CHAPTER 3

QUESTIONNAIRE DEVELOPMENT

3.1. INTRODUCTION

In Chapter 2 the readiness characteristics were identified through a number of theoretical theories, models and perspectives. The non-cognitive or psychological factors cannot be measured directly, such as high school results or as demographic variables. It is therefore necessary to measure the latent psychological perceptions and perspectives with something else. A structured questionnaire is proposed to measure the latent non-cognitive perspectives of students. According to Sedlacek (2005) non-cognitive variables are useful to predict performance in all students and seem to be positively related to retention and graduation.

A review of various questionnaire items and constructs follows. These questionnaires form the foundation for the development of items and constructs of the 'Academic Readiness Questionnaire' (ARQ). The six phases in the development of a psychological instrument, as suggested by Foxcroft (2005, p. 55) was used to standardise the ARQ. The is ARQ is regarded as a concise measurement instrument that measures the readiness characteristics identified in the synthesised model of readiness for university education that is discussed in Chapter 2.

3.2. QUESTIONNAIRE REVIEW

A review and evaluation of the main academic readiness instruments will follow. The questionnaires were chosen because they measure various non-cognitive readiness characteristics that were discussed in Chapter 2 of this report. Research on the

questionnaires seems to show reliable results for the use of the questionnaires in higher educational settings to predict retention, graduation and academic performance, with or without the use of cognitive instruments:

- Non-Cognitive Questionnaire
- Survey of Academic Orientations
- Trait Self-Regulatory Inventory
- Motivated Strategies for Learning Questionnaire
- Institutional Integration Scale
- Vocational Identity Scale
- Metacognitive Awareness Inventory
- Locus of Control Inventory
- International Personality Item Pool
- Alpha Baseline Questionnaire

3.2.1. Non-Cognitive Questionnaire (NCQ)

The NCQ is a questionnaire developed by Tracey and Sedlacek in 1984 to assess the non-cognitive dimensions that were important in minority students' (Asian, African-American and Hispanic students in the USA) academic success (Tracey & Sedlacek, 1989). The 1984 NCQ was tested empirically for its psychometric properties through various empirical studies and showed to be content valid, predictive of grades, persistence and eventual graduation. Some of the scales were found to have low internal consistency estimates and a study was conducted to improve the reliability and validity of the questionnaire (Tracey & Sedlacek, 1989).

The NCQ was revised and consists of 67 items that comprise of two sets, one set which directly assesses the non-cognitive dimensions (38 items) and a second set of experimental items. The non-cognitive items made use of a 5 point Likert-type scale and ranged from 1 Strongly agree to 5 Strongly disagree. The other items cover, for instance,

background information and goals and extra-curricular activities that can be listed in an open section. The study was restricted to the statistical analysis of the non-cognitive items only. A confirmatory factor analysis was used to determine the factor loadings of the instrument and the main objective was to determine the validity of the instrument with minority students.

A split-half reliability method was used to determine an independent estimate of the validity of the factor loading estimates for the black student group by splitting the black student group into two sub-samples. The estimated Cronbach's coefficient alphas for the original black group ranged from 0.55 to 0.84, with a mean of 0.66 (Tracey & Sedlacek, 1989). According to Tracey & Sedlacek (1989) the estimates of internal consistency appear to be adequate if taken into account the difficulty in defining the constructs. The reliability for each sub-scale across the three samples showed similar patterns, however the second black and white sample had lower reliability estimates on academic self-concept and support for academic plans. According to Tracey & Sedlacek (1989) this could be due to the few items in these sub-scales.

Finally, a random sample of white students with similar sample size as the black sub-samples was used to determine the invariance of the parameter estimates across race. Goodness-of-fit indices (Chi-square) were used to test the model derived from the first black sample on a random sample of white students. Results from the Chi-squares revealed no difference between the variances of the first and second black sub-groups and between the black model and the white group. Thus the proposed model is sufficient for all three groups based on the goodness-of-fit indicators. Based on the findings, the NCQ-R has adequate support for application with white and African students (Sedlacek, 2004, 2005).

Alternate forms of the NCQ have been subjected to empirical analysis and demonstrated good test-retest reliability estimates that range between 0.74 and 0.94 with different sample groups (Sedlacek, 2005). The alternate forms of the NCQ contain similar items, although the NCQ-R contains more items with a revised factor structure. Sedlacek

(2004) provides two alternate forms of the NCQ. Alternate form A has 29 non-cognitive specific questions while the Alternate form B has 31 non-cognitive specific questions.

The NCQ posits eight non-cognitive dimensions. These eight dimensions are:

3.2.1.1. Academic self-concept

Self-concept refers to the way students feel about themselves. Accordingly, a student with a positive self-concept is able to show confidence, determination and independence. Bandura (1986) indicates self-concept to be a related but distinct construct to self-efficacy.

3.2.1.2. Realistic self-appraisal

Self-appraisal is the ability to understand your strength and weaknesses and to learn from them so that one can improve and strengthen them. In an educational setting a motivated student would work hard to address deficiency. Academic apathy would be the opposite (see Survey of Academic Orientations in 3.2.2).

3.2.1.3. Understanding of and ability to deal with racism

Understanding of and ability to deal with racism refers to dealing with various forms of prejudices (racism, sexism, etcetera.) based on personal experiences within the institutional environment that hinder the development of students.

3.2.1.4. Preference for long range goals

Preference for long range goals refers to students' ability to set aside the need for immediate gratification for long-term outcomes.

3.2.1.5. Support of others for academic plans

Parents and relatives play a supportive role to help students persist through to graduation. According to Moxley, Najor-Durack & Dumbrigue (2001), students do not

arrive at university isolated from their parents and in many cases relatives and people with strong influence support students when they face a crisis.

3.2.1.6. Successful leadership experience

Students with leadership ability are those with an ability to organize and influence others. These students therefore have to show assertiveness in order to do so.

3.2.1.7. Demonstrated community service

Demonstrating community service refers to having a community with which students can identify and who provides needed support when necessary. According to Moxley et al. (2001) the function of external communities is firstly to transmit the value of a higher education degree, secondly to provide resources to support entry to higher education (financial and otherwise), thirdly to provide access to support that is otherwise not available from the institution, and lastly to help form support communities based on social, cultural or other types of identities (also see Jones et al., 2008).

3.2.1.8. Non-traditional knowledge

Non-traditional knowledge refers to the ability of students to gain knowledge out of a formal learning environment by using methods that are non-traditional or more experiential in nature.

Table 3.1. Internal consistencies of the Non-Cognitive Questionnaire constructs by sample

Construct	*n* items	Black 1	Black 2	White
Academic positive self-concept	4	0.60	0.49	0.40
Realistic self appraisal	5	0.58	0.56	0.49
Support for academic plans	3	0.84	0.53	0.49
Leadership	5	0.79	0.83	0.82
Long range goals	7	0.65	0.72	0.68
Community ties	8	0.61	0.57	0.70
Racism	4	0.55	0.54	0.37
Academic familiarity	4	0.66	0.74	0.60

Tracy and Sedlacek (1989, p. 642)

An evaluation of the non-cognitive dimensions of the NCQ in general shows positive relations with retention and graduation and could lead to diversity in the student population, because criteria other than academic or cognitive variables are used. Non-cognitive dimensions also show normal distribution, similar to cognitive measures, when administered in a scholarship programme (Sedlacek, 2005). For each of the eight dimensions, positive self-concept, having a supportive person, and a realistic self-appraisal have shown positive correlation with academic performance, retention, and graduation by various research studies for all types of students (Sedlacek, 2005). These dimensions seem to be universal factors necessary for academic success.

The remainder of the dimensions did not show direct relations with academic performance, retention, or graduation, but for academic success in general. For example, having an understanding of racism and knowing how to handle a racist system could help break down stereotypes with an empowering and positive approach and

positive academic expectations (Sedlacek, 2005). Having long-range goals seem to correlate with persistence for international students and in general students perform better academically with such goals. Students with leadership abilities seem to be more successful at university, specifically for minority and female students.

Culture and gender-related activities need to be taken into account when assessing leadership abilities, because cultural and gender influences present different ways of expressing leadership abilities. Culture and gender-related experiences should also be taken into account when communities are formed around these differences. In many cases white students have ample opportunities to join communities of interest, but minority and female students to not have the same opportunities. However, when minority students do join a specific community they learn how to 'handle the system, exhibit leadership, and develop their self-concepts in such groups' (Sedlacek, 2005, p. 185).

