cultures that vary widely in work values.

Ryckman et al (1978:165) suggest that care must be exercised in cross-cultural research concerning locus of control, since various components may have different meanings or be non-applicable in certain cultures. On the other hand research conducted by Riordan (1981:159) concludes that locus of control can be meaningfully applied to South Africans ethnic groups. This research included Black, Indian, Coloured, and White South African students and pupils across socio-economic groups, sex and gender.

Rieger and Blignaut (1996:35) in South Africa researched individuality and collectivity as micro-variables of diversity and statistically significant positive correlations were found. Theron (1994:2) refers to the relation between locus of control and ethnicity and concludes that Asians, Coloureds, Africans and English-speaking Whites measure high on the external dimension of locus of control, which could be ascribed to the political environment. Locus of control and socio-economic status are

interrelated therefore lower status groups have expectancies of external locus of control.

7.8 Locus of control and intelligence

De Kock and Roodt (1995:16) found significant statistical correlation between intelligence and locus of control. This is confirmed by Blount et al (1987:175). However, Little and Kendall's (1978:282) research indicates the opposite in institutionalised juvenile delinquents.

Internals have been found to be more perceptive to and ready to learn about their surroundings. They are more inquisitive, curious and efficient processors of information than externals according to Lefcourt (1976:65).

7.9 Locus of control and academic success

In the educational context it was found that students with a high internal locus of control performed better than those with a high external locus of control according to Maqsud et al as cited in Walters (1994).

Lefcourt (1983:18) and Warehime (1972:314) indicate that internal locus of control relates to higher academic performance among pupils at schools.

Lefcourt (1976:71) concludes that intelligence-test performance and socio-economic status have a reliable and robust relationship with achievement criteria and that a sense of control, measured by different devices, can add to the already high-magnitude relationships between socio-economic class, IQ, and achievement behaviour attests to the value of locus of control in formulas devised to predict achievement behaviour.

Walters (1994: 68) states that locus of control is a contributing factor to school dropout rates. These dropouts tend to display an external locus of

control. Various research indicates that locus of control is related to academic achievement according to Lefcourt (1983:30).

7.10 Locus of control and motivation

Thompson (1984:3) defines achievement motivation as the ability to overcome obstacles, competence, the ability to accomplish goals of high standard and a positive self-image.

Thebe (1992:12) cites the definition of Lever (1987) as a:
"motive to maintain one's own level of capability and to compete (with others and with oneself), once a personal goal has been set, with a subjective, internal standard of excellence in mind."

The findings of various studies with regard to the relationship between the constructs locus of control and achievement motivation have indicated that there are significant correlations between internal locus of control and achievement motivation as quoted in Rotter cited in Erwee & Pottas (1982:79); Erwee (1986:1); Rotter (1966:22); Haines et al (1980:200); Theron (1994:3); and Le Roux et al (1997:2).

A further conclusion made from the literature on locus of control is that locus of control does not influence the ability to handle complex tasks, but rather the motivation to become involved spontaneously in complex tasks according to Dailey (1980:860) and Perrewé and Mizerski (1987:48).

In order for people to function effectively in society and experience personal satisfaction from their endeavours Bothma and Schepers (1997:46) argue that intrinsic motivation and internal locus of control has to be developed. Personal power and the perception of inner control contribute to well being and achievement of success.

Thebe (1992:41) is adamant that individuals with a high need for achievement motivation have some belief in their own ability to determine

the outcome of their actions thus an internac locus of control. This is confirmed by Biggs and Felton (1977) as cited in Thebe (1992:79); Erwee and Pottas (1982:98); and O' Brien (1986:179).

FIGURE 7.1: THE PERCEIVED DETERMINANTS OF SUCCESS AND FAILURE.

		LOCUS OF CONTROL	
STABILITY		INTERNAL	EXTERNAL
	Fixed	Ability	Task difficulty
	Variable	Effort	Luck

(Source: Lefcourt, 1976:78)

7.11 Locus of control, performance incentives and participation

Evidence according to Hackman and Old (1976) as cited in Kren (1992:991) suggests that an organisation's social environment and objective job attributes determine employees' responses to duties, affect individual performance and shape their perceptions of work-related tasks. Decisions regarding the design of control-system attributes usually involve the use of economic incentives and participation in setting performance goals.

Studies conducted by Kren (1992:1006) indicate that the relationship between locus of control and incentives is significantly stronger for internals than externals. Subsequently, when the incentives are absent the internals' effort was less than that of the externals. The effort of the externals was less dependent on the level of incentives. The motivation to exert effort to accomplish a task, therefore, is more dependent on internal resources (locus of orientation) than on external resources (incentive compensation). If personal orientation is external the benefits of expending organisational resources on performance incentives may not always be seen. Some

organisational resources must be utilised to change employees' personal orientation to ensure effective organisational control. The interaction of locus of control with incentive significantly impacts not only on effort but performance as well. Therefore, if incentives primarily affect performance via the effort dimension, then locus of control will moderate that relationship.

Kren (1992:1007) found that participation is effective regardless of locus of control orientation, although it is more effective with internally orientated subordinates.

7.12 Locus of control and job complexity

De Kock and Roodt (1995:16) found that intelligence acts as moderator between locus of control and job complexity. This is confirmed by Blount et al (1987:175).

Internals do better on jobs of a complex nature demanding initiative and independent action according to Theron (1994:3).

7.13 Locus of control and job satisfaction

According to Dailey (1980:855), Perrewé and Mizerski (1987:43) and Eichler (1980:957) people with internal locus of control experience greater job satisfaction than those with external locus of control when completing complex tasks. This is confirmed by the research of Lichtman (1970) as mentioned in Pryer and Distefano (1971:535).

Locus of control, in organisational settings, refers to rewards or outcomes such as promotions, favourable working conditiond, salary increases and general career advancement. According to Spector (1988:335) internals tend to be:

- more satisfied with their jobs than externals;

- more satisfied with their supervisors about consideration and initiating structure;
- less stressed about their roles;
- more perceptions about autonomy and control; and
- employed for longer.

7.14 Locus of control and job performance

Research done by Bothma and Schepers (1997:52) concludes that locus of control predicts work performance of black managers and can be used for selection. The studies of Coetzer and Schepers (1997:34) found a modest but statistically significant relationship between external locus of control and the work performance of black marketers. Job performance was measured by: the commission earned per month by the marketer, the number of policies generated as well as percentage of lapsed policies.

O'Brien (1986:179) confirms that there is reasonable evidence that internals perform better than externals and that the locus of control depends on the situation and the ability of the individual. Add into the equation perceived competence which reflects the individual's belief in his/her ability to perform tasks and it is possible to conclude that jobs which lead to changes in employee control beliefs can also, in some circumstances, produce changes in performance levels of employees.

7.15 Locus of control and management style

Locus of control influences supervisory and management styles according to Perlow and Latham (1993:831). Internal managers are more likely to consider rewards, respect and expertise as the means to motivate people whereas externals are more likely to use coercion in power situations.

Research by Bugental, Blue & Cruzcosa (1989) as mentioned in Perlow and Latham (1993:831) links externals with child abuse. Direct-care

workers in mental retardation facilities reporting higher levels of external locus of control are more likely to display aggressive work behaviour than those reporting internal locus of control in a study conducted by Perlow and Latham (1993:831).

Kren (1992:1008) suggests that supervisory style should differ depending on the subordinate's locus of control. Directive supervision is more effective for externals, while internals appear to be more responsive to performance-contingent incentives and to participative budget goal-setting.

7.16 Skill-utilisation, alienation and locus of control

O' Brien (1986:152) cites various research findings that are in agreement on the fact that internals prefer occupations which use their skills and provide autonomy. Once internals are in a job they tend to work harder than externals on those jobs that provide opportunities for the use of initiative, skills and autonomy. Internals experience more job satisfaction from job content and will become more involved in their work than externals, therefore internals will tend to occupy posts with higher income and occupational status.

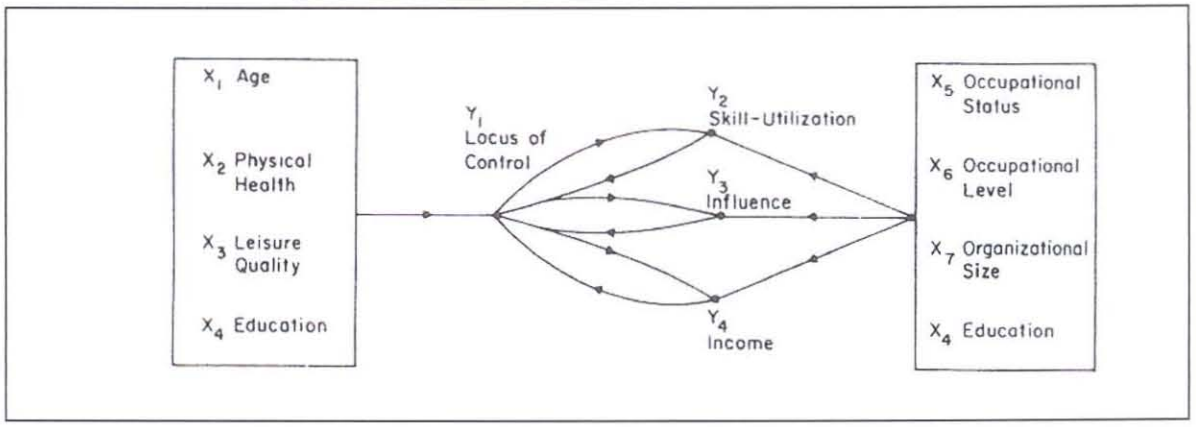
Scrutinising previous research, O' Brien (1986:152) concludes that locus of control is a significant determinant of organisational performance and behaviour, but he does not investigate the relationship between locus of control and organisational structure, and job content.

O' Brien (1986:153) defines skill-utilisation as:
"the degree of match between employee skills and skills required by the job." On the other hand influence is the amount of autonomy that an employee has over various aspects of the job including interaction, design of workplace, work organisation and rest periods. These factors are rewards valued by employees. Employees who experience these become internally controlled and perceive that their own effort was instrumental in

obtaining these intrinsic rewards and the opposite applies to those employees who do not experience these intrinsic rewards.

The same applies to income as a reward. High income induces internal orientation and low income induces external orientation. O' Brien (1986:154) depicts the reciprocal relationship between skill-utilisation, influence and income, and locus of control in Figure 7.2.

FIGURE 7.2: RECIPROCAL RELATIONSHIP BETWEEN SKILL UTILISATION, INFLUENCE, AND INCOME, AND LOCUS OF CONTROL.



(Source: O' Brien , 1986:155)

According to Figure 7.2 a reciprocal relationship was found between locus of control and income, as well as between locus of control and skill-utilisation, but not between locus of control and influence.

By the time managers achieve a reasonable amount of success – judged by status, income and security of tenure – they are in mid-life where the physical signs of ageing bear witness to the limitations of personal control. Not only are energy and ability declining, but there is also an increased awareness that some personal goals will not be reached. Not everyone will reach the highest echelons of management. These factors contribute to a sense of external control and are especially painful to managers whose entire education and career have centred on the belief in the efficacy of internal control.

More likely than not these people have few friends and often the quality of family life has been impoverished by the absence of intimacy.

The alienated manager, unable to bear the contradictions between the reality of life and life as he/she prefers to see it, may develop severe emotional illnesses, physical ailments and even contemplate suicide.

7.17 Locus of control and leadership

Leader behaviour is described in two dimensions e.g. consideration and initiating structure, as identified in the Ohio state leadership studies according to Hellriegel et al (1998:308).

Pryer and Distefano (1971:534) found positive correlations between leadership and internal locus of control and this is confirmed by research by Nealey and Blood (1968), as well as Stogdill (1963) as cited by Pryer and Distefano (1971:535).

7.18 Locus of control and entrepreneurship

People with a internal locus of control have a greater interest in starting their own business according to Erwee and Pottas (1982:89). Miller et al (1982:238) indicates that research by Brockhaus (1975), Durand and Shea (1974), and Shapiro (1975) confirm that internals are more activity orientated and more likely to possess entrepreneurial qualities than externals.

7.19 Top executive locus of control and its relationship to strategy-making, structure and environment

Miller et al (1982:237) confirm, in their research in Canada, that locus of control of top executives was found to have a direct and significant relationship with the nature of corporate strategy but an indirect relationship with structure and environment. More internal chief executives tended to undertake greater risks and more product-market innovation and to lead rather than to follow, competitors. This relationship is confirmed in studies by Nightingale and Toulose (1977) as cited in Miller et al (1982:250).

O' Brien (1986:289) declares that a person with extreme internal control beliefs exhibits a behavioural pattern of high task activity and drive. In many ways the pattern is shown in both:

- the Type A personality, who thrives on the active competitive pursuit of challenging goals and
- the successful entrepreneurial manager, who is high on achievement motivation.

Therefore it is not surprising that many organisational psychologists recommend that these individuals be placed in leadership positions or given tasks that challenge them according to Spector (1982) as mentioned in O'Brien (1986:289).

The person with a very low score on internal control believes that practically all of his/her valued reinforcements can be gained by sufficient knowledge, effort and planning.

7.20 Critique on locus of control

Although promising results have been obtained with locus of control measures the construct has been criticised on a number of grounds viz –

- Belief in a difficult world, belief in a just world, belief in a predictable world, and belief in a politically responsible world.

Collins (1974) as cited brought these different dimensions to the attention in Brewin (1988:111).

- Personal control or ideology of control

Gurin, Gurin and Morrison (1978) as mentioned by Brewin (1988:111) identified this factor, but also acknowledged that a variety of factors may emerge depending on the type of factor analysis used and the method of scoring items.

- Usually the scales fail to distinguish beliefs about good and bad outcomes

The assumption is that if people take responsibility for their successes, they would be prepared to take responsibility for their failures.

- The notion that all external determinants of reinforcement are equivalent

Levenson (1974:377) argues that there are three scales measuring the perceived influence of internal factors, chance and powerful others. The result of one's life being seen as ruled by chance may be very different from a perception that it is ruled by other people.

- The combining of casual dimensions that need to be kept separate

It is possible to have internal causes such as lack of ability or heredity over which a person has little control, and similarly there may be external causes, such as the actions of family and friends, which a person feels are reasonably controllable.

O'Brien (1986:179) suggests that the results of locus of control studies should not be interpreted as showing that all internals are the best at everything. Extreme internals who believe that all is within their power are likely to be inflexible and unco-operative in their personal style, and that attention must be focused on the moderate internal - a realist who is able to differentiate between situations where personal effort is effective, and situations where structural factors preclude individual freedom of movement.

7.21 Conclusions

Many criticisms of measures of generalised expectancies such as locus of control have pointed to the failure to identify various more specific beliefs. In one sense this criticism is unfair since the scales were designed to tap general expectancies that could influence behaviour when people find themselves in unfamiliar situations. Locus of control is related to a wide range of behaviours and criticism should perhaps not be levelled at the scale so much as at the researchers who have not used it appropriately according to Brewin (1988:114).

The superiority of internally controlled employees over externally controlled employees does not imply that all internals perform better than externals. Extreme internal control beliefs can have negative consequences for personal adjustment and could lead to have low personal integration. However, studies conducted on internal control and organisational behaviour do not distinguish between extreme and moderate internals.

A student who is motivated will strive for and achieve a higher grade when this is related to future career success than when it is not.

Research regarding locus of control encompasses many factors, such as motivation, intelligence, academic success, job satisfaction, job performance, leadership, etc. These are factors that tertiary institutions value in their students and wish to engender.

CHAPTER 8

SELECTION TECHNIQUE: MYERS-BRIGGS TYPE INDICATOR

8.1 Introduction

Van Rooyen (1992:5) defines the Myers-Briggs Type Indicator (MBTI) as:
"a *forced-choice, self-report inventory that attempts to classify individuals* according to an adaptation of Carl Jung's theory of conscious psychological type" .

MBTI is a personality test that taps four characteristics and classifies people into one of 16 personalities as defined by Robbins (1998:54).

The MBTI is based on the assumption that human behaviour is orderly and consistent. Although it is perceived as random and diverse, this is due to basic differences in the way individuals prefer to use perception and exercise judgement.

Individuals are classified as:

- Extroverted or introverted (E or I);
- Sensing or intuitive (S or N);
- Thinking or Feeling (T or F); and
- Perceiving or Judging (P or J)

according to the answers they give in the MBTI as illustrated in figure 8.1. These results are then classified into 16 personality types which differ from the 16 primary traits according to the 16-PF.

FIGURE 8.1: VERIFYING YOUR TYPE PREFERENCES – WORKSHEET.

E - Extravert Energised by theouter world	Introvert - I Energised by the inner world
S - Sensing Work with known facts	Intuition - N Look for possibilities and relationships
T - Thinking Base decisions on impersonal analysis and logic	Feeling - F Base decisions on personal values
J - Judgement Prefer a planned, decided, oderly way of life	Perception - P Prefer a flexible, spontaneous way of life
Very clear Slight	Slight Very clear

The MBTI is a widely used personal growth and development tool and Gibson et al (2000:114) report that over 2-million people per annum use the MBTI to diagnose personality.

8.2 Background

Isachsen and Berens (1988:30) state that in the 1920s a Swiss psychologist, Carl Jung developed a cognitive-style theory of personality. Jung declared that human beings consisted of two basic human types:

- extraverted - object-orientated and
- intraverted - abstract type.

Jung then added the factors of intuition, sensation as well as thinking and feeling.

This theory was later converted into the MBTI in the 1940s by the American mother-daughter team of Katherine Briggs and Isabel Briggs Myers as reported by Gibson et al (2000:114).

Cognitive style as defined by Jung's theory refers to the mental processes associated with how people perceive and make judgements from information according to Kreitner et al (1999:135).

8.3 Perception and judgement

Myers et al (1998: 6) define the J-P dichotomy as a design to identify the process a person prefers to use when dealing with the outer world.

- **Perception**

Demarest (1997:2) states that people with a preference for perceiving like to gather information and generate alternatives. They approach life in an unstructured manner, prefer to keep their options open and are more inclined to be flexible.

- **Judging**

People with a preference for judging like to approach life in a structured and orderly manner, and like to decide and reach closure according to Demarest (1997: 10).

8.4 Sensing and intuition

One way to find out is through sensing (S). The eyes, ears and other senses tell one what is actually there and actually happening. Sensing is especially useful for gathering the facts of a situation. The other way to find out is through intuition (N), which registers meanings, relationships and possibilities that are beyond the reach of one's senses. Intuition is especially useful when deciding what a person might do about a situation. People use both sensing and intuition, of course, but not both at once and not, in most cases, with equal preference according to Hirsh and Kummerow (1998:3).

8.5 Thinking and feeling

One way to decide is through thinking (T). Thinking predicts the logical result of any particular action a person may take. Then it decides impersonally, on the basis of cause and effect. The other way to decide is through one's feeling (F). Feeling takes into account anything that matters or is important to a person or to other people (without requiring that it be logical), and decides on the basis of personal values. People use both thinking and feeling, of course, but not both at once and not, in most cases, with equal confidence according to Myers et al (1998:6).

8.6 Combinations of perception and judgement

8.6.1 Sensing plus thinking

ST people are mainly interested in facts, since facts are what can be collected and verified directly by the senses - by seeing, hearing, touching, etc. They make decisions on these facts through impersonal analysis, because the kind of judgement they trust is thinking, with its step-by-step process of reasoning from cause to effect, from premise to conclusion.

8.6.2 Sensing plus feeling

SF people are also interested in facts, but make their decisions with personal warmth, because the kind of judgement they trust is feeling, with its power to weigh how much things matter to themselves and others.

8.6.3 Intuition plus feeling

NF people make decisions with the same personal warmth. But, since they prefer intuition, their interest is not in facts but in possibilities, such as new projects, things that have not happened yet but might be made to happen, new truths that are not yet known but might be discovered, or, above all, new possibilities for people.

8.6.4 Intuition plus thinking

NT people share the interest in possibilities but, since they prefer thinking, they approach these possibilities with impersonal analysis. Often the possibility they choose is a theoretical or technical one, with the human element more or less ignored.

The columns below present some of the results of these combinations:

TABLE 8.2: COMBINATIONS OF TYPE.

People who prefer:	ST SENSING + THINKING	SF SENSING + FEELING	NF INTUITION + FEELING	NT INTUITION + THINKING
focus their attention on:	Facts	Facts	Possibilities	Possibilities
and handle these with:	Impersonal analysis	Personal warmth	Personal warmth	Impersonal analysis
Thus they tend to become:	Practical and matter-of-fact	Sympathetic and friendly	Enthusiastic and insightful	Logical and ingenious
and find scope for their abilities in:	Technical skills with facts and objects	Practical help and services for people	Understanding and communicating with people	Theoretical and technical developments
for example:	Applied science Business Production Construction etc.	Patient care Community service Sales Teaching etc.	Behavioural science Research Literature and art Teaching etc.	Physical science Research Management Forecasts and analysis etc.

8.7 Summary of the four preferences

A person's type is the result of hs/her own combination of preferences, which can be stated in four letters for convenience. ISTJ means an introvert who likes sensing and thinking and a mainly judging attitude toward the outer world. ENFP means an extravert who likes intuition and feeling and a mainly perceptive attitude toward the outer world. (N is used for intuition because I stands for introversion). A summary of preferences follows according to Myers et al (1998:64).

8.7.1 Extroverted thinking types - ESTJ & ENTJ

Extroverted thinkers use their thinking to run as much of the world as may be theirs to run. They organise their facts and operations well in advance, define their objectives and make a systematic drive to reach these objectives on schedule. Through reliance on thinking, they become logical, analytical, often critical, impersonal and unlikely to be convinced by anything but reason.

8.7.2 Introverted thinking types - ISTP & INTP

Introverted thinkers use their thinking to analyse the world, not to run it. They organise ideas and facts, not situations or people unless they have to. Relying on thinking makes them logical, impersonal, objectively critical, not likely to be convinced by anything but reason. Being introverts, they focus their thinking on the principles underlying things, rather than on the things themselves. Since it is hard to switch their thinking from ideas to details of daily living, they lead their outer lives mainly with their preferred perceptive process, S or N. They are quiet, reserved, detachedly curious and quite adaptable - till one of their ruling principles is violated, at which point they stop adapting.

8.7.3 Extroverted Feeling Types - ESFJ & ENFJ

Extroverted feeling types radiate warmth and fellowship. Reliance on feeling gives them a very personal approach to life, since feeling judges everything by a set of personal values. Being extraverts, they focus their feeling on the people around them, placing a very high value on harmonious human contacts. They are friendly, tactful and sympathetic, and can almost always express the appropriate feeling.

8.7.4 Introverted Feeling Types - ISFP & INFP

Introverted feeling types have a wealth of warmth and enthusiasm, but may not show it till they know you well. Reliance on feeling leads them to judge everything by personal values; being introverts, they choose these values

without reference to the judgement of others. They know what is most important to them and protect that at all costs. Loyalties and ideals govern their lives. Their deepest feelings are seldom expressed, since their tenderness and passionate conviction are masked by their quiet reserve.

8.7.5 Extroverted Sensing Types - ESTP & ESFP

Extroverted sensing makes the adaptable realists, who good-naturedly accept and use the facts around them, whatever these happen to be. They know what the facts are, since they observe and remember more than any other type. They know what goes on, who wants what and who doesn't. And they do not fight those facts. There is a sort of effortless economy in the way they deal with a situation, never taking the hard way when an easier one will work.

8.7.6 Introverted Sensing Types - ISTJ & ISFJ

Introverted sensing types are made particularly dependable by their combination of preferences. They use their favourite process, sensing, in their inner life, and base their ideas on a deep, solid accumulation of stored impressions, which gives them some pretty unshakeable ideas. Then they use their preferred kind of judgement, thinking or feeling, to run their outer life. Thus they have a complete, realistic, practical respect both for the facts and for whatever responsibilities these facts create. Sensing provides the facts. And after the introvert's characteristic pause for reflection, their judgement accepts the responsibilities.

8.7.7 Extroverted Intuitive Types - ENTP & ENFP

The extroverted intuitives are the enthusiastic innovators. They are always seeing new possibilities - new ways of doing things, or relatively new and fascinating things that might be done - and they go all out in pursuit of these. They have a lot of imagination and initiative for originating projects, and a lot of impulsive energy for carrying them out. They are wholly confident of the worth of their inspirations, deal tirelessly with the problems involved, and

ingeniously with the difficulties. They get so interested in the current project that they think of little else.

8.7.8 Introverted Intuitive Types - INTJ & INFJ

The introverted intuitives are the great innovators in the field of ideas. They apply their intuitive insights to the relationships and meanings of things, regardless of established authority or popular beliefs. They trust their vision of the possibilities, regardless of universal scepticism. And they want to see their ideas worked out in practice, accepted and applied.

		SENSING TYPES		INSTUITIVES	
		WITH THINKING	WITH FEELING	WITH FEELING	WITH THINKING
INTROVERTS	**JUDGING**	**ISTJ** Introverted Sensing with thinking	**ISFJ** Introverted Sensing with feeling	**INFJ** Introverted Intuition with feeling	**INTJ** Introverted Intuition with thinking
	PERCEPTIVE	**ISTP** Introverted Thinking with sensing	**ISFP** Introverted Feeling with sensing	**INFP** Introverted Feeling with intuition	**INTP** Introverted Thinking with intuition
EXTRAVERTS	**JUDGING**	**ESTP** Extraverted Sensing with Thinking	**ESFP** Extraverted Sensing with feeling	**ENFP** Extraverted Intuition with feeling	**ENTP** Extraverted Intuition with thinking
	PERCEPTIVE	**ESTJ** Extraverted Thinking with sensing	**ESFJ** Extraverted Feeling with sensing	**ENFJ** Extraverted Feeling with intuition	**ENTJ** Extraverted Thinking with intuition

8.8 Reliability and Validity

Myers et al (1998:165) state that the internal consistency of the four MBTI scales is quite high in all samples as well as in the test-retest reliabilities.

8.9 Conclusion

Given a fair criterion and a test with a good predictive validity for members of one group, however, there still remains the question of whether the test will be valid for some other group, particularly when there are marked differences in the cultural backgrounds between the members of one group and the members of the other. Even where the test is found to have good predictive validity for both groups, there may still be questions relating to the fairness of the test according to Linn (1973:140). The pursuit in search of more fairness in selection is an ongoing process.

In addition assessment instruments should be affordable, easy to administer and not time consuming. Students entering tertiary education institutions are already burdened with high class fees and expensive books. However, if "old" traditional psychometric tests are used for selection, the costs will be considerably higher.

The proposed Equity Bill states that:
"Psychometric testing of an employee is prohibited unless it has been validated and measures have been taken to ensure that it is culturally fair and unbiased towards members of designated groups."

Erasmus and Arumugam (1998:41) states that:
"Psychometric testing is dead; long live situation-specific assessment".

CHAPTER 9

METHOD OF INVESTIGATION

9.1 Data Gathering Method

The accidental or incidental method of sampling was used for students studying human resources management and industrial engineering.

The incidental sampling method is defined by Plug et al (1997:382) as a sample that is available e.g. a class of students.

9.2 Participants

All first-year, second-year and third-year students studying Personnel Management and Industrial Engineering were included in the sample which contained 286 students.

9.3 Instruments

The following instruments were used to analyse the sample:

- DISCUSS – personality behavioural questionnaire;
- Nowicki-Strickland Lefcourt I/E questionnaire – internal vs external locus of control; and
- Myers-Briggs Type Indicator questionnaire – temperament indication.

The following information was gathered for each subject:

- Senior certificate results; and
- Examination results of major subjects.

The data was gathered from the information system of Technikon Pretoria.

9.4 Statistic Analysis

The SPSS for windows was used for statistical analysis.

9.4.1 Descriptive Statistics

Descriptive statistics provide a description or summary of the information or data gathered from individuals as reported by Howell (1992:4). The average, mean, degree of skewness and kurtosis are calculated and presented in this chapter.

The mean and average according to Huysamen (1997:25) are measurements of central tendency which assume a single value to represent all the values within a distribution.

Steyn et al (1996:101) refer to the arithmetic average as the most popular and widely used measurement of location, and the mean as the point that corresponds to the score that lies in the middle of the distribution. The mean instead of the arithmetic average is used to accommodate ordinal and interval scales.

Skewness can be described as the shape of the distribution of observations. A positive value indicates that the majority of the sample obtained a high score (negatively skewed) while on the other hand a negative value indicates positively skewness. A normal distribution is zero (Wegner, 1998:94).

The measure of kurtosis indicates the measure of peakedness of a distribution. The coefficient of kurtosis is defined by Steyn et al (1996:148) as follows:

$B_2 = 0$: normal kurtosis

$B_2 < 0$: negative kurtosis

$B_2 > 0$: positive kurtosis

The standard deviation is defined by McBurney (1994:419) as the square root of the variance or a measure of variability in the same units as the scores being described.

9.4.2 Correlations

The SPSS program for Windows was used to calculate correlations between the variables. A correlation analysis examines the strength of a linear association between two variables (Wegner, 1998:303).

9.4.3 Predictions

Multiple regression attempts to predict a dependent variable from a set of independent variables, and the regression equation according to Bless and Kathuria (1993:277):

$$y = ß_0 + ß_1x_1 + ß_2 x_2 + ...ß_kx_k$$

and $ß_0$, $ß_1$,.....$ß_k$ indicates the effect of its respective independent variable on the dependent variable and is called the partial regression. In order to determine the regression models for prediction, regression analysis for every measurement was done.

To determine whether the association, as postulated by multiple regression equation is significant, the size of the test statistics F are compared with the critical values of the F-distribution. F indicates the association of the variance as a result of regression and the variance as a result of error (ratio of between-variance to within-variance). High values indicate that the effect is responsible for a significant proportion of the variance of the response, in other words that it has a significant effect. When the F-value is more than the critical value of the F-distribution, the zero hypothesis can be rejected, which indicates that a significant association exists between the dependent and at least one of the independent variables (Underhill and Bradfield,1994:307).

9.4.4 Reliability

Smit (1993:37) reports that the reliability of a measure is simply its consistency. Generally reliability of a measuring instrument can be determined through three methods viz test-retest, alternate or parallel and internal consistency. In this study the method of internal consistency will be used to determine the reliability of a single test opportunity.

Cronbach's alpha also called the alpha coefficient, according to Rosnow and Rosenthal (1996:404), is a measurement of reliability and the inter-association of every item is examined. This indicates in essence the average of all possible split-half coefficients, which is the result of different distributions of the measuring instruments. The more highly the scores correlated, and the more items there are, the higher the reliability is. The alpha value of an item indicates the value of the item if the item is excluded from the scale.

Item analysis is a statistical method to determine which items from a multiple item scale must be excluded in order to increase the reliability of the instrument. The item with the highest alpha value (higher than Cronbach's alpha) is excluded from the model and the analysis is repeated until the alpha value of none of the exceeds Cronbach's alpha value (Julyan, 1996:8). A mathematical representation of alpha:

$$\alpha = \left(\frac{k}{k-1}\right)\left(1 - \frac{\sum_{i=1}^{k} \sigma_i^2}{\sigma_T^2}\right)$$

The reliability coefficient for the Nowicki-Strickland Lecourt I/E Scales (Rotter) was calculated according to Cronbach's alpha:

$$r = 0.9098$$

This is a very high reliability coefficient according to Bless and Higson-Smith (1995:135).

Research conducted by Roodt and Roberts (1996) concludes the Discuss's reliability of 0.728 (dominance), 0.645 (influence, 0.730 (steadiness) and 0.550 (compliance).

The reliability coefficient of the Myers-Briggs is reported by Myers et al (1998:163) as 0.79 (E/I), 0.83 (S/N), 0.62 (T/F) and 0.82 (J/P) which indicate consistency over time.