A different study confirms the use of non-cognitive dimensions for academic success (Schmitt, Oswald & Gillespie, 2005, p. 199). These dimensions were isolated after an analysis of 35 United States colleges' and universities' mission statements. The purpose of these dimensions is to measure the 'ultimate criterion' that includes academic knowledge, citizenship and leadership and the 'actual criterion' of academic performance and graduation (Schmitt et al., 2005, p. 199).

Of the 12 dimensions isolated in the Schmitt et al. (2005) study, five of the dimensions correspond almost directly with five dimensions of the NCQ (Camara, 2005a):

• Leadership versus successful leadership experience
• Social responsibility, citizenship, and involvement versus demonstrated community service
• Perseverance versus preference for long range goals

- Multicultural tolerance and appreciation versus understanding of and ability to deal with racism
- Continuous learning, intellectual interest, and curiosity versus non-traditional knowledge

The non-cognitive dimensions in Schmitt et al. (2005) that could have a direct effect on academic success, that are not represented in the NCQ is having clear career-related goals, being physically and mentally healthy to pursue a degree and being able to adapt to changing environments. Results from a statistical analysis on the 12 dimensions show only moderate relations between grade point average (GPA) and health, adaptability, and knowledge. Schmitt et al. (2005) indicated that the dimensions added incremental validity above that of the GPA to predict academic performance.

3.2.2. Survey of Academic Orientations (SAO) (Davidson, Beck & Silver, 1999)

The SAO is a short international questionnaire that assesses undergraduate students' perceptions of key college-environment features. The survey consists of 36 items and is measured on a 5 point Likert-type scale. The SAO measures six academic orientations, namely: structure dependence (S), creative expression (C), reading for pleasure (R), academic efficacy (E), apathy (A), and mistrust of instructors (M) (Davidson et al., 1999, p. 680).

3.2.2.1. Structure dependence

Structure dependence (S) refers to individuals that prefer structure over ambiguity by knowing exactly what is expected of them in class. Students who are structure dependent (S) on the SAO show concurrent validity with the sub-scale: a need for structure of the Personal Need for Structure Scale (PNS). High S scores were also associated with scores high in extrinsic motivation and grade orientation and dependence on external guidance in order to achieve academically. These students also tended to be self-doubting of their ability (Davidson et al., 1999, p. 687).

3.2.2.2. Creative expression

Creative expression (C) refers to individuals that enjoy creative expression and they are predominantly learning oriented. Students who score high on creative expression usually have high intrinsic motivation scores, are learning oriented, score high on the sub-scale 'openness' of the 'Big Five' measure, have high scores on reading for pleasure (R) of the SAO and they have low grade orientations (Davidson et al., 1999, p. 688).

3.2.2.3. Reading for pleasure

Reading for pleasure (R) refers to individuals who enjoy reading a variety of literature for non-degree purposes. Students who have high R scores value achievement through their own effort. High R scores are correlated positively with the sub-scale 'openness' and the creative expression subscale of the SAO as well as with high intrinsic motivation score. They also show high levels of learning orientation and low levels of grade orientation (Davidson et al., 1999, p. 689).

3.2.2.4. Academic efficacy

Academic efficacy (E) refers to individuals who are confident that they will achieve their academic goals. They do not succumb to self-doubt and are able to overcome failures and obstacles. Students with high E scores have high learning orientation and independence score and low grade orientation score. High E scores are also related to low levels of self-doubt and low mistrust score (M) on the SAO. Self-efficacious students usually set achievement goals and make use of self-regulated learning (Davidson et al., 1999, p. 689).

3.2.2.5. Apathy

Apathy (A) refers to individuals who will exert minimal effort to attain a grade. They set low academic standards and do not exert the necessary effort in academic task to achieve high marks. Concurrent validity with the LOGOII survey indicates that high apathy scores are associated with high grade orientation and low learning orientation

scores. These students tend to think concretely, have poor study skills and usually experience test anxiety. Because of their tendency to have grade orientation, they aspire to make have good marks but frequently do not have the skill to obtain them (Davidson et al., 1999). 'As a consequence, they reduce their effort, which provides a less threatening reason (low effort) for low grades than does an attribution of low capability' (Davidson et al., 1999, p. 689).

3.2.2.6. *Mistrust of instructors*

Mistrust of instructors (M) refers to individuals who believe their instructors to be devious when it comes to assessment and assigning grades. These students also blame academic staff for their failures, rather than themselves. Students with high M scores are highly grade orientated and steer away from independence in academic situations. 'Their tendency to focus on grades, combined with their lack of confidence in grade givers, apparently makes them reluctant to pursue tasks that encourage self-directed accomplishments' (Davidson et al., 1999, p. 689).

Table 3.2. Internal consistencies of the Survey of Academic Orientation constructs by sample

Constructs	*n* items	Alpha
Structure dependence	6	0.59
Creative expression	6	0.70
Reading for pleasure	6	0.85
Academic efficacy	6	0.74
Apathy	6	0.66
Mistrust	6	0.67

(Davidson et al., 1999, p. 688)

In general, high scores on the C, R, and E orientations are regarded as desirable because they are generally associated with positive outcomes. High scores on the S, A, and M orientations are regarded as undesirable because they are generally associated with negative outcomes (Davidson et al., 1999).

The SAO provides predictive information on students who are at risk of experiencing academic stress (Davidson & Beck, 2006), receiving poor grades or not persisting to graduation and therefore functions as an early warning indicator to identify students at risk (Beck & Davidson, 2001). Two of the six orientations provided good prediction for GPA, namely: academic efficacy and academic apathy. According to Beck and Davidson (2001, 2006) there is ample evidence from literature to suggest the importance of these orientations for academic success. For the SOA to be used as an early warning indicator, the results of the SOA have to predict academic success and risk for withdrawal. To determine academic success, a summary metric (AI) was developed to determine a student's overall orientation toward the institution. Results from the Beck and Davidson (2001) study indicate that the predictive value for the AI scores was lower than that of the six orientations entered individually when predicting GPA.

Two studies in Beck and Davidson (2001) to provide external validity evidence were conducted that provide consistent results indicating statistically significant correlations between the SOA and GPA and suggesting the use of the SOA as an early warning indicator at some institutions. A limitation of the study is the lack of empirical evidence of the predictive validity of the SAO on retention or withdrawal. Conclusions made regarding the other orientations that have not shown statistical significance with retention and adjustment are based on anticipated relationships and not empirical evidence.

3.2.3. Trait Self-Regulation Inventory (TSRI)

The Trait Self-Regulatory Inventory is a questionnaire that was developed by O' Neil, Baker, Ni, Jacoby and Swigger (as cited in Hong & O'Neil, 2001, p. 189). An adapted

version of the original TSRI is used to measure trait self-regulation in Hong and O'Neil's (2001) study. The adapted version of the TSRI consists of 34 items and four first-order constructs were identified, namely planning, self-checking, effort and self-efficacy. The model that was developed from a Confirmatory Factor Analysis of the items indicates a complex structure (Hong & O'Neil, 2001, p. 191). The hierarchical model indicates self-regulation as the third-order factor, which consists of two second-order factors, namely trait meta-cognition and motivation. Meta-cognition consists of two of the first-order factors, namely planning and self-checking. Motivation consists of two of the remaining first-order factors, namely effort and self-efficacy. According to the results of Hong and O'Neil (2001), planning and self-checking correlated strongly with each other and effort and self-efficacy correlated strongly with each other.

According to Zimmerman (as cited in Hong & O'Neil, 2001, p. 191) 'self-regulated learners plan and self-monitor (meta-cognitive component) and perceive themselves as self-efficacious and put forth effort on tasks (motivational component)'. According to Borkowski (as cited in Hong & O'Neil, 2001, p. 187) self-regulation is regarded as the highest level of meta-cognition. Meta-cognition is regarded as the ability to think about your thinking while doing a task and includes activities such as self-checking, planning or goal setting and rehearsing (Hong & O'Neil, 2001).