The reliability coefficient for the Myers-Briggs was calculated according to Cronbach's alpha:

$$r = 0.6914$$

This is a high reliability coefficient according to Bless and Higson-Smith (1995:135).

9.5 Summary

In this chapter the method of investigation and the descriptive statistics, correlational statistics and multiple regression used in the research are discussed.

The results of the reliability coefficient of the various instruments used are reported.

CHAPTER 10

RESULTS

The results of the various statistical techniques are subsequently discussed.

10.1 Descriptive Statistics

In Tables 10.1, 10.2, 10.3 and 10.4 the mean, standard error of the mean, standard deviation, variance, skewness and kurtosis of:

- matric subjects;
- DISCUSS;
- Myers-Briggs;
- Nowicki-Strickland & Lefcourt I/E Scales; and
- Technikon major subjects are presented.

Table 10.1: Descriptive statistics of matric subjects (N=286).

	Mean	Standard error of the Mean	Standard Deviation	Variance	Skewness	Kurtosis
Afrikaans	4.2418	6.787E-02	1.1214	1.258	-.220	-.252
English	4.0848	5.438E-02	.9147	.837	-.169	-.052
Mathematics	4.2979	.1111	1.3188	1.739	-.377	.078
Economics	4.3158	.1404	1.2243	1.499	-.857	.843
Business Economics	4.5269	.1210	1.1665	1.361	-.549	-.213
Typing	2.6429	.2123	1.3761	1.894	.512	-.482
Biology	4.7202	8.051^{E}-02	1.0435	1.089	-.953	.864
Science	4.5761	.1106	1.0611	1.126	-.486	-.418
Home Economics	3.5000	.3437	1.2860	1.654	-.886	.359
Art	4.0000	1.0000	1.7321	3.000	-1.732	.
Music						
Computers	4.8000	.2000	.4472	.200	-2.236	5.000
Geography	4.5122	.1180	1.0686	1.142	-.904	.774
History	4.5000	.1450	.9832	.967	-.293	-.307
Industrial Arts	4.2857	.2857	.7559	.571	-.595	-.350
S-Sotho	3.5000	.3273	.9258	.857	.000	.000
Swazi	3.6250	.2631	.7440	.554	-1.951	3.205
Agriculture	4.2174	.3077	1.4758	2.178	-.410	-.606
Northern Sotho	3.6667	.1209	.9819	.964	-.585	.213

Table 10.1: (continued)

	Mean	Standard error of the Mean	Standard Deviation	Variance	Skewness	Kurtosis
Accounting	4.5055	.1320	1.2594	1.586	-.729	-.060
Technika	4.6667	.3333	.5774	.333	-1.732	.
Tswana	3.8413	9.386E-02	.7450	.555	.026	-.661
Biblical Studies	4.0465	.1851	1.2141	1.474	-.679	.240
German	4.0000	1.0000	1.4142	2.000	.	.
Law	2.5000	1.5000	2.1213	4.500	.	.
Woodwork	3.4000	.4000	.8944	.800	-1.258	.312
Fitting & Turn	2.0000	.	.	.	.	.
Eng Science	4.0000	.5774	1.0000	1.000	.000	.
Motor Eng	4.5000	.5000	.7071	.500	.	.
Zulu	4.2000	.1414	.7071	.500	-.307	-.846
Xhosa	4.1429	.2608	.6901	.476	-.174	.336
Electrical Works	4.5000	.5000	.7071	.500	.	.
Ind Electricity	4.5000	.5000	.7071	.500	.	.
Electrical Technology	5.0000	.	.	.	.	.
Tsonga	3.5000	.1667	.5270	.278	.000	-2.571

In respect of Table 10.1 the distribution is skewed with the skewness coefficients with only three exceptions are either greater than zero or less than zero. The kurtosis values show that the distribution is not in the form of a bell curve, but either leptokurtic $\geq$ 0.263 or platykurtic $\leq$ 0,263. Due to the large values of the standard error of the mean, generalisations to the population cannot be made.

Shaded values represent an indication of a relatively normal distribution of the following matric subjects:

- Southern Sotho;
- Tswana;
- Engineering Science; and
- Tsonga.

Table 10.2: Descriptive statistics of the DISCUSS (N=286).

	Minimum	Maximum	Mean	Standard error of the Mean	Standard Deviation	Variance	Skewness	Kurtosis
Internal D	11.00	95.00	49.7168	.8110	13.7146	188.091	.644	1.093
Internal I	6.00	95.00	44.0105	1.0512	17.7771	316.024	.412	-.018
Internal C	24.00	95.00	68.0000	.8785	14.8567	220.723	-.258	-.742
Internal S	23.00	95.00	61.1853	1.0558	17.8549	318.797	.084	-.806
External D	5.00	83.00	39.9021	.8619	14.5765	212.475	.364	.223
External I	10.00	90.00	41.5979	1.0942	18.5047	342.424	.408	-.596
External S	18.00	90.00	51.2308	.8117	13.7270	188.431	.045	-.062
External C	5.00	91.00	58.9650	1.0721	18.1303	328.708	-.283	-.766
Stress	1.00	4.00	1.9720	3.602E-02	.6092	.371	.576	1.693

Table 10.2 indicates that the distribution of the DISCUSS is skewed with the skewness coefficients either greater than zero or less than zero. The kurtosis values show that the distribution is not in the form of a bell curve, but either leptokurtic $\geq$ 0.263 or platykurtic $\leq$ 0,263.

Table 10.3: Descriptive statistics of the Myers-Briggs and Nowicki-Strickland & Lefcourt I/E Scales (N=286).

	Minimum	Maximum	Mean	Standard error of the Mean	Standard Deviation	Variance	Skewness	Kurtosis
Myer E	1.00	10.00	5.9476	.1119	1.8920	3.580	-.102	-.383
Myer I	.00	12.00	4.0839	.1149	1.9430	3.775	.289	.324
Myer S	3.00	19.00	12.0804	.1617	2.7345	7.478	-.343	.450
Myer N	.00	17.00	7.9056	.1636	2.7673	7.658	.267	.528
Myer T	.00	18.00	9.8986	.1902	3.2173	10.351	-.145	.198
Myer F	2.00	20.00	10.0979	.1918	3.2429	10.517	.139	.171
Myer J	2.00	19.00	13.6888	.1804	3.0501	9.303	-.705	.420
Myer P	.00	15.00	6.2413	.1766	2.9867	8.921	.570	-.004
Rotter	12.00	65.00	27.2448	.3306	5.5910	31.259	1.186	8.180

Table 10.4: Descriptive statistics of the Technikon major subjects (N=286).

	Minimum	Maximum	Mean	Standard error of the Mean	Standard Deviation	Variance	Skewness	Kurtosis
MVI	5.00	75.00	52.6557	1.7421	13.6062	185.130	-1.131	2.972
PIW	.00	78.00	48.7719	2.6380	19.9168	396.679	-1.710	2.071
MED	.00	57.00	27.5000	15.8981	31.7962	1011.000	.014	-5.921
Pers Man	.00	76.00	49.0178	1.1238	16.8576	284.178	-1.914	3.483
Bus Eco	31.00	83.00	52.0343	.8438	11.1618	124.585	.255	-.390
Bus Admin	42.00	88.00	63.7500	1.4386	9.9670	99.340	.378	.212
Average (IE)	11	69	50.78	1.78	13.47	181.366	-1.360	1.293
AVG PM	17	78	51.71	.84	12.55	157.575	-.850	.760

As regards to Table 10.4 the distribution is skewed where the skewness coefficients are either greater than zero or less than zero. The kurtosis values show that the distribution is not in the form of a bell curve, but either leptokurtic $\geq$ 0.263 or platykurtic $\leq$ 0,263.

Table 10.5: Frequency distribution of the Industrial Engineering students (N=57).

	Frequency	Percentage	Valid percentage	Cumulative percentage
Fail	9	3.1	15.8	15.8
Pass	48	16.8	84.2	100.0
Total	57	19.9	100.0	-

From Table 10.5 it is evident that 84.2% of the sample were successful in their studies.

Table 10.6: Frequency distribution of the Personnel Management students (N=224).

	Frequency	Percentage	Valid percentage	Cumulative percentage
Fail	32	11.2	14.3	14.3
Pass	192	67.1	85.7	100.0
Total	224	78.3	100.0	-

From Table 10.6 it is evident that 85.7% of the sample passed their major subject.

10.1.1 Comparative descriptives between Industrial Engineering and Personnel Management Students

Table 10.7: Processing summary (N=286).

MATRIC SUBJECT	VALID		MISSING	
	N	Percent	N	Percent
Afrikaans	273	95.5%	13	4.5%
English	283	99.0%	3	1.0%
Mathematics	141	49.3%	145	50.7%
Economics	76	26.6%	210	73.4%
Bus Economics	93	32.5%	193	67.5%
Typing	42	14.7%	244	85.3%
Biology	168	58.7%	118	41.3%
Science	92	32.2%	194	67.8%
Home Economics	14	4.9%	272	95.1%
Art	3	1.0%	283	99.0%
Computers	5	1.7%	281	98.3%
Geography	82	28.7%	204	71.3%
History	46	16.1%	240	83.9%
Industrial Arts	7	2.4%	279	97.6%
S-Sotho	8	2.8%	278	97.2%
Swazi	8	2.8%	278	97.2%
Agriculture	23	8.0%	263	92.0%
Northern Sotho	66	23.1%	220	76.9%
Accounting	91	31.8%	195	68.2%

Table 10.7: Processing summary (N=286).

MATRIC SUBJECT	VALID		MISSING	
	N	Percent	N	Percent
Technology	3	1.0%	283	99.0%
Tswana	63	22.0%	223	78.0%
Biblical Studies	43	15.0%	243	85.0%
German	2	0.7%	284	99.3%
Law	2	0.7%	284	99.3%
Woodwork	5	1.7%	281	98.3%
Fitting & Turn	1	0.3%	285	99.7%
Eng Science	3	1.0%	283	99.0%
Motor Eng	2	0.7%	284	99.3%
Zulu	25	8.7%	261	91.3%
Xhosa	7	2.4%	279	97.6%
Electrical Works	2	0.7%	284	99.3%
Ind Electricity	2	0.7%	284	99.3%
Electrical Technology	1	0.3%	285	99.7%
Tsonga	10	3.5%	276	96.5%

Table 10.8: Comparative Afrikaans matric marks for Industrial Engineering and Personnel Management students (N=286).

	Symbol	Industrial Engineering	Personnel Management	Total
Afrikaans	A	1	3	4
	B	0	7	7
	C	14	47	61
	D	21	67	88
	E	15	58	73
	F	5	35	40
Total		56	217	273

It is evident from Table 10.8 that 217 Personnel Management students and 56 Industrial Engineering students had Afrikaans as a matric subject. 64.2% of the Industrial Engineering students and 57.1% of the Personnel Management students had obtained above 50% in Afrikaans.

Table 10.9: Comparative English matric marks for Industrial Engineering and Personnel Management students (N=286).

	Symbol	Industrial Engineering	Personnel Management	Total
English	A	0	1	1
	B	2	7	9
	C	13	48	61
	D	23	96	119
	E	21	59	80
	F	2	11	13
Total		61	222	283

From Table 10.9 it is clear that 61 Industrial Engineering students and 222 Personnel Management students had English as matric subject. 62.2% of the Industrial Engineering students and 68.5% of Personnel Management students obtained 50% or more in English.

Table 10.10: Comparative Mathematics matric marks for Industrial Engineering and Personnel Management students (N=286).

	Symbol	Industrial Engineering	Personnel Management	Total
Mathematics	A	3	1	4
	B	7	4	11
	C	10	8	18
	D	26	16	42
	E	12	29	41
	F	2	21	23
	G	0	1	1
	H	0	1	1
Total		60	81	141

It is evident from Table 10.10 that 81 Personnel Management students and 60 Industrial Engineering students had Mathematics as matric subject and 76.7% of the Industrial Engineering students and 35.8% of the Personnel Management students obtained above 50% in Mathematics.

Table 10.11: Comparative Economics matric marks for Industrial Engineering and Personnel Management students (N=286).

	Symbol	Industrial Engineering	Personnel Management	Total
Economics	A	0	4	4
	C	0	13	13
	D	0	21	21
	E	2	25	27
	F	0	11	11
Total		2	74	76

From Table 10.11 it is clear that 2 Industrial Engineering students and 74 Personnel Management students had Economics as a matric subject. None of the Industrial Engineering students and 51.4% of Personnel Management students obtained 50% or more in Economics.

Table 10.12: Comparative Business Economics matric marks for Industrial Engineering and Personnel Management students (N=268).

	Symbol	Industrial Engineering	Personnel Management	Total
Bus Economics	A	0	1	1
	B	1	2	3
	C	0	15	15
	D	1	21	22
	E	0	31	31
	F	0	21	21
Total		2	91	93

It is evident from Table 10.12 that 91 Personnel Management students and only 2 Industrial Engineering students had Business Economics as a matric subject. Both the Industrial Engineering students and 42.9% of the Personnel Management students obtained above 50% in Business Economics.

Table 10.13: Comparative Typing matric marks for Personnel Management students (N=286).

	Symbol	Personnel Management	Total
Typing	A	11	11
	B	9	9
	C	12	12
	D	5	5
	E	4	4
	F	1	1
Total		42	42

Table 10.13 indicates that no Industrial Engineering students and 42 Personnel Management students had Typing as a matric subject. 88.0% of Personnel Management students obtained 50% or more in Typing.

Table 10.14: Comparative Biology matric marks for Industrial Engineering and Personnel Management students (N=286).

	Symbol	Industrial Engineering	Personnel Management	Total
Biology	A	0	1	1
	B	1	5	6
	C	4	10	14
	D	11	22	33
	E	26	52	78
	F	4	32	36
Total		46	122	168

It is evident from Table 10.14 that 122 Personnel Management students and 46 Industrial Engineering students had Biology as a matric subject. 34.8% of the Industrial Engineering students and 31.1% of the Personnel Management students obtained above 50% in Biology.

Table 10.15: Comparative Science matric marks for Industrial Engineering and Personnel Management students (N=286).

	Symbol	Industrial Engineering	Personnel Management	Total
Science	B	1	2	3
	C	9	4	13
	D	16	6	22
	E	23	13	36
	F	7	11	18
Total		56	36	92

Table 10.15 indicates that 56 Industrial Engineering students and 36 Personnel Management students had Science as a matric subject. 46.4% of the Industrial Engineering and 33.3% of Personnel Management students obtained 50% or more in Science.

Table 10.16: Comparative Home Economics matric marks for Industrial Engineering and Personnel Management students (N=286).

	Symbol	Industrial Engineering	Personnel Management	Total
Home Economics	A	0	2	2
	C	0	4	4
	D	0	5	5
	E	1	2	3
Total		1	13	14

It is evident from Table 10.16 that 13 Personnel Management students and only one Industrial Engineering student had Home Economics as a matric subject and 84.6% of the Personnel Management students had obtained above 50% in Home Economics.

Table 10.17: Art matric marks for Personnel Management students (N=286).

	Symbol	Personnel Management	Total
Art	B	1	1
	E	2	2
Total		3	3

Table 10.17 indicates that no Industrial Engineering students and only 3 Personnel Management students had Art as a matric subject.

Table 10.18: Comparative Computer Science matric marks for Industrial Engineering and Personnel Management students (N=286).

	Symbol	Industrial Engineering	Personnel Management	Total
Computer Science	D	1	0	1
	E	3	1	4
Total		4	1	5

From Table 10.18 it is evident that 4 Industrial Engineering and only one Personnel Management student had Computer Science as a matric subject.

Table 10.19: Comparative Geography matric marks for Industrial Engineering and Personnel Management students (N=286).