Various research studies in Hong & O'Neil (2001) indicate a strong positive relationship between motivation, self-efficacy and self-regulation. Zimmerman (as cited in Hong & O'Neil, 2001, p. 187) has also shown that effort has a positive relationship with intrinsic motivation, self-efficacy and persistence in a learning environment. Bandura and Schunk (as cited in Hong & O'Neil, 2001, p. 187) indicate that self-efficacy influences motivation by the amount of effort that is implemented into a task and the levels of persistence to continue with the task in the face of challenges. Bandura adds that motivation also contributes to the goals that people set for themselves (1986).

Table 3.3. Internal consistencies of the Trait Self-regulatory Inventory constructs by sample

Constructs	*n* item	Alpha
Planning	9	0.76
Self-checking	5	0.60
Effort	10	0.83
Self-efficacy	10	0.85

3.2.4. Motivated Strategies for Learning Questionnaire (MSLQ) (Pintrich & De Groot, 1990)

The Motivated Strategies for Learning Questionnaire consists of 56 items measured on a 7 point Likert-type scale. A factor analysis indicated five first-order factors, namely self-efficacy, intrinsic value, test anxiety, cognitive strategy use and self-regulation. Two second-order factor were also identified, namely motivational beliefs and self-regulated learning strategies. According to the factor model, motivational beliefs consist of self-efficacy, intrinsic value, and test anxiety. Self-regulated learning strategies consist of cognitive strategy use and self-regulation. Academic performance on various classroom tasks was used as the dependent variable.

Research in Pintrich and De Groot (1990) suggests there are three important aspects to self-regulated learning, namely: meta-cognitive strategies, implementation of effort, and learning strategies that are important in academic achievement. Motivational beliefs are also seen as important to academic achievement (Pintrich & De Groot, 1990, p. 33). The authors made use of the expectancy-value model as theoretical framework to show how the three components of self-regulated learning are associated with individual differences in motivation.

Accordingly the expectancy component of motivation has to do with beliefs that academic achievement is possible and that such performance is due to personal responsibility. The expectancy component, according to Pintrich and De Groot (1990), has been associated with meta-cognition, learning strategy use and effort. The value component involves task-goals and the beliefs about the importance and interest of the task. The affective component involves the emotional reactions to tasks and could refer to feelings of anger or anxiety toward the task.

The relationship between the components of the expectancy-value model and self-regulation is not always considered to be a linear one. Research by Pintrich and De Groot suggests that the expectancy and value components are positively related to the three self-regulated learning components, whereas research on test anxiety does not suggest such simple relations (1990, p. 34). Multiple Analyses of Covariates (MANCOVA) results from Pintrich and De Groot's (1990, p. 36) research for the motivational variables indicated a significant and positive relationship between self-efficacy and cognitive strategies, as well as for self-regulatory strategies. 'Students who believed that they were capable were more likely to report use of cognitive strategies, to be more self-regulatory in terms of reporting more use of meta-cognitive strategies, and to persist more often at difficult or uninteresting academic tasks' (Pintrich & De Groot, 1990, p. 37).

As soon as cognitive engagement variables are included in a regression analysis, self-efficacy showed a statistical non-significant relationship with academic achievement on various tasks. The results indicate that self-efficacy plays a supportive role to cognitive strategy use and that cognitive strategy use is a better predictor of actual academic achievement. Self-efficacy did, however, have a significant and positive relationship with average academic achievement. The results of the MANCOVA further indicated a significant and positive relationship between intrinsic value and cognitive strategies, as well as for self-regulatory strategies.

Similar to self-efficacy, intrinsic value did not show statistical significant relationships with academic achievement when cognitive strategy use or self-regulation strategies are included in a regression analysis. Intrinsic value therefore also plays a supportive role in using cognitive and self-regulatory strategies to predict actual academic achievement. Test anxiety did not show significant results between any of the other constructs in a MANCOVA. Test anxiety was predominantly negatively related to academic achievement, but showed mixed results for academic achievement on various types of task in a regression analysis. As for academic achievement, zero-order correlations indicated a significant and positive relationship between intrinsic value and academic achievement for all tasks assessed, as well as for self-efficacy and academic achievement on the same tasks.

As for the self-regulated learning strategies, zero-order correlations indicate that self-regulation and cognitive strategy use are highly correlated with academic achievement. These two constructs are also highly correlated with each other ($r = 0.83$) and according to Pintrich and De Groot (1990, p. 37) cognitive strategy use was a suppressor variable when included in a regression analysis with self-regulation. This indicated that self-regulation was the better predictor of actual academic achievement, indicating that self-regulating strategies, such as monitoring, goal setting, planning, and effort management and persistence are essential for academic achievement (Pintrich & De Groot, 1990, p. 38).

Table 3.4. Internal consistencies of the Motivated Strategies for Learning Questionnaire constructs by sample

Constructs	*n* item	Alpha
Self-efficacy	9	0.89
Intrinsic value	9	0.87
Test anxiety	4	0.75
Cognitive strategy use	13	0.83
Self-regulation	9	0.74

3.2.5. Institutional Integration Scale (IIS)

The Institutional Integration Scale was developed by Pascarella and Terenzini and is based on Tinto's longitudinal model of student withdrawal and assesses social and academic integration in academic environments (Caison, 2007, p. 439; French & Oakes, 2004, p. 89). The questionnaire consists of 30 items and five subscales. The sub-scales are: 1. Peer-group interactions, 2. Interactions with faculty, 3. Faculty concern for student development and teaching, 4. Academic and intellectual development, and 5. Institutional and goal commitment. The questionnaire was revised by French and Oakes (2004) and they included four more items that improved the internal consistency reliability, item discrimination, and correlations among subscale and full scale scores.

The revised model, based on a confirmatory factor analysis indicated that the questionnaire assesses academic and social integration based on interactions between faculty, peers and the institutional environment (French & Oakes, 2004, p. 97). Two new factors were identified, namely 'Faculty' and 'Student' and academic and social integration items consisted of both these factors. According to the authors, this indicates that academic and social integration, in this sample is not mutually exclusive. The faculty factor suggests '...that students may have a sense of social and academic integration that is specific to the faculty members with whom they have interacted during the 1st

year' and the student factor '...assesses aspects of social and academic integration but in relation to peers and the general university environment' (French & Oakes, 2004, p. 97).

Table 3.5. Internal consistencies of the Institutional Integration Scale constructs by sample

Construct	*n* items	Alpha
Peer-group interactions	7	0.84
Interactions with faculty	5	0.89
Faculty concern for student development and teaching	5	0.88
Academic and intellectual development	7	0.82
Institutional and goal commitment	6	0.76

French and Oakes (2004, p. 91)

Research by Caison (2007, p. 449) indicates that the Institutional Integration Scale provided some predictive information on persistence, but that data sourced from students prior to entering the institution provided better predictive information. The usefulness of the IIS for retention-related counselling was not determined with this study and other studies in Caison have demonstrated the usefulness of the questionnaire in retention studies.

3.2.6. Vocational Identity Scale (VIS)

The Vocational Identity Scale is a sub-scale from the My Vocational Situation and consists of 18 true-false questions that measure the extent to which a person has developed clear and consistent goals, understand their interests and talents and their

personality traits (Blinne & Johnston, 1998). Test-retest reliability studies indicated the VIS to have a Cronbach's coefficient alpha value of 0.64.

3.2.7. Metacognitive Awareness Inventory (MAI)

The Metacognitive Awareness Inventory was developed by Schraw and Dennison (1994) and measure two main constructs, namely knowledge of cognition and regulation of cognition. The questionnaire consists of 52-items and is answered on a 5 point Likert-type scale. The items are organized in two scales and eight sub-scales. The sub-scale definitions are as follows: (Schraw & Dennison, 1994, p. 460)

3.2.7.1.   *Knowledge of cognition*

- *Declarative knowledge:* knowledge about your own learning skills and abilities
- *Procedural knowledge:* knowledge of how to implement a learning strategy
- *Conditional knowledge:* knowledge of when and why to use a learning strategy

3.2.7.2.   *Regulation of cognition*

- *Evaluation:* analysis of your performance and learning strategies used after the task has been completed.
- *Debugging strategies*: implementation of strategies to improve performance and comprehension.
- *Information processing strategies:* strategies to organize, develop and summarise information.
- *Monitoring:* continuous calculation of the learning process and the strategies that have been used.
- *Planning:* planning en goal setting before one commences with a learning task.