	Symbol	Industrial Engineering	Personnel Management	Total
Geography	A	0	1	1
	B	2	1	3
	C	5	5	10
	D	5	13	18
	E	7	32	39
	F	1	10	11
TOTAL		20	62	82

It is evident from Table 10.19 that 62 Personnel Management students and 20 Industrial Engineering student had Geography as matric subject. 32.3% of the

Personnel Management and 60.0% of the Industrial Engineering students had achieved above 50% in Geography.

Table 10.20: Comparative History matric marks for Industrial Engineering and Personnel Management students (N=286).

	Symbol	Industrial Engineering	Personnel Management	Total
History	B	0	1	1
	C	1	5	6
	D	0	15	15
	E	0	17	17
	F	0	7	7
TOTAL		1	45	46

Table 10.20 indicates that only one Industrial Engineering student and 45 Personnel Management students had History as a matric subject. 46.7% of the Personnel Management students obtained 50% or more in History.

Table 10.21: Industrial Arts matric marks for Industrial Engineering students (N=286).

	Symbol	Industrial Engineering	Total
Industrial Arts	C	1	1
	D	3	3
	E	3	3
TOTAL		7	7

No Personnel Management students and 7 Industrial Engineering students had Industrial Arts as a matric subject. 4 of the 7 obtained more than 50% for the subject.

Table 10.22: Comparative Southern Sotho matric marks for Industrial Engineering and Personnel Management students (N=286).

	Symbol	Industrial Engineering	Personnel Management	Total
S- Sotho	B	1	0	1
	C	0	3	3
	D	0	3	3
	E	0	1	1
TOTAL		1	7	8

Table 10.22 indicates that only one Industrial Engineering student and 7 Personnel Management students had Southern Sotho as a matric subject. Six of the Personnel Management students obtained 50% or more for this subject.

Table 10.23: Comparative Swazi matric marks for Industrial Engineering and Personnel Management students (N=286).

	Symbol	Industrial Engineering	Personnel Management	Total
Swazi	B	0	1	1
	C	0	1	1
	D	4	2	6
TOTAL		4	4	8

Swazi as a matric subject was taken by 4 Industrial Engineering and 4 Personnel Management students. All obtained 50% or more in this subject.

Table 10.24: Comparative Agriculture matric marks for Industrial Engineering and Personnel Management students (N=286).

	Symbol	Industrial Engineering	Personnel Management	Total
Agriculture	A	0	1	1
	B	0	2	2
	C	1	3	4
	D	0	6	6
	E	0	4	4
	F	1	5	6
TOTAL		2	21	23

Only 2 Industrial Engineering students and 21 Personnel Management students had Agriculture as a matric subject. 57.1% of the Personnel Management students obtained 50% or more in this subject.

Table 10.25: Comparative Northern Sotho matric marks for Industrial Engineering and Personnel Management students (N=286).

	Symbol	Industrial Engineering	Personnel Management	Total
Northern Sotho	A	1	1	2
	B	0	5	5
	C	2	17	19
	D	7	20	27
	E	0	13	13
Total		10	56	66

It is evident from Table 10.25 that 10 Industrial Engineering students and 56 Personnel Management students had Northern Sotho as a matric subject. 9 of the Industrial Engineering and 78.6% of the Personnel Management students obtained 50% or more in this subject.

Table 10.26: Comparative Accounting matric marks for Industrial Engineering and Personnel Management students (N=286).

	Symbol	Industrial Engineering	Personnel Management	Total
Accounting	A	1	1	2
	B	2	2	4
	C	2	13	15
	D	1	15	16
	E	1	32	33
	F	0	21	21
TOTAL		7	84	91

Table 10.26 indicates that 7 Industrial engineering and 84 Personnel Management students had Accounting as a matric subject. All the Industrial Engineering and

36.9% of the Personnel Management students obtained 50% or more for this subject.

Table 10.27: Comparative Technology matric marks for Industrial Engineering and Personnel Management students (N=286).

	Symbol	Industrial Engineering	Personnel Management	Total
Technology	D	0	1	1
	E	2	0	2
TOTAL		2	1	3

It is clear from Table 10.27 that 2 Industrial Engineering students and one Personnel Management student had Technology as a matric subject.

Table 10.28: Comparative Tswana matric marks for Industrial Engineering and Personnel Management students (N=286).

	Symbol	Industrial Engineering	Personnel Management	Total
TSWANA	B	1	0	1
	C	7	13	20
	D	6	24	30
	E	3	9	12
TOTAL		17	46	63

Table 10.28 indicates that 17 Industrial engineering and 46 Personnel Management students had Tswana as a matric subject. 82.4% of the Industrial Engineering and 80.4% of the Personnel Management students obtained 50% or more in this subject.

Table 10.29: Comparative Biblical Studies matric marks for Industrial Engineering and Personnel Management students (N=286).

	Symbol	Industrial Engineering	Personnel Management	Total
Biblical Studies	A	0	2	2
	B	1	1	2
	C	1	8	9
	D	0	12	12
	E	0	15	15
	F	0	3	3
TOTAL		2	41	43

From Table 10.28 it is clear that only 2 Industrial Engineering and 41 Personnel Management students had Biblical Studies as a matric subject. Both the Industrial Engineering students as well as 56.1% of the Personnel Management students obtained 50% or more in this subject.

Table 10.30: Comparative German matric marks for Industrial Engineering and Personnel Management students (N=286).

	Symbol	Industrial Engineering	Personnel Management	Total
German	C	0	1	1
	E	1	0	1
TOTAL		1	1	2

Only one student from Industrial Engineering and one student from Personnel Management had German as a matric subject.

Table 10.31: Comparative Computer Science matric marks for Industrial Engineering and Personnel Management students (N=286).

	Symbol	Industrial Engineering	Personnel Management	Total
Computers	A	1	0	1
	D	0	1	1
Total		1	1	2

Table 10.31 indicates that one student from Industrial Engineering and one student from Personnel Management had Computer Science as a matric subject.

Table 10.32: Comparative Woodwork matric marks for Industrial Engineering and Personnel Management students (N=286).

	Symbol	Industrial Engineering	Personnel Management	Total
Woodwork	B	1	0	1
	C	0	1	1
	D	1	2	3
TOTAL		2	3	5

Two Industrial Engineering and 3 Personnel Management students took the matric subject, Woodwork.

Table 10.33: Fitting and Turning matric marks for Industrial Engineering students (N=286).

	Symbol	Industrial Engineering	Total
Fitting and Turning	B	1	1
TOTAL		1	1

One Industrial Engineering student and no Personnel Management student had the matric subject Fitting and Turning.

Table 10.34: Comparative Engineering Science matric marks for Industrial Engineering and Personnel Management students (N=286).

	Symbol	Industrial Engineering	Total
Eng Science	C	1	1
	D	1	1
	E	1	1
Total		3	3

Table 10.34 indicates that 3 Industrial Engineering and no Personnel Management students had Engineering Science as a matric subject.

Table 10.35: Motor Engineering matric marks for Industrial Engineering and Personnel Management students (N=286).

	Symbol	Industrial Engineering	Total
Motor Engineering	D	1	1
	E	1	1
Total		2	2

It is evident from table 10.35 that 2 Industrial Engineering and no Personnel Management students had Motor Engineering as a matric subject.

Table 10.36: Comparative Zulu matric marks for Industrial Engineering and Personnel Management students (N=286).

	Symbol	Industrial Engineering	Personnel Management	Total
Zulu	C	1	3	4
	D	2	10	12
	E	0	9	9
TOTAL		2	22	25

Table 10.36 indicates that 2 Industrial Engineering and 22 Personnel Management students had Zulu as a matric subject. Both the Industrial Engineering, as well as 59.0% of the Personnel Management students obtained 50% or more in this subject.

Table 10.37: Comparative Xhosa matric marks for Industrial Engineering and Personnel Management students (N=286).

	Symbol	Industrial Engineering	Personnel Management	Total
Xhosa	C	1	0	1
	D	2	2	4
	E	0	2	2
TOTAL		3	4	7

It is evident from Table 10.37 that 3 Industrial Engineering, and 4 Personnel Management students had Xhosa as a matric subject. All the Industrial

Engineering and 50% of the Personnel Management students obtained achieved 50% or more in this subject.

Table 10.38: Electrical Work matric marks for Industrial Engineering students (N=286).

	Symbol	Industrial Engineering	Total
Electrical Work	D	1	1
	E	1	1
TOTAL		2	2

Table 10.38 indicates that 2 Industrial Engineering and no Personnel Management students had Electrical Work as a matric subject.

Table 10.39 : Industrial Electricity matric marks for Industrial Engineering students (N=286).

	Symbol	Industrial Engineering	Total
Industrial Electricity	D	1	1
	E	1	1
TOTAL		2	2

It is evident from Table 10.39 that 2 Industrial Engineering and no Personnel Management students had Industrial Electricity as a matric subject.

Table 10.40: Electric Technology matric marks for Industrial Engineering students (N=286).

	Symbol	Industrial Engineering	Total
Electric Technology	E	1	1
TOTAL		1	1

Table 10.40 indicates that only one Industrial Engineering and no Personnel Management students had Electric Technology as a matric subject.

Table 10.41: Comparative Tsonga matric marks for Industrial Engineering and Personnel Management students (N=286).

	Symbol	Industrial Engineering	Personnel Management	Total
Tsonga	C	1	4	5
	D	0	5	5
TOTAL		1	9	10

1 Industrial Engineering and 9 Personnel Management students took Tsonga as a matric subject. All obtained 50% or more in this subject.

Table 10.42: Comparative descriptive statistics of Industrial Engineering and Personnel Management students (N=286).

		N	MEAN	STANDARD DEVIATION	STANDARD ERROR OF THE MEAN
Inter D	Industrial Eng	61	50.7541	15.0849	1.9314
	Personnel Man	225	49.4356	13.3412	.8894
Inter I	Industrial Eng	61	35.1803	14.1191	1.8078
	Personnel Man	225	46.4044	17.9359	1.1957
Inter S	Industrial Eng	61	63.4262	17.6441	2.2591
	Personnel Man	225	60.5778	17.9021	1.1935
Inter C	Industrial Eng	61	72.6230	14.9456	1.9136
	Personnel Man	225	66.7467	14.6151	.9743
Ext D	Industrial Eng	61	41.8361	15.8978	2.0355
	Personnel Man	225	39.3778	14.1895	.9460
Ext I	Industrial Eng	61	40.5574	17.9662	2.3003
	Personnel Man	225	41.8800	18.6772	1.2451
Ext S	Industrial Eng	61	47.7049	13.3658	1.7113
	Personnel Man	225	52.1867	13.6963	.9131
Ext C	Industrial Eng	61	62.9016	17.0799	2.1869
	Personnel Man	225	57.8978	18.2953	1.2197
Stress	Industrial Eng	61	1.9180	.6402	8.197E-02
	Personnel Man	225	1.9867	.6012	4.008E-02
Myer E	Industrial Eng	61	6.1311	2.0855	.2670
	Personnel Man	225	5.8978	1.8379	.1225
Myer I	Industrial Eng	61	3.8689	2.0855	.2670
	Personnel Man	225	4.1422	1.9033	.1269
Myer S	Industrial Eng	61	12.6066	2.4582	.3147
	Personnel Man	225	11.9378	2.7928	.1862
Myer N	Industrial Eng	61	7.4098	2.4588	.3148
	Personnel Man	225	8.0400	2.8352	.1890
Myer T	Industrial Eng	61	10.9508	2.9801	.3816
	Personnel Man	225	9.6133	3.2261	.2151
Myer F	Industrial Eng	61	9.0492	2.9801	.3816
	Personnel Man	225	10.3822	3.2590	.2173
Myer J	Industrial Eng	61	14.9344	2.7072	.3466
	Personnel Man	225	13.3511	3.0555	.2037

Table 10.42: (continued).

		N	MEAN	STANDARD DEVIATION	STANDARD ERROR OF THE MEAN
Myer P	Industrial Eng	61	5.0656	2.7072	.3466
	Personnel Man	225	6.5600	2.9847	.1990
Rotter	Industrial Eng	61	28.4918	4.5520	.5828
	Personnel Man	225	26.9067	5.8037	.3869

10.2 Multiple Regression Analysis

By means of multiple regression analysis the influence of two or more variables on the dependent variable can be determined. This analysis the influence of a variety of factors such as the factors of the Myers-Briggs on academic performance, can be determined. The calculation of the relative weight of each of the predictors in the regression model relies on both the single correlation between predictor and the criterion and on the inter-correlations between predictors (Coakes and Steed, 1996:129).

10.2.1 Matric Subjects

Description of matric subjects and Technikon subjects are presented in Tables 10.43 and 10.44 The data of the sample regarding matric subjects and Technikon major subjects were gathered from the Technikon's information system. All 35 possible matric subjects were included in the sample.

The major subjects for the Industrial Engineering students are:

- Mechanical Manufacturing Engineering (MME);
- Production Engineering (PE); and
- Mechanical Engineering Design (MED).

The major subjects for the Personnel Management students are:

- Personnel Management (PM);
- Business Economics (Bus Eco); and
- Business Administration (Bus Admin).

Table 10.43: Correlations between Matric subjects (N=286).

		Afrikaans	English	Mathe-matics	Economics	Bus Econo-mics	Typing	Biology	Science	Home Economics
Afrikaans	Pearson Correlation	1.000	.093	.010	-.196	.005	.486	-.081	.053	.652
	Sig. (2-tailed)	.	.128	.906	.101	.963	.001	.309	.629	.011
	N	273	270	132	71	90	41	159	87	14
English	Pearson Correlation	.093	1.000	.226	-.052	-.136	.100	.051	-.083	.052
	Sig. (2-tailed)	.128	.	.007	.656	.192	.530	.512	.432	.861
	N	270	283	141	76	93	42	165	92	14
Mathematics	Pearson Correlation	.010	.226	1.000	-.215	-.308	.002	-.105	.030	.280
	Sig. (2-tailed)	.906	.007	.	.392	.144	.993	.309	.781	.649
	N	132	141	141	18	24	25	95	86	5
Economics	Pearson Correlation	-.196	-.052	-.215	1.000	.126	.083	.906	.	.
	Sig. (2-tailed)	.101	.656	.392	.	.374	.832	.005	.	.
	N	1	76	18	76	52	9	7	2	2
Bus Economics	Pearson Correlation	.005	-.136	-.308	.126	1.000	.483	.268	-.185	.276
	Sig. (2-tailed)	.963	.192	.144	.374	.	.042	.185	.726	.549
	N	90	93	24	52	93	18	26	6	7
Typing	Pearson Correlation	.486	.100	.002	.083	.783	1.000	.266	-.155	.628
	Sig. (2-tailed)	.001	.530	.993	.832	.042	.	.272	.740	.052
	N	41	42	25	9	18	42	19	7	10
Biology	Pearson Correlation	-.081	.051	-.105	.906	.268	.266	1.000	.361	.562
	Sig. (2-tailed)	.309	.512	.309	.005	.185	.272	.	.002	.147
	N	159	165	95	7	26	19	168	70	8
Science	Pearson Correlation	.053	-.083	.030	.	-.185	-.155	.361	1.000	.
	Sig. (2-tailed)	.629	.432	.781	.	.726	.740	.002	.	.
	N	87	92	86	2	6	7	70	92	1
Home Economics	Pearson Correlation	.652	.052	.280	.	.276	.628	.562	.	1.000
	Sig. (2-tailed)	.011	.861	.649	.	.549	.052	.147	.	.
	N	14	14	5	2	7	10	8	1	14

Table 10.43: (continued).

		Afrikaans	English	Mathe-matics	Economics	Bus Econo-mics	Typing	Biology	Science	Home Economics
Art	Pearson Correlation	-.500	-.500	.	.	.	.	-1.000	.	.
	Sig. (2-tailed)	.667	.667	.	.	.	.	.	.	.
	N	3	3	1	0	1	2	2	1	1
Music	Pearson Correlation	.	.	.	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.
	N	0	0	0	0	0	0	0	0	0
Computers	Pearson Correlation	-.612	.612	-.612	.	.	.	.	-.333	.
	Sig. (2-tailed)	.272	.272	.272	.	.	.	.	.667	.
	N	5	5	5	0	1	0	1	4	0
Geography	Pearson Correlation	.082	-.084	-.022	-.302	.336	.108	.140	-.192	1.000
	Sig. (2-tailed)	.483	.457	.896	.698	.342	.838	.258	.380	.
	N	76	81	38	4	10	6	67	23	2
History	Pearson Correlation	-.005	-.023	.163	-1.000	.471	.000	.069	.	.866
	Sig. (2-tailed)	.974	.886	.675	.	.105	1.000	.698	.	.333
	N	44	43	9	2	13	4	34	2	3
Industrial Arts	Pearson Correlation	.359	.000	.764	.	.	.	.	.320	.
	Sig. (2-tailed)	.484	1.000	.046	.	.	.	.	.484	.
	N	6	7	7	0	0	0	0	7	0
Southern Sotho	Pearson Correlation	.650	-.602	.000	.	.	.	.869	.866	.
	Sig. (2-tailed)	.114	.114	1.000	.	.	.	.056	.333	.
	N	7	8	4	2	1	1	5	3	0
Swazi	Pearson Correlation	-.311	.311	.746	.	-.500	.	.633	.	.
	Sig. (2-tailed)	.453	.453	.148	.	.667	.	.127	.	.
	N	8	8	5	1	3	0	7	4	0
Agriculture	Pearson Correlation	.609	-.138	-.277	.	.	.	.022	-.693	.
	Sig. (2-tailed)	.003	.529	.821	.	.	.	.927	.512	.
	N	22	23	3	1	1	0	20	3	0

Table 10.43: (continued).

		Afrikaans	English	Mathe-matics	Economics	Bus Econo-mics	Typing	Biology	Science	Home Economics
Northern Sotho	Pearson Correlation	-.162	-.001	.132	-.093	-.286	.	-.297	-.113	0
	Sig. (2-tailed)	.210	.993	.568	.630	.208	.	.105	.727	.
	N	62	64	21	29	21	0	31	12	1
Accounting	Pearson Correlation	.136	-.109	-.164	-.038	-.208	-.481	.506	.558	.
	Sig. (2-tailed)	.208	.304	.311	.781	.151	.051	.023	.038	.
	N	87	91	40	56	49	17	20	14	0
Industrial Arts	Pearson Correlation	-1.00	.	.	.	.	.	.	.	.
	Sig. (2-tailed)	.000	.	.	.	.	.	.	.	.
	N	3	3	2	1	1	0	0	2	0
Tswana	Pearson Correlation	.087	-.008	.028	-.244	.251	.	-.222	-.084	.
	Sig. (2-tailed)	.507	.949	.877	.560	0.368	.	.133	.689	.
	N	60	63	33	8	15	1	47	25	1
Biblical Studies	Pearson Correlation	-.144	-.059	.000	-.389	-.188	.	-.086	.232	.
	Sig. (2-tailed)	.369	.712	1.000	.518	.656	.	.646	.768	.
	N	41	42	5	5	8	1	31	4	1
German	Pearson Correlation	1.000	1.000	.	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.
	N	2	2	1	0	1	1	1	1	0
Law	Pearson Correlation	1.000	.	.	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.
	N	2	2	1	0	1	1	0	1	0
Woodwork	Pearson Correlation	-.102	-.208	-.866	.	.	.	1.000	.	.
	Sig. (2-tailed)	.870	.649	.333	.	.	.	.	.	.
	N	5	5	3	2	2	0	2	2	0
Fitting & Turning	Pearson Correlation	.	.	.	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.
	N	1	1	1	0	0	0	0	1	0
Eng Science	Pearson Correlation	.866	.866	.866	.	.	.	-1.000	.	.
	Sig. (2-tailed)	.333	.333	.333	.	.	.	.	.	.
	N	3	3	3	0	0	0	2	2	0

Table 10.43: (continued).

		Afrikaans	English	Mathe-matics	Economics	Bus Econo-mics	Typing	Biology	Science	Home Economics
Motor Engineering	Pearson Correlation	1.000	.	1.000	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.
	N	2	2	2	0	0	0	1	2	0
Zulu	Pearson Correlation	-.266	.183	-.700	.156	-.356	.	-.342	-.686	.
	Sig. (2-tailed)	.208	.393	.121	.667	.233	.	.277	.314	.
	N	24	24	6	10	13	0	12	4	0
Xhosa	Pearson Correlation	.945	.019	-.255	.	.	.	-.343	1.000	.
	Sig. (2-tailed)	.212	.967	.775	.	.	.	.506	.	.
	N	3	7	4	3	0	1	6	2	0
Electrical works	Pearson Correlation	.	1.000	1.000	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.
	N	1	2	2	0	0	0	0	2	0
Ind Electricity	Pearson Correlation	.	-1.000	.	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.
	N	2	2	2	0	0	0	1	1	0
Electrical Technology	Pearson Correlation	.	.	.	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.
	N	1	1	1	0	0	0	0	0	0
Tsonga	Pearson Correlation	-.368	.186	.	-.577	.500	.	.443	.	.
	Sig. (2-tailed)	.295	.608	.	.423	.667	.	.379	.	.
	N	10	10	1	4	3	0	6	1	0

Table 10.43: (continued)

		Art	Music	Com-puters	Geo-graphy	History	Industrial Arts	Southern Sotho	Swazi	Agri-culture
Afrikaans	Pearson Correlation	-.500	.	-.612	.082	-.005	.359	.650	-.311	.609
	Sig. (2-tailed)	.667	.	.272	.483	.974	.484	.114	.453	.003
	N	3	.	5	76	44	6	7	8	22
English	Pearson Correlation	-.500	0	.612	-.084	-.023	.000	-.602	.311	-.138
	Sig. (2-tailed)	.667	.	.272	.457	.886	1.000	.114	.453	.529
	N	3	.	5	81	43	7	8	8	23
Mathematics	Pearson Correlation	.	0	-.612	-.022	.163	.764	.000	.746	-.277
	Sig. (2-tailed)	.	.	.272	.896	.675	.046	1.000	.148	.821
	N	1	.	5	38	9	7	4	5	3
Economics	Pearson Correlation	.	0	.	-.302	-1.000	.	.	.	.
	Sig. (2-tailed)	.	.	.	.698	.	.	.	.	.
	N	0	.	0	4	2	0	2	1	1
Bus Economics	Pearson Correlation	.	0	.	.336	.471	.	.	-.500	.
	Sig. (2-tailed)	.	.	.	.342	.105	.	.	.667	.
	N	1	.	1	10	13	0	1	3	1
Typing	Pearson Correlation	.	0	.	.108	.000	.	.	.	.
	Sig. (2-tailed)	.272	.740	.052	.	1.000	.	.	.	.
	N	19	7	10	2	4	0	1	0	0
Biology	Pearson Correlation	1.000	.361	.562	-1.000	.069	.	.869	.633	.022
	Sig. (2-tailed)	.	.002	.147	.	.698	.	.056	.127	.927
	N	168	70	8	2	34	0	5	7	20
Science	Pearson Correlation	.361	1.000	.	.	.	.320	.866	.	-.693
	Sig. (2-tailed)	.002	.	.	.	.	.484	.333	.	.512
	N	70	92	1	1	2	7	3	4	3
Home Economics	Pearson Correlation	.562	.	1.000	.	.866	.	.	.	.
	Sig. (2-tailed)	.147	.	.	.	.333	.	.	.	.
	N	8	1	14	1	3	0	0	0	0

Table 10.43: (continued)

		Art	Music	Com-puters	Geo-graphy	History	Industrial Arts	Southern Sotho	Swazi	Agri-culture
Art	Pearson Correlation	-1.000	.	.	1.000	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.
	N	2	1	1	3	0	0	0	0	0
Music	Pearson Correlation	.	.	.	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.
	N	0	0	0	0	0	0	0	0	0
Computers	Pearson Correlation	.	.	1.000	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.
	N	0	0	5	1	0	2	0	0	0
Geography	Pearson Correlation	.	.	.	1.000	.243	.	.000	.	.521
	Sig. (2-tailed)	.	.	.	.	.424	.	1.000	.	.101
	N	1	0	1	82	13	1	3	1	11
History	Pearson Correlation	.	.	.	.243	1.000	.	.	.	-.868
	Sig. (2-tailed)	.	.	.	.424	.	.	.	.	.132
	N	0	0	0	13	46	0	1	1	4
Industrial Arts	Pearson Correlation	.	.	.	.	.	1.000	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.
	N	0	0	2	1	0	7	0	0	0
Southern Sotho	Pearson Correlation	.	.	.	.000	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	1.000	.	.	.	.	.
	N	0	0	0	3	1	0	8	0	0
Swazi	Pearson Correlation	.	.	.	.	.	.	.	1.000	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.
	N	0	0	0	1	1	0	0	8	1
Agriculture	Pearson Correlation	.	.	.	.521	-.868	.	.	.	.
	Sig. (2-tailed)	.	.	.	.101	.132	.	.	.	1.000
	N	0	0	0	11	4	0	0	1	23
Northern Sotho	Pearson Correlation	.	.	.	.086	-.546	.	.	.	-.229
	Sig. (2-tailed)	.	.	.	.780	.128	.	.	.	.621
	N	0	0	0	13	9	1	0	0	7

Table 10.43: (continued)

		Art	Music	Com-puters	Geo-graphy	History	Industrial Arts	Southern Sotho	Swazi	Agri-culture
Accounting	Pearson Correlation	.	.	.	.633	-.596	.	-1.000	.	.
	Sig. (2-tailed)	.	.	.	.177	.593	.	.	.	.
	N	0	0	1	6	3	0	2	1	0
Technika	Pearson Correlation	.	.	.	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.
	N	0	0	1	0	0	2	0	0	0
Tswana	Pearson Correlation	.	.	.	-.040	.222	.	.	.	-.267
	Sig. (2-tailed)	.	.	.	.841	.467	.	.	.	.522
	N	0	0	0	27	13	1	0	0	8
Biblical Studies	Pearson Correlation	.	.	.	.108	-.431	.	.	.	-.065
	Sig. (2-tailed)	.	.	.	.702	.084	.	.	.	.868
	N	0	0	0	15	17	0	0	1	9
German	Pearson Correlation	.	.	.	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.
	N	0	0	0	0	0	0	0	0	0
Law	Pearson Correlation	.	.	.	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.
	N	0	0	1	0	1	0	1	0	0
Woodwork	Pearson Correlation	.	.	.	.186	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.879	.	.	.	.	.
	N	0	0	0	3	0	0	0	0	0
Fitting & Turning	Pearson Correlation	.	.	.	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.
	N	0	0	0	0	0	1	0	0	0
Eng Science	Pearson Correlation	.	.	.	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.
	N	0	0	0	0	0	0	0	0	0
Motor Eng	Pearson Correlation	.	.	.	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.
	N	0	0	0	0	0	1	0	0	0

Table 10.43: (continued)

		Art	Music	Com-puters	Geo-graphy	History	Industrial Arts	Southern Sotho	Swazi	Agri-culture
Zulu	Pearson Correlation	.	.	.	.395	.343	.	.	.	.
	Sig. (2-tailed)	.	.	.	.510	.505	.	.	.	.
	N	0	0	0	5	6	0	0	0	1
Xhosa	Pearson Correlation	.	.	.	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.
	N	0	0	0	2	2	0	0	0	0
Electrical works	Pearson Correlation	.	.	.	.	.	1.000	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.
	N	0	0	0	0	0	2	0	0	0
Ind Electricity	Pearson Correlation	.	.	.	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.
	N	0	0	0	0	0	0	0	0	0
Electrical Technology	Pearson Correlation	.	.	.	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.
	N	0	0	0	0	0	0	0	0	0
Tsonga	Pearson Correlation	.	.	.	-1.000	.	.	.	.	.349
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.565
	N	0	0	0	1	2	0	0	0	5

Table 10.43: (continued)

		Northern Sotho	Acounting	Technika	Tswana	Biblical Studies	German	Law	Wood-work	Fitting & Turning
Afrikaans	Pearson Correlation	-.162	.136	-1.000	.087	-.144	1.000	1.000	-.102	.
	Sig. (2-tailed)	.210	.208	.000	.507	.369	10	.	.870	.
	N	62	87	3	60	41	2	2	5	1
English	Pearson Correlation	-.001	-.109	.	-.008	-.059	1.000	.	-.280	.
	Sig. (2-tailed)	.993	.304	.	.949	.712	.	.	.649	.
	N	64	91	3	63	42	2	2	5	1
Mathematics	Pearson Correlation	.132	-.164	.	.028	.000	.		.	-.866
	Sig. (2-tailed)	.568	.311	.	.877	1.000	.	.		.333
	N	21	40	2	33	5	1	1	3	1
Economics	Pearson Correlation	-.093	-.038	.	-.244	-.389	.	.	.	.
	Sig. (2-tailed)	.630	.781	.	.560	.518	.	.	.	.
	N	29	56	1	8	5	0	0	2	0
Bus Economics	Pearson Correlation	-.286	-.208	.	.251	-.188	.	.	.	.
	Sig. (2-tailed)	.208	.151	.	.368	.656	.	.	.	.
	N	21	49	1	15	8	1	1	2	0
Typing	Pearson Correlation	.	.051	.	.	.	.	.	.	.
	Sig. (2-tailed)	.	.051	.	.	.	.	.	.	.
	N	0	17	0	1	1	1	1	0	0
Biology	Pearson Correlation	-.297	.506	.	-.222	-.086	.	.	1.000	.
	Sig. (2-tailed)	.105	.023	.	.133	.646	.	.	.	.
	N	31	20	0	47	31	1	0	2	0
Science	Pearson Correlation	-.113	.558	.	-.084	.232	.	.	.	.
	Sig. (2-tailed)	.727	.038	.	.689	.768	.	.	.	.
	N	12	14	2	25	4	1	1	2	1
Home Economics	Pearson Correlation	.	.	.	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.
	N	1	0	0	1	1	0	0	0	0

Table 10.43: (continued)

		Northern Sotho	Acounting	Technika	Tswana	Biblical Studies	German	Law	Wood-work	Fitting & Turning
Art	Pearson Correlation	.	.	.	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.
	N	0	0	0	0	0	0	0	0	0
Music	Pearson Correlation	.	.	.	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.
	N	0	0	0	0	0	0	0	0	0
Computers	Pearson Correlation	.	.	.	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.
	N	0	1	1	0	0	0	1	0	0
Geography	Pearson Correlation	.086	.633	.	-.040	.108	.	.	.189	.
	Sig. (2-tailed)	.780	.177	.	.841	.702	.	.	.879	.
	N	13	6	0	27	15	0	0	3	0
History	Pearson Correlation	-.526	-.596	.	.222	-.431	.	.	.	.
	Sig. (2-tailed)	.128	.593	.	.467	.084	.	.	.	.
	N	9	3	0	13	17	0	1	0	0
Industrial Arts	Pearson Correlation	.	.	.	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.
	N	1	0	2	1	0	0	0	0	1
Southern Sotho	Pearson Correlation	.	-1.000	.	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.
	N	0	2	0	0	0	0	1	0	0
Swazi	Pearson Correlation	.	.	.	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.
	N	0	1	0	0	1	0	0	0	0
Agriculture	Pearson Correlation	-.229	.	.	-.267	-.065	.	.	.	.
	Sig. (2-tailed)	.621	.	.	.522	.868	.	.	.	.
	N	7	0	0	8	9	0	0	0	0
Northern Sotho	Pearson Correlation	1.000	.053	.	.	.342	.	.	.	.
	Sig. (2-tailed)	.	.801	.	.	.277	.	.	.	.
	N	66	25	0	0	12	0	0	0	0

Table 10.43: (continued)