Table 3.6. Internal consistencies of the Metacognitive Awareness Inventory constructs by sample

Constructs	*n* items	Alpha
Knowledge of Cognition	17	0.88
Regulation of Cognition	34	0.88

(Schraw & Dennison, 1994)

3.2.8. Locus of Control Inventory (LCI)

The Locus of Control Inventory was developed by Schepers (1998). The LCI measures three factors, namely internal locus of control, external locus of control, and autonomy. The current version of the inventory consists of 88 items and is measured on a 7 point Likert-type scale. This questionnaire was developed for a South African population and is regarded as highly reliable for this population. Construct definitions are as follow:

- Internal locus of control is defined as an active and inquisitive focus.
- External locus of control is defined as a person who is dependent on other people for support.
- Autonomy is defined as a person who takes personal responsibility for learning (see Keyes & Lopez, 2002).

Table 3.7. Internal consistencies of the Locus of Control Inventory constructs by sample

Construct	*n* items	Alpha
Internal locus of control	30	0.77
External locus of control	27	0.81
Autonomy	29	0.80

(Schepers, 1998)

3.2.9. International Personality Item Pool (IPIP)

The International Personality Item Pool is an international web-based research database that provides raw data, norms and items on personality related questionnaires. The pool of items is related to proprietary psychological tests like Cattell's 16 Personality Factor Questionnaire (16PF), Six Factor Personality Questionnaire (6FPQ), and the Hogan Personality Inventory (HPI).

Table 3.8. Internal consistencies of the International Personality Item Pool constructs by sample

Construct	Alpha
Methodicalness	0.78
Internality (LOC)	0.61
Intellect/Self-efficacy	0.76-0.86
Resourcefulness	0.81
Sociability	0.66-0.87
Adaptability	-0.67

3.2.10. Alpha Baseline Questionnaire (ABQ)

The Alpha Baseline Questionnaire is a comprehensive questionnaire developed by the University of Stellenbosch that determines student perceptions before the commencement of their studies. This instrument is used in conjunction with the Alpha Process Questionnaire (APQ), with the view to measure the change in perception from the beginning of the first year to the end of the first academic year (Bitzer, 2003). The ABQ is the only South African questionnaire that relates to the objectives of academic readiness, but was not available for comparative studies.

The 2002 version of the instrument consisted of 174 items and were grouped into 14 sections, namely biographical, study patterns at school, informal activities at school, time management patterns, perceptions of own abilities, influences regarding study decisions, financial concerns, reasons for studying at the institution, assistance needed, view on the self, involvement/participation in activities, career goals, views and values, and personal wellness (Bitzer, 2003). In 2003 the instrument was subjected to a number of validation measures and was completely reconfigured for use in 2004. The 2004 version of the instrument has 120 items that are organized in 12 categories. The categories related to 'view on the self' and 'involvement/participation in activities' were discarded.

There is no fixed rating scale for the ABQ because each section serves a different purpose. The majority of students who completed the questionnaire were predominantly white, Afrikaans speaking students and more females than males responded. Only eight isolated questions from the ABQ were subjected to statistical analysis. These items are related to generic outcomes as required by the South African Qualifications Framework (Bitzer, 2005). According to a Chi-square analysis, only writing, problem solving and research associated strongly to academic performance. Goodman and Kruskal Gamma values also indicated a positive relationship between ABQ confidence levels and first-year marks in the areas of writing, problem solving and research (Bitzer, 2005).

3.3. ACADEMIC READINESS QUESTIONNAIRE DEVELOPMENT

Foxcroft (2005, p. 55) suggests six phases in the development of a psychological instrument. These six phases will be used as broad guideline for the development of the Academic Readiness Questionnaire. The six phases are planning, item selection, construct and pilot testing of the questionnaire, item analysis, revising and standardising of the questionnaire and technical evaluation and establishing norms.

3.3.1. Planning Phase

3.3.1.1. Rationale of the construct

From the literature there is a covariance between the various motivational constructs. Murphy and Alexander (as cited in Pintrich, 2000, p. 101) indicate positive correlations between goals, attributions, self-efficacy, interest, and intrinsic motivation. Regardless of the close correlation between the constructs, Pintrich argues for a clear distinction between the constructs during empirical research and not to combine them in one general factor called 'motivation'. Pintrich (2000) argues for differences among individual motivations which will only be analysed effectively when the constructs are regarded separately as independent predictors of academic achievement.

Fraser and van Staden (as cited in Du Plessis et al. 2005, p. 690) 'found that successful learners were committed to a study programme, studied on the basis of a pre-planned study schedule, established achievable and realistic learning objectives, had self-confidence and completed tasks within the allotted time-frame. Regular and constructive feedback increased the students' ability to self-evaluate and collectively led to increased success'.

3.3.1.2. State or trait constructs of motivation

According to Hong and O'Neil (2001, p. 187), 'states' refers to the attributes of people that are relatively changeable over time or in different contexts. 'Traits' refers to the attributes of people that are relatively stable over time or in different contexts. Murphy and Alexander (as cited in Pintrich, 2000, p. 102) suggest that a goal orientation specifically represent relatively stable attributes of a person's personality. Pintrich (2000, p. 102) argues to the contrary that goals as 'cognitive representation or knowledge structures [which] are sensitive to both contextual and internal personal factors'. Pintrich suggests that 'knowledge structures' can be activated before entering a task and can be changed due to influence from the context the task is nested in or by the individual self, thus being more state-like. Pintrich adds that knowledge structures can however be stable over time and in different contexts, thus more trait-like. Some people for instance may be more mastery orientated while others are more performance orientated in

various contexts. Pintrich (2000, p. 102) also indicates that personality traits are at times affected by external or contextual influences.

Hong and O'Neil (2001, p. 187) confirm the point of view of Pintrich (2000) that motivational constructs can be state or trait-like. Hong and O'Neil adopted Spielberger's state-trait theory of anxiety to indicate that self-regulation can be state or trait-like depending on the demands of the context. Research in Hong and O'Neil (2001, p. 187) also indicates that state and trait constructs are highly related, thus people with high trait attributes usually have high state behaviour of the attribute. Hong and O'Neil also indicate that self-regulation (consisting of planning and self-checking) is more trait-like than state-like.

According to Pintrich (2000, p. 103) goals are potentially conscious and accessible motivational constructs. Goals are not trait-like in relation to personality related traits, but show intra-individual stability and contextual sensitivity. It is reasoned that the other motivational constructs (self-efficacy, locus of attribution and values) show intra-individual stability and contextual sensitivity due to the strong relationship between the motivational constructs and self-regulation. Maddux (2002) argue that self-efficacy is neither trait nor state like but is a belief about one's ability that develops over time. Constructs like locus of control, self-esteem and values are regarded as personality traits.

3.3.1.3.   Criteria for selection of the constructs

According to Pervin (as cited in Owen, 1996, p. 21) there are three approaches to identify constructs. The first is the 'rational construct approach' that was used to identify the constructs in this research. According to this approach, the items are chosen based on a theoretical definition of the construct. The second is the 'empirical criterion approach' in which knowledge of the differences between groups is used to develop a questionnaire. The third approach, the 'factor analysis approach', was also used. According to this approach, a large number of items are administered to a sample of the intended population and a factor analysis is conducted to determine the constructs. A

test developer can use more than one approach in developing an instrument. The researcher followed the rational and factor analysis approach for purposes of this study. This allows for the constructs to have a sound theoretical foundation which is scientifically tested with a factor analysis (Durrheim, 1999a; Owen, 1996, p. 21).

Criteria for the selection of the constructs were the following:

1. Good psychometric properties (validity and reliability);
2. The definition of the factors must show that it is has a correlation with academic performance and/or retention;
3. The frequency of the citation of a factor in the literature;
4. The close relationships between factors in the literature (for example the relationship between goals and values);
5. The differentiation of one main factor for purposes of identification (for example there is a close relation between self-efficacy and self-esteem but only self-efficacy was used).

3.3.1.4.   Definitions of the constructs

Based on the specified criteria, the following constructs were identified from the literature and current questionnaires. The factors from the main study with its corresponding questions will also be mentioned here.