		Northern Sotho	Acounting	Technika	Tswana	Biblical Studies	German	Law	Wood-work	Fitting & Turning
Accounting	Pearson Correlation	.053	1.000	.	.166	.577	.	.	.	.
	Sig. (2-tailed)	.801	.	.	.605	.423	.	.	.	.
	N	25	91	1	12	4	1	0	0	0
Industrial Arts	Pearson Correlation	.	.	1.000	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.
	N	0	1	3	0	0	0	0	0	0
Tswana	Pearson Correlation	.	.166	.	1.000	.135	.	.	.	.
	Sig. (2-tailed)	.	.605	.	.	.729	.	.	.	.
	N	0	12	0	63	9	0	0	0	0
Biblical Studies	Pearson Correlation	.342	.577	.	.135	1.000	.	.	.	.
	Sig. (2-tailed)	.277	.423	.	.729	.	.	.	.	.
	N	12	4	0	9	43	0	0	0	0
German	Pearson Correlation	.	.	.	.	.	1.000	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.
	N	0	1	0	0	0	2	0	0	0
Law	Pearson Correlation	.	.	.	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.
	N	0	0	0	0	0	0	0	2	0
Woodwork	Pearson Correlation	.	.	.	.	.	.	.	1.000	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.
	N	0	0	0	0	0	0	0	5	0
Fitting & Turning	Pearson Correlation	.	.	.	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.
	N	0	0	0	0	0	0	0	0	1
Eng Science	Pearson Correlation	.	1.000	.	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.
	N	1	2	0	0	0	0	0	0	0
Motor Eng	Pearson Correlation	.	.	.	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.
	N	1	1	0	0	0	0	0	0	0

Table 10.43: (continued)

		Northern Sotho	Acounting	Technika	Tswana	Biblical Studies	German	Law	Wood-work	Fitting & Turning
Zulu	Pearson Correlation	.	.077	.	.	-.163	.	.	.	.
	Sig. (2-tailed)	.	.844	.	.	.675	.	.	.	.
	N	0	9	0	0	9	0	0	0	0
Xhosa	Pearson Correlation	.	.	.	.	-.277	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.821	.	.	.	.
	N	0	1	0	0	3	0	0	0	0
Electrical works	Pearson Correlation	.	.	.	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.
	N	0	0	1	1	0	0	0	0	0
Industrial Electricity	Pearson Correlation	.	.	.	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.
	N	0	0	1	1	0	0	0	0	0
Electrical Technology	Pearson Correlation	.	.	.	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.
	N	1	0	0	0	0	0	0	0	0
Tsonga	Pearson Correlation	.	-.500	.	.	1.000	.	.	.	.
	Sig. (2-tailed)	.	.667	.	.	.000	.	.	.	.
	N	0	3	0	0	3	0	0	0	0

Table 10.43: (continued)

		Eng Science	Motor Eng	Zulu	Xhosa	Electrical Work	Ind Electricity	Electrical Technology	Tsonga
Afrikaans	Pearson Correlation	.866	1.000	-.266	.945	.	.	.	-.368
	Sig. (2-tailed)	.333	.	.208	.212	.	.	.	.295
	N	3	2	24	3	1	2	1	10
English	Pearson Correlation	.866	.	.183	.019	1.000	-1.000	.	.186
	Sig. (2-tailed)	.333	.	.393	.967	.	.	.	.608
	N	3	2	24	7	2	2	1	10
Mathematics	Pearson Correlation	.866	1.000	-.700	-.225	1.000	.	.	.
	Sig. (2-tailed)	.333	.	.121	.775	.	.	.	.
	N	3	2	6	4	2	2	1	1
Economics	Pearson Correlation	.	.	.156	.	.	.	.	-.577
	Sig. (2-tailed)	.	.	.667	.	.	.	.	.423
	N	0	0	10	3	0	0	0	4
Bus Economics	Pearson Correlation	.	.	-.356	.	.	.	.	.500
	Sig. (2-tailed)	.	.	.233	.	.	.	.	.667
	N	0	0	13	0	0	0	0	3
Typing	Pearson Correlation	.	.	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.
	N	0	0	0	1	0	0	0	0
Biology	Pearson Correlation	-1.000	.	-.342	-.343	.	.	.	.443
	Sig. (2-tailed)	.	.	.277	.506	.	.	.	.379
	N	2	1	12	6	0	1	0	6
Science	Pearson Correlation	.	.	-.686	1.000	.	.	.	.
	Sig. (2-tailed)	.	.	.314	.	.	.	.	.
	N	2	1	4	2	2	1	0	1
Home Economics	Pearson Correlation	.	.	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.
	N	0	0	0	0	0	0	0	0
Art	Pearson Correlation	.	.	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.
	N	0	0	0	0	0	0	0	0

Table 10.43: (continued)

		Eng Science	Motor Eng	Zulu	Xhosa	Electrical Work	Ind Electricity	Electrical Technology	Tsonga
Music	Pearson Correlation	.	.	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.
	N	0	0	0	0	0	0	0	0
Computers	Pearson Correlation	.	.	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.
	N	0	0	0	0	0	0	0	0
Geography	Pearson Correlation	.	.	.395	.	.	.	.	.
	Sig. (2-tailed)	.	.	.510	.	.	.	.	.
	N	0	0	5	2	0	0	0	1
History	Pearson Correlation	.	.	.343	.	.	.	.	-1.000
	Sig. (2-tailed)	.	.	.505	.	.	.	.	.
	N	0	0	6	2	0	0	0	2
Industrial Arts	Pearson Correlation	.	.	.	.	1.000	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.
	N	0	1	0	0	2	0	0	0
Southern Sotho	Pearson Correlation	.	.	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.
	N	0	0	0	0	0	0	0	0
Swazi	Pearson Correlation	.	.	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.
	N	0	0	0	0	0	0	0	0
Agriculture	Pearson Correlation	.	.	.	.	.	.	.	.349
	Sig. (2-tailed)	.	.	.	.	.	.	.	.565
	N	0	0	1	0	0	0	0	5
Northern Sotho	Pearson Correlation	.	.	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.
	N	1	1	0	0	0	1	1	0

Table 10.43: (continued)

		Eng Science	Motor Eng	Zulu	Xhosa	Electrical Work	Ind Electricity	Electrical Technology	Tsonga
Accounting	Pearson Correlation	1.000	.	.077	.	.	.	.	-.500
	Sig. (2-tailed)	.	.	.844	.	.	.	.	.667
	N	2	1	9	1	0	1	0	3
Technika	Pearson Correlation	.	.	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.
	N	0	0	0	0	1	0	0	0
Tswana	Pearson Correlation	.	.	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.
	N	0	0	0	0	1	0	0	0
Biblical Studies	Pearson Correlation	.	.	-.163	-.277				1.000
	Sig. (2-tailed)	.	.	.675	.821				.000
	N	0	0	9	3	0	0	0	3
German	Pearson Correlation	.	.	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.
	N	0	0	0	0	0	0	0	0
Law	Pearson Correlation	.	.	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.
	N	0	0	0	0	0	0	0	0
Woodwork	Pearson Correlation	.	.	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.
	N	0	0	0	0	0	0	0	0
Fitting & Turning	Pearson Correlation	.	.	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.
	N	0	0	0	0	0	0	0	0
Eng Science	Pearson Correlation	1.000	.	.	.	.	-1.000	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.
	N	3	1	0	0	0	2	0	0
Motor Eng	Pearson Correlation	.	1.000	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.
	N	1	2	0	0	0	0	0	0

Table 10.43: (continued)

		Eng Science	Motor Eng	Zulu	Xhosa	Electrical Work	Ind Electricity	Electrical Technology	Tsonga
Zulu	Pearson Correlation	.	.	1.000	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.
	N	0	0	25	0	0	0	0	0
Xhosa	Pearson Correlation	.	.	.	1.000	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.
	N	0	0	0	7	0	0	0	0
Electrical works	Pearson Correlation	.	.	.	.	1.000	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.
	N	0	0	0	0	2	0	0	0
Ind Electricity	Pearson Correlation	-1.000	.	.	.	.	1.000	.	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.
	N	2	0	0	0	0	2	1	0
Electrical Technology	Pearson Correlation	.	.	.	.	.	.	1.000	.
	Sig. (2-tailed)	.	.	.	.	.	.	.	.
	N	1	0	0	0	0	1	1	0
Tsonga	Pearson Correlation	.	.	.	.	.	.	.	1.000
	Sig. (2-tailed)	.	.	.	.	.	.	.	.
	N	0	0	0	0	0	0	0	10

($p \leq 0.05$)

It is obvious from Table 10.43 that significant correlations exist between the following matric subjects as indicated by shaded values:

- Afrikaans and Typing (0,001);
- Afrikaans and Home Economics (0,011);
- Afrikaans and Agriculture (0,003);
- Economics and Biology (0,005);

- Business Economics and Typing (0,042);
- Biology and Science (0,005);
- Biology and Economics (0,002);
- Industrial Arts and Mathematics (0,046);
- Accounting and Typing (0,051);
- Accounting and Biology (0,023)
- Accounting and Science (0,038);
- Biology and Music (0,002);
- Science and Art (0,002); and
- Tsonga and Biblical Studies (0,000).

Table 10.44: Correlation between matric subjects and Technikon major subjects (N=286).

MATRIC SUBJECT		INDUSTRIAL ENGINEERING			PERSONNEL MANAGEMENT		
		MME	PE	MED	PM	Bus Economics	Bus Admin
Afrikaans	Pearson Correlation	0.049	-0.17	-0.945	-0.135	-0.096	-0.525
	Sig. (2-tailed)	0.719	0.223	0.212	0.047	0.215	.000
	N	56	53	3	217	168	47
English	Pearson Correlation	0.169	-0.028	0.257	-0.049	-0.018	-0.363
	Sig. (2-tailed)	0.192	0.836	0.743	0.463	0.817	0.011
	N	61	57	4	222	172	48
Mathematics	Pearson Correlation	0.001	-0.027	-0.036	-0.402	-0.202	-0.3
	Sig. (2-tailed)	0.994	0.842	0.964	.000	0.135	0.165
	N	60	56	4	81	56	23
Economics	Pearson Correlation	.	.	.	-0.246	-0.231	-0.231
	Sig. (2-tailed)	.	.	.	0.034	0.084	0.371
	N	2	1	1	74	57	17
Bus Eco	Pearson Correlation	-1	1	.	-0.075	-0.204	-0.042
	Sig. (2-tailed)	.	.	.	0.481	0.092	0.853
	N	2	2	0	91	69	22
Typing	Pearson Correlation	.	.	.	-0.172	-0.137	0.033
	Sig. (2-tailed)	.	.	.	0.276	0.688	0.864
	N	0	0	0	42	11	30
Biology	Pearson Correlation	0.227	-0.068	1	-0.275	-0.101	-0.216
	Sig. (2-tailed)	0.13	0.659	.	0.002	0.329	0.3
	N	46	44	2	122	96	25
Science	Pearson Correlation	0.185	-0.097	.	-0.073	-0.377	0.116
	Sig. (2-tailed)	0.172	0.489	.	0.671	0.044	0.827
	N	56	53	3	36	29	6
Home Economics	Pearson Correlation	.	.	.	-0.407	-0.458	0.18
	Sig. (2-tailed)	.	.	.	0.168	0.361	0.733
	N	1	1	0	13	6	6
Art	Pearson Correlation	.	.	.	0.434	.	.
	Sig. (2-tailed)	.	.	.	0.715	.	.
	N	0	0	0	3	2	1

Table 10.44: (continued).

MATRIC SUBJECT		INDUSTRIAL ENGINEERING			PERSONNEL MANAGEMENT		
		MME	PE	MED	PM	Bus Economics	Bus Admin
Music	Pearson Correlation	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.
	N	0	0	0	0	0	0
Computers	Pearson Correlation	-0.351	-0.228	.	.	.	.
	Sig. (2-tailed)	0.649	0.772	.	.	.	.
	N	4	4	0	1	1	0
Geography	Pearson Correlation	-0.171	-0.05	.	-0.068	0.005	-0.287
	Sig. (2-tailed)	0.47	0.835	.	0.598	0.971	0.421
	N	20	20	0	62	51	10
History	Pearson Correlation	.	.	.	-0.404	-0.312	0.94
	Sig. (2-tailed)	.	.	.	0.006	0.05	0.06
	N	1	1	0	45	40	4
Industrial Arts	Pearson Correlation	0.239	0.056	.	.	.	.
	Sig. (2-tailed)	0.606	0.916	.	.	.	.
	N	7	6	1	0	0	0
Southern Sotho	Pearson Correlation	.	.	.	-0.671	-0.015	.
	Sig. (2-tailed)	.	.	.	0.099	0.98	.
	N	1	1	0	7	5	2
Swazi	Pearson Correlation	.	.	.	-0.063	-1	.
	Sig. (2-tailed)	.	.	.	0.937	.	.
	N	4	4	0	4	2	2
Agriculture	Pearson Correlation	1	-1	.	-0.027	-0.179	.
	Sig. (2-tailed)	.	.	.	0.909	0.438	.
	N	2	2	0	21	21	0
Northern Sotho	Pearson Correlation	-0.051	-0.062	.	-0.234	-0.353	-0.14
	Sig. (2-tailed)	0.889	0.873	.	0.082	0.01	0.86
	N	10	9	1	56	52	4
Accounting	Pearson Correlation	-0.05	-0.311	.	-0.071	-0.093	-0.476
	Sig. (2-tailed)	0.915	0.498	.	0.521	0.471	0.029
	N	7	7	0	84	63	21

Table 10.44: (continued).

MATRIC SUBJECT		INDUSTRIAL ENGINEERING			PERSONNEL MANAGEMENT		
		MME	PE	MED	PM	Bus Economics	Bus Admin
Technika	Pearson Correlation	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.
	N	2	1	1	1	0	1
Tswana	Pearson Correlation	-0.211	-0.038	.	0.079	0.093	.
	Sig. (2-tailed)	0.416	0.885	.	0.603	0.543	.
	N	17	17	0	46	45	1
Biblical Studies	Pearson Correlation	-1	-1	.	0.076	0.002	-0.734
	Sig. (2-tailed)	.	.	.	0.636	0.992	0.158
	N	2	2	0	41	36	5
German	Pearson Correlation	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.
	N	1	1	0	1	0	1
Law	Pearson Correlation	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.
	N	1	1	0	1	1	0
Woodwork	Pearson Correlation	-1	-1	.	-0.5	0.5	.
	Sig. (2-tailed)	.	.	.	0.667	0.667	.
	N	2	2	0	3	3	0
Fitting & Turning	Pearson Correlation	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.
	N	1	1	0	0	0	0
Eng Science	Pearson Correlation	-0.768	-1	.	.	.	.
	Sig. (2-tailed)	0.443	.	.	.	.	.
	N	3	2	1	0	0	0
Motor Eng	Pearson Correlation	-1	-1	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.
	N	2	2	0	0	0	0
Zulu	Pearson Correlation	0.976	1	.	0.193	0.218	-0.468
	Sig. (2-tailed)	0.14	.	.	0.391	0.401	0.427
	N	3	2	1	22	17	5

Table 10.44: (continued).