Table 3.9. Construct definitions

Constructs	Definition
Self-efficacy	Confidence in one's own ability to achieve one's academic goals.
Vocational identity	Ability to settle on an occupational identity.
Educational values	The importance of pursuing a higher education degree.
Goal orientation	The ability to set task oriented goals.
Academic apathy	The lack of interest in academic work and an inclination to do as little as possible.
Autonomy and Locus of Control	The degree to which one takes personal responsibility for learning.
Reading behaviour	The tendency to find pleasure in extensive, broad reading.
Institutional integration	The sufficiency of information from the University of Pretoria.
Financial support	The degree of financial support during one's studies.
Family support	The degree of family support during one's studies
Social integration	The extent to which one can relate easily to others.
Cultural integration	The extent to which one can relate easily to people from other cultures.

3.3.1.5. *Purpose of the questionnaire*

The purpose of the Academic Readiness Questionnaire is to function as a screening test for first-year students that enter the University of Pretoria. Its purpose is therefore to identify, and not to diagnose, students who may possibly be at risk for failure or withdrawal. Its purpose is also to be used as a placement test for support services.

3.3.2. Item Selection

Items for the questionnaire were selected based on their relevance to the higher educational environment and their ability to measure the main constructs that were identified through the literature discussion and the review of various questionnaires. The researcher decided beforehand that the length of the questionnaire should be such that the questionnaire can be completed within 30 minutes, administration time included. This meant a questionnaire with between 60 and 80 items should be developed.

Developing the items consisted of several stages. In the first stage a pool of items was developed based on the literature reviews and on the sample questionnaires (rational construct approach). The pool of items that was useable for the proposed questionnaire was in excess of 130 items. The items were all phrased to be measured on an interval scale, as the intention is to measure the extent to which a construct is present in a student (Gregory, 2000, p.119).

In the second stage the pilot questionnaire items and constructs were reviewed by a group of specialists, consisting of a Statistician, Research Psychologist, Clinical Psychologist, Career Counsellor and an Educationist. This approach is known as 'panelling' and is used to establish face validity, eliminate linguistic problems and analyse the sufficiency of the item pool (Griffin, Coates, Mcinnis, & James, 2003, p. 262). In the third stage changes were made based on the recommendations of the panel of experts. The questionnaire for the pilot study consisted of 84 items. A Likert-type scale was used because the items can be scored easily and quickly when administered to a large sample (Owen, 1996, p. 23). According to Gregory (2000, p. 123), this is a widely used method for scaling attitudes and allows a researcher to obtain items scores as well as total scores for scales. A 5 point Likert-type scale was used and the answers ranged from 1 *Definitely disagree* to 5 *Definitely agree*. This scale was used for items 1 to 82. Item 83 was a dichotomous question and item 84 used a 3 point Likert-type scale and the answers ranged between 1 *Not at all,* 2 *Sometimes,* and 3 *Definitely.*

3.3.3. Construct and Pilot Testing of the Questionnaire

The pilot questionnaire was administered to 368 students from three Faculties, namely Humanities, Natural and Agricultural Sciences, and Economic and Management Sciences. This questionnaire was piloted in English only due to the time-constraints the researcher faced.

Table 3.10. Data Collection during the pilot study in three faculties

Faculty	Department	Number of students	Language group
Humanities	Ancient Languages	32	Afrikaans
Humanities	Psychology	37	English
Humanities	Psychology	18	Afrikaans
Total		**87**	
Economic and Management Sciences	Accountancy	105	Afrikaans
Economic and Management Sciences	Accountancy	75	English
Total		**180**	
Natural and Agricultural Sciences	Plant Biology	59	Afrikaans
Natural and Agricultural Sciences	Plant Biology	51	English
Total		**110**	

3.3.4. Item Analysis

According to Gregory (2000, p. 127) the purpose of item analysis is to determine which items should be retained, revised or thrown out. Various methods can be used, depending on the type of instrument that is being developed. For surveys and questionnaires the 'item-reliability index' is sufficient. This method is used to determine an item's strength of relationship with the rest of the items in the scale. Point-biserial correlations are expressed as a coefficient ranging from 0 to 1, similar to the Pearson correlation coefficient (Gregory, 2000, p. 128).

3.3.4.1.   *Point-biserial correlations*

Point-biserial correlations showed rather low to average correlations and ranged between 0.04 and 0.55. According to Owen (1996, p. 36) items with values lower than 0.20 should be discarded from the test but added that regardless of statistical findings, the final decision rest with the researcher to discard the items or not.

3.3.4.2.   *Factor analysis*

An oblique factor analysis identified five factors with canonical correlations ranging between 0.086 and 0.96. The variance explained was 26.35%. The five factors, following rotated factor loadings, were clustered as follow:

Factor 1: Values, goals and academic apathy

Factor 2: Vocational identity and self-efficacy

Factor 3: Reading for pleasure

Factor 4: Autonomy and locus of control

Factor 5: Integration and support (institutional integration, family support, social integration, cultural integration)

The factor correlations showed low correlations between factors which show that the factors are independent constructs (between -0.044 and 0.286).

3.3.4.3. *Cronbach's coefficient alpha*

Cronbach's coefficient alpha is used to determine a scale's internal consistency. This refers to the degree to which scale items measure the same construct or factor (Pallant, 2007, p. 95). It also measures the strength of the relationship between two variables (Durrheim, 1999b). The Cronbach's alpha coefficient should ideally be above 0.70 (Field, 2005). The Cronbach's coefficient alpha for the total scale was 0.86, thus indicating to the internal consistency and reliability of the scale for the selected sample.

3.3.5. Revising and Standardising the Questionnaire

In total, 18 questions were discarded and in some cases questions were rephrased because the questionnaire was to be administered during orientation week and not at the beginning of March 2008 as was initially intended. The questions that measured lecturer involvement, for instance, had to be discarded because students would not have had contact with lecturers during the orientation week. Other items were revised because linguistic reasons (differences in the use of English among researchers from the United States, Britain and South Africa). 'The same words in the same language may not have semantic equivalence across cultures or countries' (Van Widenfelt, Treffers, De Beurs, Siebelink & Koudijs, 2005, p. 138).

The final Academic Readiness Questionnaire consists of 70 questions and is answered on a 5 point Likert-type scale. The answers ranged from 1 *Definitely disagree* to 5 *Definitely agree*. Four questions (items 15, 18, 19 and 26) were removed from the analyses due to potential sensitivity issues. The number of items used for this sample is 66 items.

The Academic Readiness Questionnaire was developed in English and had to be translated in Afrikaans (Language Policy, University of Pretoria). According to Van Widenfelt et al. (2005, p. 137) the goal of a translation is to have a questionnaire in the new language that measures the same construct and has the same meaning as the questionnaire from the source language. When translating questionnaires, it is

important to maintain semantic understanding of the item in both the Afrikaans and English versions.

According to Van Widenfelt et al., (2005, p. 139) it is beneficial to have at least two independent translators who are native speakers and who are bilingual. It is also beneficial if the translators have an understanding of the context and expertise of the field (Sireci, Yang, Harter & Ehrlich, 2006). An adapted 'forward-translation design' as discussed in Kanjee (2005, p. 60) was used as the design for translation of the Academic Readiness Questionnaire. The questionnaire was initially translated from English into Afrikaans by the researcher. Instead of presenting a version to test-takers the Afrikaans and English questionnaires were then handed to translators that have an understanding of the context and expertise of the field (Educationist and Instructional Designer). The Afrikaans and English questionnaires were also handed to an independent editor to determine equivalence of two translations items. Changes were made to the Afrikaans and English translations of the questionnaire based on the feedback of the translators.

3.3.6. Technical Evaluation and Establishing Norms

The technical evaluation of the ARQ will be discussed in Chapter 5. The technical information includes descriptive and inferential statistics. Norm groups were not established for the purposes of this study, although the raw scores from each factor were standardized to z scores for some of the statistical techniques. The z scores can be used to compare the factors because they all measure the distance from the mean in standard deviation units (Durrheim, 1999b; Gregory, 2000). It therefore gives an indication of the size and direction of the relationship.

3.4. THE ACADEMIC READINESS QUESTIONNAIRE

The Academic Readiness Questionnaire (ARQ) was compiled through a scientific process of measure development. The constructs for the ARQ were informed by the theoretical review and confirmed by some of the constructs from the 11 questionnaires. The items were in many cases sourced from the mentioned questionnaires and pilot tested to determine its relevance and comprehensibility in a South African context. The ARQ was translated to measure academic readiness of the Afrikaans student group.

Table 3.11. shows how the ARQ item statements and constructs are arranged around the factors. The five factors of the ARQ were identified through a factor analysis (see Results in Chapter 5). The item statements that loaded on the factor are sorted to cluster around the construct that it measures. The item statement, as it is found in the ARQ, is next to the item number. The item statement is referenced back to the original construct and questionnaire scale.

Table 3.11. Academic Readiness Questionnaire items, constructs and reference scale

Factor	Item number	Item statement	Construct	Scale	Original construct
Achievement motivation orientation	4	I have the ability to be successful in my studies this year.	Vocational identity	VIS	Vocational identity
	7	I feel I made the right decision in choosing to study this degree programme.		IIS	Institutional and goal commitments
	20	I know exactly what I want to major in.		VIS NCQ	Vocational identity
	59	I have the ideal personality to pursue my field of study.		VIS	Vocational identity

	29	It is important to always be prepared for class.	Educational values	MSLQ	Intrinsic value
	43	It is important to have a good university education to make a success in life.		IIS	Institutional and goal commitments
	63	Getting good grades is important to me.		IIS	Academic and intellectual development
	22	Grades provide me with an ideal goal to work towards.	Goals	SAO	Structure dependence
	62	I usually double check things; just to make sure they are correct.		IPIP (TSRI)	Methodicalness (Self-checking)
	64	I know what I want to be doing 10 years from now.		NCQ	Long range goals
	68	I have clear and reachable goals for my studies this year.		NCQ	Target goals
	45	I expect to do very well in my degree.	Self-efficacy	MSLQ	Self-efficacy
	25	The structure and routine of a person's work should be determined by himself/herself.	Autonomy and Locus of control	LCI	Internal LOC
	34	Getting good grades is mainly related to a person's dedication.		LCI	Internal LOC
	46	It is important to have people recognise the work I have done.*		LCI	External LOC
	53	I will ask for help if I am battling with a complex problem.		MAI	Regulation of cognition
	57	I take responsibility for my own intellectual development.		LCI	Internal LOC

Factor	Item number	Item statement	Construct	Scale	Original construct
Learning-efficacy	9	I like to occupy a leadership position.	Autonomy and Locus of control	LCI	Autonomy
	35	I feel in control of my life.		IPIP (LCI)	Internality (LOC) (Internal LOC)
	42	I have confidence in sharing my own opinions, even if they might be different from the way most other people think.		LCI	Autonomy
	54	I am generally satisfied with my life.		IPIP	Internality (LOC)
	67	I will continue working on a complex task even if I do not succeed at it with the first try.		TSRI (LCI)	Effort (Autonomy)
	13*	I expect to have a harder time to perform academically than most students here.*	Self-efficacy	NCQ (MSLQ)	Academic positive self-concept (Self-efficacy)
	16	I can easily adjust to different styles of teaching.		IPIP	Flexibility
	23	I am as skilled academically as the best students here.		NCQ (MSLQ)	Academic positive self-concept (Self-efficacy)
	24	I enjoy working on complex, intellectually demanding problems.		LCI (IPIP) (MSLQ)	Autonomy (Intellect/Self-efficacy) (Intrinsic value)
	31	I know what I want and I usually make sure that I get it.		NCQ (TSRI)	Realistic self appraisal (Self-efficacy)
	47	I am quick to grasp new concepts and ideas.		IPIP	Intellect/Self-efficacy
	70	I learn things more quickly than most people.		IPIP	Intellect/Self-efficacy

Factor	Item number	Item statement	Construct	Scale	Original construct
Goal orientation	27*	I tend to study in spurts rather than at a regular consistent pace.*	Academic apathy	SAO	Academic apathy
	38*	My goal is to get the best grade I can without spending a lot of effort on my course work.*		SAO (TSRI)	Academic apathy (Effort)
	50*	I often don't see things through to the end.*		IPIP	Resourcefulness
	69	I plan my study sessions in advance and pretty much stick to the plan.		SAO (IPIP) (TSRI)	Academic apathy (Methodicalness) (Planning)
	5	I'm a very methodical person.	Goals	IPIP	Methodicalness
	11	I set specific goals before I begin learning for tests/exams.		MAI (MSLQ)	Regulation of cognition) (Self-regulation)
	56	I like to have a routine to follow.		IPIP	Methodicalness
	58	I organise my study time to best accomplish my goals.		MAI	Regulation of cognition
	60*	I prefer to be spontaneous rather than to set goals when I study for tests/exams.		NCQ	Long range goals
	36	I have the ability to plan my work (study time)	Self-efficacy	LCI (TSRI)	Internal LOC (Planning)
	65	I can motivate myself to study when I need to.		MAI	Knowledge of cognition
Factor	Item number	Item statement	Construct	Scale	Original construct
Integration &	1	I had sufficient information about	Institutional	Theory	Institutional support

Support		the University of Pretoria before enrolling.	support		
	2	I acquired information about my degree programme before I enrolled at the University of Pretoria.		NCQ (CSI)	Long range goals (Career planning)
	14	I was informed about the career possibilities for a specific degree programme.		Theory	Career planning
	49*	I worry about financing my way through higher education. *	Financial support	Theory	Financial concern
	66*	I need to undertake paid employment in order to help fund my studies.*		Theory	Financial concern
	6	My family has always wanted me to go to University.	Family support	NCQ	Support of academic plans
	39	My family is a source of encouragement and support.		NCQ	Support of academic plans
	52	If I run into problems at university, I have someone who would help me.		NCQ	Support of academic plans
	33	I enjoy meeting new people.	Social integration	NCQ (IPIP)	Ability to establish community ties (Sociability)
	51*	I try to avoid becoming involved with social groups and organisations.*		IPIP	Sociability
	55	I expect to be involved in many off-campus activities while enrolled here (social, sport, etc.).		NCQ	Ability to establish community ties
	61	My friends are extremely important		IIS	Peer-group interactions

		to me.		(IPIP)	(Sociability)
	48*	I find it difficult to accept criticism.*	Autonomy and Locus of control	IPIP	Adaptability
	32	I have talked about my career goals with someone who has worked in that field.	Goals	NCQ	Academic familiarity

Factor	Item number	Item statement		Scale	Original construct
Reading behaviour	8	It is important to learn about other cultures and ways of life.	Creative expression	SAO	Creative expression
	30	I am comfortable interacting with people from other races and cultures.		NCQ (SAO)	Ability to establish community ties (Creative expression)
	10	I enjoy reading books on a variety of topics.	Reading behaviour	SAO	Reading for pleasure
	21	I will try to do optional reading even though I know it will not influence my performance.		SAO	Reading for pleasure
	28	Reading is one of my favourite pastimes.		SAO	Reading for pleasure
	37	I like to look through the library for books that spark my interest.		SAO	Reading for pleasure

Deleted	Item number	Item statement	Construct	Scale	Original construct
Deleted	44	When working on a project I prefer to work as part of a team.	Social integration	NCQ	Ability to establish community ties
	12	I get more comfortable in a new place as soon as I make some good friends.		NCQ	Ability to establish community ties
	17*	I prefer to do things on my own.*		NCQ	Ability to establish community ties

	15*	My parents/ guardians negatively influenced my achievement at school because of interference in my affairs.	Family support	LCI	External LOC
	3	I was informed about the combination of subjects needed to fulfil the requirements of my degree programme.	Institutional integration	Theory	Institutional integration
	41	My high school grades don't really reflect what I can do at university.	Self-efficacy	NCQ	Academic positive self-concept
	18	I sometimes wonder if I am really university material.		SAO	Academic efficacy
	40	I try to break studying down into smaller steps.	Goals	MAI	Regulation of cognition
	19	I will try to make time for outside reading despite the demands of my course work.	Reading behaviour	SAO	Reading for pleasure

Questionnaire scale acronyms: NCQ (Non-Cognitive Questionnaire; SAO (Survey of Academic Orientations); MAI (Meta-cognitive Awareness Inventory); LCI (Locus of Control Inventory); IIS (Institutional Integration Scale); TSRI (Trait Self-Regulatory Inventory); MSLQ (Motivated Strategies for Learning Questionnaire); VIS (Vocational Identity Scale); IPIP (International Personality Item Pool).