MATRIC SUBJECT		INDUSTRIAL ENGINEERING			PERSONNEL MANAGEMENT		
		MME	PE	MED	PM	Bus Economics	Bus Admin
Xhosa	Pearson Correlation	0.5	1	.	0.648	0.891	.
	Sig. (2-tailed)	0.667	.	.	0.352	0.109	.
	N	3	2	1	4	4	0
Electrical works	Pearson Correlation	1	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.
	N	2	1	1	0	0	0
Ind Electricity	Pearson Correlation	-1	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.
	N	2	1	1	0	0	0
Electrical Technology	Pearson Correlation	.	.	.	.	.	.
	Sig. (2-tailed)	.	.	.	.	.	.
	N	1	0	1	0	0	0
Tsonga	Pearson Correlation	.	.	.	0.219	0	.
	Sig. (2-tailed)	.	.	.	0.571	1	.
	N	1	1	0	9	8	1

($p \leq 0.05$)

Table 10.44 indicates that a relatively high correlation exists between:

- Personnel Management and the matric subjects: Afrikaans, Mathematics, Economics, Biology and History;
- Business Economics and the matric subjects Science, History and Northern Sotho;
- Business Administration and the matric subjects Afrikaans, English and Accounting

10.2.2 Major Subjects of Personnel Management as a Dependent Variable

Regression analysis was conducted on the various measuring instruments in order to predict the Personnel Management mark. The following results regarding the measuring instruments were found:

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.379	.144	.069	12.11

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	**Regression**	5078.305	18	282.128	1.923	.016
	Residual	30218.417	206	146.691		
	Total	35296.722	224			

Case Number	Std Residual	AVG PM	Predicted Value	Residual
72	-3.123	30	67.82	-37.82

The following variables are included as possible predictors of the average Personnel Management mark:

- Rotter / Nowicki-Strickland Lefcourt I/E Scales;
- Myers-Briggs (extraversion, intraversion, sensing, judging, thinking, feeling, perception, intuition);

- DISCUSS (External dimensions - dominance, influence, compliance, steadiness);
- DISCUSS (Internal dimensions – dominance, influence, steadiness, compliance); and
- DISCUSS - Stress dimension.

The possible predictors together explain 14,4% of the variance in the major Technikon subject Personnel Management and is significant as indicated by the F value.

Table 10.45: Residuals statistics (N=225).

	Minimum	Maximum	Mean	Std Deviation	N
Predicted Value	34.88	72.11	51.71	4.76	225
Std Predicted Value	-3.534	4.284	.000	1.000	225
Standard Error of Predicted Value	1.77	12.05	3.28	1.28	225
Adjusted Predicted Value	11.62	76.02	51.40	5.74	225
Residual	-37.82	23.94	4.11E-15	11.61	225
Std Residual	-3.123	1.977	.000	.959	225
Stud Residual	-3.437	2.045	.008	1.002	225
Deleted Residual	-45.82	48.88	.31	13.03	225
Stud Deleted Residual	-3.531	2.061	.006	1.010	225
Mahal Distance	3.766	220.865	17.920	23.455	225
Cook's Distance	.000	.742	.008	.051	225
Centered Leverage Value	.017	.986	.080	.105	225

10.2.2.1 DISCUSS

Table 10.46: Coefficients of the model tested. (N=286).

	Unstandardised Coefficients		Standardised Coefficients	T	Sig
	B	Std Error	Beta		
(Constant)	29.055	59.821		.486	.628
Inter D	-6.496E-02	.089	-.069	-.728	.467
Inter I	-4.953E-02	.062	-.071	-.798	.426
Inter S	-2.919E-03	.064	-.004	-.045	.964
Inter C	-9.455E-02	.072	-.110	-1.308	.192
Ext D	.104	.088	.118	1.187	.237
Ext I	-2.707E-02	.060	-.040	-.448	.655
Ext S	2.085E-02	.083	.023	.252	.802
Ext C	.116	.060	.169	1.916	.057
Stress	.116	1.493	.047	.653	.515

It is evident from Table 10.46 that the dimension external compliance contributes significantly to the model.

10.2.2.2 Myers-Briggs

Table 10.47: Coefficients of the model tested (N=286).

	Unstandardised Coefficients		Standardised Coefficients	T	Sig
	B	Std. Error	Beta		
(Constant)	29.055	59.821		.486	.628
Myer E	.326	1.287	.048	.254	.800
Myer I	.476	1.237	.072	.385	.701
Myer S	-8.052E-02	1.229	-.018	-.066	.948
Myer N	.265	1.227	.060	.216	.829
Myer T	-.846	2.327	-.218	-.364	.716
Myer F	-.106	2.320	-.027	-.046	.964
Myer J	.757	.875	.184	.865	.388
Myer P	.503	.906	.120	.555	.579

10.2.2.3 Nowicki-Strickland & Lefcourt I/E Scales

Table 10.48: Coefficients of the model tested (N=286).

	Unstandardised Coefficients		**Standardised Coefficients**	T	**Sig**
	B	**Std. Error**	**Beta**		
(Constant)	29.055	59.821		.486	.628
ROTTER	.473	.150	.219	3.147	.002

The shaded value as indicated in Table 10.48 indicates a significant contribution to the model.

Table 10.49 : Correlations between DISCUSS and Myers-Briggs (N=286).

		Myer E	Myer I	Myer S	Myer N	Myer T	Myer F	Myer J	Myer P
Internal D	Pearson Correlation	0.068	-0.083	0.107	-0.11	0.276	-0.286	0.031	-0.017
	Sig. (2-tailed)	0.249	0.16	0.07	0.063	0	0	0.603	0.769
	N	286	286	286	286	286	286	286	286
Internal I	Pearson Correlation	0.054	-0.024	-0.17	0.134	-0.072	0.074	-0.158	0.145
	Sig. (2-tailed)	0.359	0.691	0.004	0.024	0.222	0.212	0.007	0.014
	N	286	286	286	286	286	286	286	286
Internal S	Pearson Correlation	-0.041	0.036	-0.143	0.161	-0.237	0.239	-0.079	0.087
	Sig. (2-tailed)	0.486	0.549	0.016	0.007	0	0	0.184	0.141
	N	286	286	286	286	286	286	286	286
Internal C	Pearson Correlation	-0.094	0.092	0.242	-0.211	0.076	-0.074	0.226	-0.24
	Sig. (2-tailed)	0.114	0.119	0	0	0.201	0.21	0	0
	N	286	286	286	286	286	286	286	286
Ext D	Pearson Correlation	0.113	-0.102	0.161	-0.179	0.262	-0.266	0.074	-0.083
	Sig. (2-tailed)	0.056	0.086	0.006	0.002	0	0	0.215	0.16
	N	286	286	286	286	286	286	286	286
Ext I	Pearson Correlation	0.088	-0.067	-0.152	0.162	-0.098	0.093	-0.199	0.208
	Sig. (2-tailed)	0.139	0.256	0.01	0.006	0.098	0.118	0.001	0
	N	286	286	286	286	286	286	286	286
Ext S	Pearson Correlation	-0.139	0.128	-0.089	0.105	-0.302	0.306	-0.087	0.103
	Sig. (2-tailed)	0.019	0.031	0.133	0.076	0	0	0.14	0.083
	N	286	286	286	286	286	286	286	286
Ext C	Pearson Correlation	0.059	-0.065	0.042	-0.06	0.082	-0.076	0.164	-0.18
	Sig. (2-tailed)	0.316	0.271	0.476	0.312	0.166	0.2	0.005	0.002
	N	286	286	286	286	286	286	286	286
Stress	Pearson Correlation	-0.01	0.011	-0.1	0.057	-0.068	0.071	-0.027	0.008
	Sig. (2-tailed)	0.861	0.855	0.092	0.339	0.254	0.234	0.645	0.898
	N	286	286	286	286	286	286	286	286

($p \leq 0.05$)

The following shaded values of the DISCUSS as indicated in Table 10.49 correlate significantly with the indicated dimensions of the Myers-Briggs:

- Internal influence with sensing, intuition and judging;
- Internal steadiness with sensing and intuition;
- External dominance with sensing and intuition;
- External influence with sensing, intuition and judging;
- External sensing with extraversion and intuition; and
- External compliance with judging and perception.

Table 10.50: Correlations between DISCUSS and Nowicki-Strickland & Lefcourt I/E Scales (N=286).

		Rotter
Internal D	Pearson Correlation	0.085
	Sig. (2-tailed)	0.15
	N	286
Internal I	Pearson Correlation	-0.103
	Sig. (2-tailed)	0.083
	N	286
Internal S	Pearson Correlation	0.127
	Sig. (2-tailed)	0.031
	N	286
Internal C	Pearson Correlation	-0.062
	Sig. (2-tailed)	0.299
	N	286
External D	Pearson Correlation	0.098
	Sig. (2-tailed)	0.099
	N	286
External I	Pearson Correlation	-0.072
	Sig. (2-tailed)	0.225
	N	286
External S	Pearson Correlation	-0.097
	Sig. (2-tailed)	0.102
	N	286
External C	Pearson Correlation	0.028
	Sig. (2-tailed)	0.635
	N	286
Stress	Pearson Correlation	-0.143
	Sig. (2-tailed)	0.015
	N	286

($p=\leq 0.05$)

From the shaded values in Table 10.50 it is evident that a significant relation exists between the Rotter/ Nowicki-Strickland Lefcourt I/E scales and the Discuss

internal steadiness dimension as well as the Discuss stress dimension. Major Subjects of Industrial Engineering as a Dependent Variable Regression analysis was conducted on the various measuring instruments in order to predict the Industrial Engineering mark. The following results regarding the measuring instruments were found:

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.514	.265	-.004	13.50

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	**Regression**	2687.829	15	179.189	.984	.489
	Residual	7468.680	41	182.163		
	Total	10156.509	56			

The following variables are included as possible predictors of the average Industrial Engineering mark:

- Rotter/ Nowicki-Strickland Lefcourt I/E scales;
- Myers-Briggs – intraversion, intuition, sensing, feeling, perception;
- DISCUSS – External dominance, influence, steadiness, compliance;
- DISCUSS – Internal dominance, influence, steadiness, compliance; and
- DISCUSS – stress.

The possible predictors together explain 26.5% of the variance in the major Technikon subjects of Industrial Engineering and is significant as indicated by the F value.

Table 10.51: Residual Statistics (N=57).

	Minimum	Maximum	Mean	Std Deviation	N
Predicted Value	34.64	68.49	50.78	6.93	57
Std Predicted Value	-2.330	2.557	.000	1.000	57
Standard Error of Predicted Value	4.66	13.50	7.01	1.43	57
Adjusted Predicted Value	34.26	74.61	51.00	8.10	56
Residual	-36.52	19.50	-8.5E-15	11.55	57
Std Residual	-2.705	1.445	.000	.856	57
Stud Residual	-3.034	1.643	-.007	1.015	56
Deleted Residual	-45.92	25.23	-.22	16.20	56
Stud Deleted Residual	-3.403	1.680	-.022	1.055	56
Mahal Distance	5.686	55.018	14.737	7.279	57
Cook's Distance	.000	.191	.025	.043	56
Centered Leverage Value	.102	.982	.263	.130	57

10.2.3.1 DISCUSS

Table 10.52: Coefficients of the model tested (N=286).

	Unstandardised Coefficients		Standardised Coefficients	T	Sig
	B	Std Error	Beta		
(Constant)	148.873	331.221	.298	.449	.655
Inter D	.260	.265	.119	.981	.332
Inter I	.110	.205	.053	.537	.594
Inter S	4.125E-02	.160	.012	.258	.798
Inter C	1.097E-02	.220	.029	.050	.960
Ext D	2.421E-02	.201	.115	.120	.905
Ext I	8.489E-02	.166	-.139	.512	.611
Ext S	-.143	.196	.129	-.730	.469
Ext C	9.999E-02	.147	.029	.678	.501
Stress	.614	3.590	.029	.171	.865

10.2.3.2 Myers-Briggs

Table 10.53: Coefficients of the model tested (N=286).

	Unstandardised Coefficients		Standardised Coefficients	T	Sig
	B	Std. Error	Beta		
(Constant)	148.873	331.221		.449	
Myer I	.348	1.063	.055	.328	.745
Myer S	-7.719	17.002	-1.453	-.454	.652
Myer N	-7.859	17.075	-1.479	-.460	.648
Myer F	2.237	.721	.509	3.102	.003
Myer P	-1.024	.899	-.211	-1.139	.261

The shaded value as indicated in Table 10.53 indicates a significant contribution to the model.

10.2.2.3 Nowicki-Strickland & Lefcourt I/E Scales

Table 10.54: Coefficients of the model tested (N= 286).

	Unstandardised Coefficients		Standardised Coefficients	T	Sig
	B	**Std Error**	**Beta**		
(Constant)	148.873	331.221		.449	.655
Rotter	.532	.500	.182	1.064	.294

According to Table 10.54 the value of the constant indicates that there is no relationship between the five independent variables and the dependent variable Industrial Engineering.

Table 10.55: T-test of measuring instruments (N=286).

		LEVENE'S TEST FOR EQUALITY OF VARIANCES		T-TEST FOR EQUALITY OF MEANS				T-TEST FOR EQUALITY OF MEANS		
		F	SIG	T	DF	SIG (2-TAILED)	MEAN DIFFERENCE	STD ERROR DIFFERENCE	95% CONFIDENCE INTERVAL OF THE DIFFERENCE	
									Lower	Upper
Inter D	Equal variances assumed	1.149	.285	.665	284	.506	1.3185	1.9817	-2.5821	5.2192
	Equal variances not assumed			.620	87.096	.537	1.3185	2.1264	-2.9078	5.5449
Inter I	Equal variances assumed	3.448	.064	-4.521	284	.000	-11.2241	2.4829	-16.1114	-6.3369
	Equal variances not assumed			-5.179	117.938	.000	-11.2241	2.1674	-15.5163	-6.9320
Inter S	Equal variances assumed	.049	.826	1.106	284	.270	2.8485	2.5764	-2.2228	7.9197
	Equal variances not assumed			1.115	96.159	.268	2.8485	2.5550	-2.2230	7.9199
Inter C	Equal variances assumed	.605	.437	2.772	284	.006	5.8763	2.1199	1.7036	10.0490
	Equal variances not assumed			2.737	93.460	.007	5.8763	2.1474	1.6123	10.1402
Ext D	Equal variances assumed	2.684	.102	1.169	284	.243	2.4583	2.1028	-1.6808	6.5974
	Equal variances not assumed			1.095	87.621	.276	2.4583	2.2446	-2.0026	6.9192
Ext I	Equal variances assumed	.399	.528	-.494	284	.621	-1.3226	2.6748	-6.5875	3.9423
	Equal variances not assumed			-.506	98.055	.614	-1.3226	2.6157	-6.5134	3.8681
Ext S	Equal variances assumed	.057	.811	-2.278	284	.023	-4.4817	1.9671	-8.3538	-.6097
	Equal variances not assumed			-2.311	96.921	.023	-4.4817	1.9397	-8.3315	-.6320
Ext C	Equal variances assumed	3.461	.064	1.921	284	.056	5.0039	2.6049	-.1235	10.1312
	Equal variances not assumed			1.998	100.528	.048	5.0039	2.5040	3.633E-02	9.9714
Stress	Equal variances assumed	3.554	.060	-.780	284	.436	-6.8634E-02	8.800E-02	-.2419	.1046
	Equal variances not assumed			-.752	90.731	.454	-6.8634E-02	9.124E-02	-.2499	.1126
Myer E	Equal variances assumed	1.732	.189	.854	284	.394	.2334	.2732	-.3045	.7712
	Equal variances not assumed			.794	86.896	.429	.2334	.2938	-.3506	.8173
Myer I	Equal variances assumed	1.197	.275	-.975	284	.331	-.2734	.2805	-.8255	.2788
	Equal variances not assumed			-.925	88.943	.358	-.2734	.2956	-.8608	.3140
Myer S	Equal variances assumed	.569	.451	1.700	284	.090	.6688	.3934	-.1056	1.4432
	Equal variances not assumed			1.829	105.868	.070	.6688	.3657	-5.6235E-02	1.3938
Myer N	Equal variances assumed	.639	.425	-1.582	284	.115	-.6302	.3984	-1.4144	.1541
	Equal variances not assumed			-1.716	107.317	.089	-.6302	.3672	-1.3581	9.775E-02

Table 10.55: (continued).