*Negatively worded item statement

3.5. CONCLUSION

This chapter set out to investigate a number of questionnaires that measure non-cognitive entry characteristics that are associated with readiness for university education. The questionnaires that were investigated are by no means the only questionnaires that measure readiness characteristics. Due to saturation of the item pool, during the item development and testing phase, no additional questionnaires were

sourced or mentioned. The questionnaire items and constructs have shown to relate to academic success and retention. Furthermore, the questionnaires have also shown to have good psychometric properties.

The aim of developing a concise measurement instrument would be to provide empirical evidence to the readiness characteristics that are associated with risk and to test the hypotheses of the study (refer to Chapter 1). The ARQ consists of 70 items that can be used as a screening tool to identify students at risk for failure or withdrawal. The ARQ was administered to students from the Faculty of Economic and Management Sciences and analysed with various statistical techniques. The results of the study will be discussed in Chapter 5.

CHAPTER 4

METHODOLOGY

4.1. INTRODUCTION

In this chapter, the aim of the study that was discussed in Chapter 1 will be repeated. The sampling design and methodology will be discussed next, followed by the data collection methods for both the quantitative and qualitative part of the study and the various statistical methods that were used to analyse both the quantitative and qualitative data. The way missing data were used will be discussed briefly in the last place.

4.2. AIM OF THE STUDY

The aim of the study is to determine the relationship between a student's entry characteristics and (1) withdrawal and (2) academic failure. The proposed hypotheses for this study are:

- Students who score high on the 'Academic Readiness Questionnaire' factors will have higher academic performance than students who perform lower on the questionnaire factors.
- Students who score low on the 'Academic Readiness Questionnaire' factors are more likely to withdraw from their studies than students who score higher on the questionnaire factors.
- Student readiness characteristics directly affect the likelihood of withdrawal.
- Student readiness characteristics directly affect academic performance at first year.

- Academic performance is an intervening variable for withdrawal.
- The predictors of risk for failure will differ between the racial groups.
- The predictors of risk for withdrawal will differ between the racial groups.

This study would benefit academia on a theoretical and practical level. On a theoretical level the study will contribute to the current readiness and retention models by focussing on the cognitive and non-cognitive readiness characteristics of first-year students at a South African tertiary institution. The range of theories and models investigated as a guide for the theoretical model on readiness for university education and statistical analyses of the factors is regarded as a contribution to academia, specifically in a South African higher education environment.

The practical benefit would be the development and standardisation of a concise measurement instrument from the theoretical model that can be used by faculty, firstly as a screening tool and secondly as part of an early warning system to determine 'risk'. The readiness characteristics can thus be used to profile students in need of academic or personal support (Seidman, 2005, p. 302).

4.3. SAMPLING DESIGN AND METHODOLOGY

A quantitative and qualitative approach for the research design was taken. The research project was completed in three phases. In the first phase a literature study was done (in 2007) to determine the various constructs that explain academic readiness, retention and withdrawal and a model will be developed. Current questionnaires on academic readiness were used in conjunction with a literature study to develop a contextually relevant questionnaire. A sample was selected to administer a pilot study to test the questionnaire's item constructs and scales before it was administered to the final sample. The data of the pilot study was analysed using various descriptive and inferential statistical methods.

In the second phase the 'Academic Readiness Questionnaire' was administered to students from the Faculty of Economic and Management Sciences at the end of January 2008. The data was analysed using various descriptive and inferential statistical methods to report on the research problem. Students were monitored at the end of the academic year to determine those students who have withdrawn from their studies. Student marks at the end of the academic year was used as an indicator of academic performance.

Because there is a difference in the number of credits needed to pass an academic year in the different programmes in a Faculty, a standardised method of classification was used. In view of these considerations, academic performance was normalised by dividing the number of credits passed by the total number of credits registered for by the student in the particular academic year.

In the third phase students were interviewed at the end of the academic 2008 year to understand student withdrawal behaviour. The reason for this is that '…theory on departure should develop from the direct experiences of college students' (Braxton et al., 2004, p. 19). The semi-structured telephonic interviews were directed towards discovering the main reason for withdrawal from studies, as well as sub-reasons that may have contributed to the decision to discontinue studies. In addition, information was obtained about which support structures the participants made use of to address problems prior to discontinuation, including the reasons for seeking support.

In both the pilot and main study, a convenience sample was used. The researcher recognizes the possible bias due to this sampling method. However, in the pilot study a convenience sample was used to determine the item constructs and reliability of the items. During a pilot study it is not necessary to use a random sample as long as the sample is from the population that the questionnaire is intended for.

During the main study the questionnaire was administered to a convenience sample from students registered in the Faculty of Economic and Management Sciences. The intention was to do a census study. Attendance at the orientation week is compulsory for all first-year students, but not all students attend it hence not all students could be assessed. Nevertheless, the large number of students who completed the questionnaire proved to be representative of the Faculty's demographics in terms of language, gender, race, M-score and faculty school, most of the time.

4.4. DATA COLLECTION

The following data collection techniques were used:

4.4.1. Questionnaire

A structured questionnaire that measures a student's readiness for university was used. Current questionnaires that propose to measure non-cognitive factors associated with retention and academic performance were also used. The main factors were identified and items were selected based on their relevance to the identified constructs from the theoretical framework and questionnaires. The pilot study contributed toward the development of the final Academic Readiness Questionnaire based on statistical results, most notably a Factor analysis and Cronbach's coefficient alpha (refer to section 3.3.4. Item Analysis). Measurement is usually associated with the use of standardised tests to measure certain attributes of a person and using the data to make decisions about the performance of a person. 'A questionnaire can be defined as a group of written questions used to gather information from respondents, and is regarded as one of the commonest tools for gathering data in the social sciences' (Kasimjee, 1999, p. 293). A structured questionnaire is seen as a good method of collecting data when working with large populations. It is also imperative to design a questionnaire that is reliable and valid.

4.4.2. Database Mining

Demographic data as mined from the institutional database of the University was used (BIRAP, 2008). The following demographic variables can be drawn from the database to be correlated with student academic readiness:

- Student's school performance (M-score)
- School subjects registered for
- Home language
- Preferred language of tuition
- Age
- Race
- Gender
- Parents studied at UP
- Type of student accommodation
- Faculty school
- Credits registered
- University marks
- Reason for withdrawal

4.4.3. Exit Interviews

Semi-structured telephonic interviews were conducted with participants who discontinued their studies in 2008 and who agreed to participate in the research study. Interviews were recorded and referred back to when necessary. This was done to increase the validity of the data gathering process. The interviews were directed towards discovering the main reason for withdrawal from studies, as well as sub-reasons that may have contributed to the decision to discontinue studies. In addition, information was obtained about which support structures the participants made use of to address problems prior to discontinuation, including the reasons for seeking support. Participants were also asked to indicate whether they intended to further their education and if so, at which institution they would enrol.

Data were gathered during a two-week block in May 2009. Two interviewing researchers were involved in gathering the data, where the one researcher conducted the interviews and the other one took written notes on the responses of the participants. The supervising researcher monitored the overall quality of the interviews and consistency was assured by training the interviewing researchers on conducting telephonic interviews, for example listening skills and probing, and sensitising them to the field of retention, withdrawal and attrition.

A semi-structured interview schedule was developed prior to 2006 to assist in telephonic exit interviews with students. The interview schedule was informed by an extensive literature review and the questions were tested during a pilot study in 2006. A codebook was also developed during this period.

4.5. DATA ANALYSIS

4.5.1. Assumptions

According to Field (2005), most inferential statistical methods that are based on normal distributions have four basic assumptions that have to be met.

- *Normality of the data*: Normality of the data refers to a bell shaped curve where the majority of scores lie around the centre and as the scores start to deviate from the centre their frequency start to decline, thus producing the bell shaped curve (Field, 2005, p. 8). Two components related to normality, namely kurtosis and skewness are assessed. Skewness determines the symmetry of the distribution by investigating the mean in relation to the midpoint and kurtosis determines the peakedness of a distribution (Tabachnick & Fidell, 2007, p. 79). The assumption of normality of distribution is regarded as a minimum standard for the majority of inferential statistics that is used in our analysis (Tabachnick & Fidell, 2007).