		LEVENE'S TEST FOR EQUALITY OF VARIANCES		T-TEST FOR EQUALITY OF MEANS				T-TEST FOR EQUALITY OF MEANS		
		F	SIG	T	DF	SIG (2-TAILED)	MEAN DIFFERENCE	STD ERROR DIFFERENCE	95% CONFIDENCE INTERVAL OF THE DIFFERENCE	
									Lower	Upper
Myer T	Equal variances assumed	.021	.886	2.918	284	.004	1.3375	.4584	.4351	2.2398
	Equal variances not assumed			3.054	101.441	.003	1.3375	.4380	.4687	2.2063
Myer F	Equal variances assumed	.049	.825	-2.884	284	.004	-1.3330	.4622	-2.2429	-.4232
	Equal variances not assumed			-3.036	102.334	.003	-1.3330	.4391	-2.2039	-.4622
Myer J	Equal variances assumed	3.552	.061	3.674	284	.000	1.5833	.4309	.7351	2.4316
	Equal variances not assumed			3.938	105.237	.000	1.5833	.4020	.7862	2.3805
Myer P	Equal variances assumed	3.281	.071	-3.535	284	.000	-1.4944	.4227	-2.3265	-.6624
	Equal variances not assumed			-3.739	103.061	.000	-1.4944	.3997	-2.2871	-.7018
Rotter	Equal variances assumed	2.336	.128	1.974	284	.049	1.5851	.8030	4.534E-03	3.1657
	Equal variances not assumed			2.266	118.380	.025	1.5851	.6996	.1999	2.9704

($p \leq 0.05$)

The shaded values in Table 10.55 indicate significant relations between academic success in average Technikon major subject and the dimensions of the:

- Discuss internal influence, steadiness;
- Discuss external steadiness, compliance;
- Myers-Briggs thinking, feeling, judging, perception; and the
- Rotter/ Nowicki-Strickland Lefcourt I/E scales.

CHAPTER 11

DIFFERENTIAL SELECTION MODEL

11.1 Introduction

Stoker et al (1985:158) recommend course specific selection. The fields of study at tertiary institutions, but especially Technikons, impose distinctive requirements and challenges to students. The ideal, therefore, would be a specific selection procedure or differential admission requirements for each course of study.

In its mission statement the Technikon Pretoria commits itself to procuring students with the highest possible ability in order to maintain high academic standards. During 1996 a new admission policy was accepted. This policy states that the Swedish formula cannot be used in isolation, but research must to be undertaken to provide alternative selection methods. The criteria that were set for the admission policy are that it should be:

- scientific, that is accountable, objective and empirically founded;
- transparent, that is, all procedures should be clearly described and known; and
- fair, that is the highest possible level of objectivity to be achieved.

Louw et al (1998:153) suggests the following regarding selection and its purpose:

- the best equipped person for the career task should be selected. This does not necessarily mean the academically best qualified person, but implies that not only will the person at present be able to achieve success in a course, but there exists a possibility of personal growth and development within the chosen career;
- Selection should not be only aimed at the potentially successful first-year student, but also at the potentially successful final-year student and incumbent; and

- Selection should make provision for individual differences.

Van der Vyfer (1984:113) states that a selection system including more than scholastic performance as the sole predictor, will become increasingly important at tertiary institutions, especially at Technikons.

The Technikon Pretoria strives to provide and promote career-orientated education in accordance with the high-level human resource needs of the community, and to support and promote programmes for co-operative education. Smit (1992:5) states that in order to achieve this aim training and education are career specific.

11.2 Model

A differential multiple hurdles model has been designed for the selection of students at tertiary institutions as depicted in Figures 11.1 and 11.2. Huysamen (1996:12) also recommends the multiple-hurdles model for tertiary institutions.

The model as depicted in Figure 11.1 is designed for the selection of Personnel Management students. The first hurdle is the Swedish formula therefore an applicant, with a mark of 100 and above, is unconditionally accepted. This represents 5 subjects on higher grade with an average D-symbol.

To an applicant with a Swedish mark of lower than 100 the Nowicki-Strickland Lefcourt I/E scales will be applied. If an applicant receives 30 or more he/she will be accepted. An applicant receiving below 30 will be subjected to the Discuss model and specifically, the external compliance dimension.

FIGURE 11.1: SELECTION MODEL FOR THE SELECTION OF HUMAN RESOURCES MANAGEMENT STUDENTS.

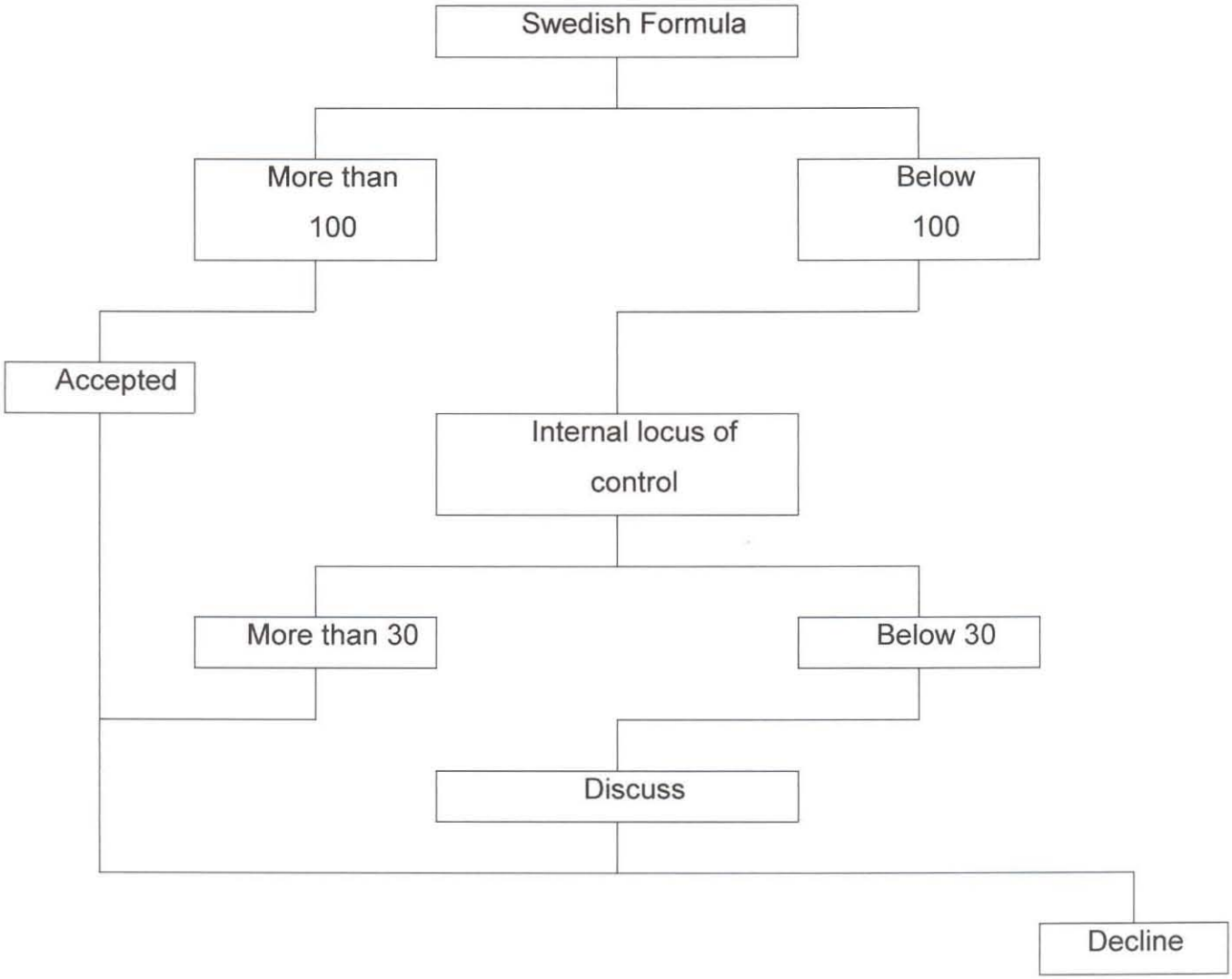
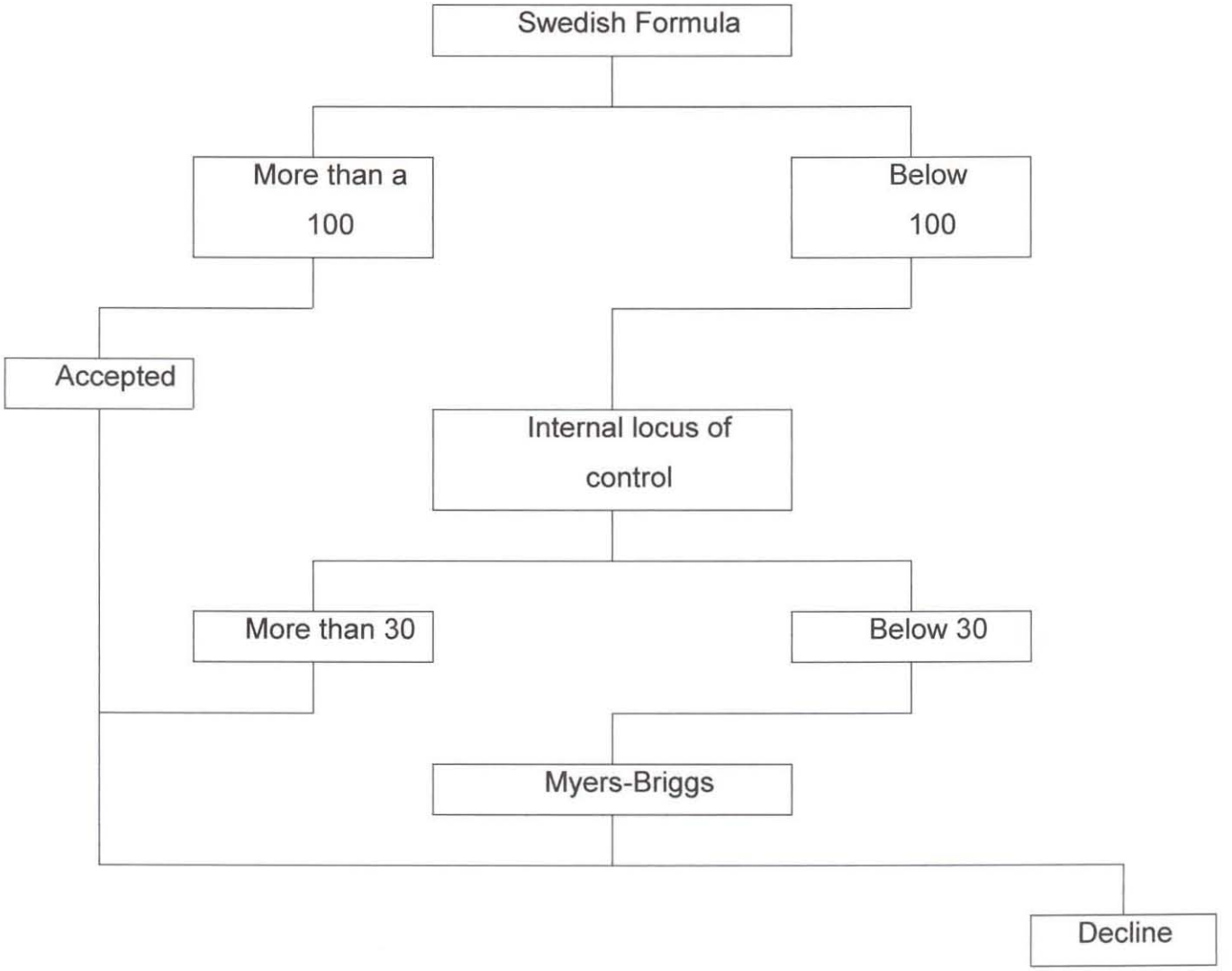


FIGURE 11.2: SELECTION MODEL FOR THE SELECTION OF INDUSTRIAL ENGINEERING STUDENTS.



The model as depicted in Figure 11.2 has been designed for the selection of Industrial Engineering students. The first hurdle is the Swedish formula and an applicant with a mark of 100 and above is unconditionally accepted. This represents 5 subjects on higher grade with an average D symbol.

To an applicant with a Swedish mark of lower than 100, the Nowicki-Strickland Lefcourt I/E scales will be applied. If an applicant receives 30 or more he/she will

be accepted. An applicant receiving lower than 30 will be subjected to the Myers-Briggs and specifically the intraversion, intuition, sensing, feeling and perception.

11.3 Conclusions

Selecting students for tertiary study is a worldwide problem. Traditionally, scholastic achievements were used as selection criteria to gain access to South African tertiary institutions. An alternative procedure has therefore been researched and the focus has had to move to assessing the individual's ability to achieve academic success.

From the results as presented in chapter 10 the following conclusions can be drawn:

11.3.1 Matric subjects

Significant correlations were found between:

- Afrikaans and Typing, Home Economics and Agriculture;
- Economics and Biology;
- Business Economics and Typing;
- Biology and Science and Economics;
- Industrial Arts and Mathematics;
- Accounting, Biology and Science;
- Science and Art; and
- Tsonga and Biblical Studies.

11.3.2 Matric subjects and Technikon subjects

11.3.2.1 Personnel Management

Significant relations were found between Personnel Management and the following matric subjects:

- Afrikaans;

- English
- Mathematics;
- Economics;
- Biology;
- Science
- History;
- Northern Sotho; and
- Accounting.

The relation with 3 languages could indicate the underlying assumption that language ability is a necessity for academic success as mentioned by Landman (1986:116).

The inclusion of numerical subjects such as Economics, Accounting and Mathematics indicates a relation with the business environment.

11.3.2.2 Industrial Engineering

No significant relations with any matric subjects were found. A possible reason could be that that the number of students namely 57 included in the study, had a choice of 35 matric subjects.

11.4 Measuring Instruments

Specifically the Discuss external dimension compliance and the Nowicki-Strickland Lefcourt I/E scales predict success in Personnel Management.

The following variables are included as possible predictors of the average Personnel Management mark:

- Rotter / Nowicki-Strickland Lefcourt I/E Scales;
- Myers-Briggs (extraversion, intraversion, sensing, judging, thinking, feeling, perception, intuition);
- DISCUSS (External dimensions - dominance, influence, compliance, steadiness);

- DISCUSS (Internal dimensions – dominance, influence, steadiness, compliance); and
- DISCUSS - Stress dimension.

Significant relations between the following dimensions of the Discuss and Myers-Briggs were found:

- Internal influence and sensing, intuition, thinking and judging;
- Internal steadiness and sensing, intuition;
- External dominance and sensing, intuition;
- External influence and sensing, intuition, judging;
- External sensing and extraversion, intuition; and
- External compliance and judging and perception.

Significant relations were found between the Nowicki-Strickland Lefcourt I/E scales and the following dimensions of the Discuss:

- Internal steadiness; and
- Stress.

The following variables are included as possible predictors of the average Industrial Engineering mark:

- Rotter/ Nowicki-Strickland Lefcourt I/E scales;
- Myers-Briggs – intraversion, intuition, sensing, feeling, perception;
- DISCUSS – External dominance, influence, steadiness, compliance;
- DISCUSS – Internal dominance, influence, steadiness, compliance; and
- DISCUSS – stress.

Significant relations between Industrial Engineering and the feeling dimension of the Myers-Briggs were found.

Significant relations were found between academic success in the average Technikon major subjects and the dimensions of the:

- Discuss internal influence, steadiness;
- Discuss external steadiness, compliance;

- Myers-Briggs thinking, feeling, judging, perception; and
- Rotter/ Nowicki-Strickland Lefcourt I/E scales.

In conclusion of this study the models as presented in Figures 11.1 and 11.2 can be utilised to predict academic success for the two courses viz Human Resources Management and Industrial Engineering.

11.5 Recommendations

It has been concluded that Technikon selection cannot depend solely on matric results and that milieu limitations regarding education systems, social and economic factors must be taken into consideration. This poses new challenges to Technikons and other tertiary institutions.

The point of departure will always be matric subjects combined in different permutations, but those applicants who do not comply with this criteria must be give an opportunity to enter tertiary education through additional selection techniques as presented in Figures 11.1 and 11.2.

One of the limitations of this study is that the number of Industrial Engineering students included in the sample was only 57.

The validity and reliability of the measuring instruments in this study can contribute significantly to the journey of fine-tuning the models presented in Figures 11.1 and 11.2. The inclusion of a valid and reliable potential test will enhance these models significantly.

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