- *Homogeneity of variance:* This assumption refers to the variances that should remain the same throughout the data. When different groups are tested, the samples from the populations for each group should have the same variance (Field, 2005).
- *Interval data*: The data from a scale should be measured at an interval level.
- *Independence*: Data from different participants should be independent from one another, thus without influence.

The four assumptions are regarded as primary while additional secondary assumptions are applicable with different types of inferential statistical analyses. The secondary assumptions will be mentioned when a specific type of analysis is discussed.

4.5.2. Descriptive Statistics

Descriptive statistics were performed to explore the data. These descriptive statistics include the frequency, mean, and standard deviation, range of scores, skewness and kurtosis (continuous variables). These statistics are important to collect to make sure that none of the follow-up analysis 'assumptions' are violated (Pallant, 2007, p. 53). For categorical variables (nominal data) frequencies and percentages were used. Summary statistics also provide information to assess normality of the dependent variable(s), to determine where groups could be combined to get a composite score or to omit variables that have low case numbers.

4.5.3. Factor Analysis

Factor analysis is regarded as a technique to reduce data into a smaller number of components or factors. According to Pallant (2007, p. 179) factor analysis is extensively used to develop and test questionnaires and surveys. A number of assumptions are applicable to conduct factor analysis. These include the following:

- A sufficient sample size of at least 300 cases (Field, 2005, p. 639; Tabachnick & Fidell, 2007, p. 613) to be able to generalise the findings or at least 10 cases for each item (Pallant, 2007);

- The variables should have a normal distribution (Tabachnick & Fidell, 2007). Field (2005, p. 641) adds that the assumption is important if the results of the analysis is to be generalised beyond the sample used;

- The relationships among pairs of variables are linear (Tabachnick & Fidell, 2007);

- An absence of multicollinearity and singularity (Tabachnick & Fidell, 2007). Multicollinearity refers to variables that are highly correlated and singularity refers to variables that are perfectly correlated;

- The factorability of the correlation (Tabachnick & Fidell, 2007). Bartlett's test of sphericity and the Kaiser-Meyer-Olkin measure of sample adequacy, as provided in SPSS outputs, will be used to determine the adequacy of the factor analysis; and

- The absence of outliers among variables. This is determined with the strength of the correlations amongst items. Tabachnick and Fidell (2007, p. 657) recommend coefficients greater than 0.3.

Oblique rotation factor analysis was done firstly to explore the number of factors. Three, four and five factors were consecutively extracted from the factor analysis and it seemed that three factors would work the best. The first factor of the three factor analysis had many items loading on it and it seems that there are finer dimensions to this factor. This view was supported when extracting five factors during an analysis. A Varimax rotation was also conducted by extracting three, four and five factors to compare the two rotations with one another. The items in the Varimax rotation were similar in dispersion to the oblique rotation. On face value, it however seemed as if the Varimax rotation had a better dispersion and all further analyses were done using the Varimax method of rotation instead of the oblique rotation.

4.5.4. Internal Consistency Reliability

4.5.4.1. *Cronbach's coefficient alpha*

Cronbach's coefficient alpha is used to determine a scale's internal consistency or reliability. This refers to the degree to which questionnaire items consistently measure the same construct or factor (Field, 2005, p. 666; Pallant, 2007, p. 95). Measuring a single construct is referred to as 'unidimensionality' by Field (2005, p. 668). The alpha value provides an indication about the strength of that construct. Two caveats from Field (2005) should be mentioned here; the first is that a larger number of items in a scale could increase the alpha value, and the second is that an alpha value can be achieved with various numbers of factors. This indicates that an alpha value should not be used as a measure of unidimensionality. It is recommended to have an alpha value for each factor separately. Cronbach's alpha coefficient should ideally be above 0.70 but values below 0.70 are satisfactory in social sciences because of the diversity of the constructs that are measured (Field, 2005, p. 668). As is the case for factor analysis, Cronbach's alpha coefficient is sample sensitive and the reliability should be determined with each sample.

4.5.4.2. *Split-half reliability*

Split-half reliability is an additional way of determining reliability of a scale. To conduct a split-half analysis of a scale, the scale is randomly divided in two halves (Field, 2005, p. 667). A score for each case is calculated based on each half of the scale and a person's score on one half of the scale should be similar to the score in the other half of the scale (Field, 2005). According to the Spearman-Brown split half coefficient (StatSoft, Inc, 2010), a scale is seen as reliable if the two halves are highly correlated (above 0.70).

4.5.5. Predictive Validity

4.5.5.1. *Logistic regression analysis*

According to Field (2005, p. 218) a logistic regression is used to predict the likelihood of a binary outcome based on certain variables. Tabachnick and Fidell (2007, p. 437) describe logistic regression as a technique to determine the predicted likelihood of a variable. Logistic regression has no assumptions about the distributions of the predictor variables, the predictors do not have to be normally distributed, linear, or of equal variance within different groups (Tabachnick & Fidell, 2007). The predictor variables can be a mix of continuous, discrete or binary variables. The dependent variable is always coded binary. Some notes of caution when conducting a logistic regression analysis:

- *Sample size*: According to Pallant (2007, p. 167), there should be an adequate sample size and the number of predictors should not be too many. A reasonable rule of thumb is to have at least 30 times as many cases as parameters estimated in the model (SPSS manual, 2006, p. 3.4).
- *Multicollinearity*: Multicollinearity refers to the strength of the inter-correlations between independent variables. The strength of the relationship between variables should not be high as they could complicate the model without significantly improving the prediction (Pallant, 2007; Tabachnick & Fidell, 2007). Co-linearity statistics are conducted in SPSS to determine high inter-correlations (values less than 0.1).
- *Absence of Outliers*: Outliers refers to cases that do not have the same characteristics as that sample group and would not be predicted to fall in the correct group and could influence the goodness-of-fit of the model (Pallant, 2007, p. 167).

4.5.5.2. *Multiway frequency analysis*

Multiway frequency analysis determines the relationship among variables. Based on the relationship among variables, a linear model with the expected cell frequencies is developed (Tabachnick & Fidell, 2007, p. 858). The cells have their own combination of parameter estimates that are used to predict cell frequency. Thus, according to Tabachnick and Fidell (2007, p. 859), the odds that a person falls into one of the categories can be predicted from the cell's combination of parameter estimates.

The SAS CATMOD analysis was used for the multiway frequency analysis. The CATMOD provides Maximum Likelihood Analysis of Variance tables with likelihood ratio Chi-square test of each effect individually (Tabachnick & Fidell, 2007, p. 884). CATMOD is a log-linear analysis that produces a hierarchical model. A multiway frequency analysis is a type of log-linear analysis that determines the associations among more than two categorical variables and produces the best fitting model based on the expected and observed frequency counts (Field, 2005, p. 704; Tabachnick & Fidell, 2007). Similar to the Chi-square test the log-linear analysis tests the hypothesis that the expected frequencies predicted by the model are significantly different from the observed frequencies. With a log-linear analysis a non-significant result on the goodness-of-fit statistics is expected, to show a good fit between the model and the data (Field, 2005).

Multiway frequency analyses, like logistic regression analyses, are flexible techniques. Practical limitations according to Tabachnick and Fidell (2007) are the requirements for independence, adequate sample size and the size of the expected frequency in each cell should adequate. The size of the expected frequency in each cell should be greater than one, and no more than 20% is less than five (Tabachnick & Fidell, 2007, p. 862). Multiway frequency analysis and logistic regression analysis can both be used to fit and compare models (Tabachnick & Fidell, 2007, p. 439). Multiway frequency analysis allows the development of a full model, consisting of all possible effects in the model and different order effects, based on the number of variables in the model.

4.5.5.3. Cross-tabulations with Chi-square test for independence

Cross-tabulations are used to determine the relationship between categorical variables (Field, 2005). A Pearson's Chi-square test is frequently used with cross-tabulations to compare the observed frequencies in certain categories with the expected frequencies in the categories (Field, 2005, p. 682). According to Field (2005) the Chi-square test determines whether the variables are independent. A significant value on the Chi-square test means that the hypothesis that the variables are independent can be rejected and the variables are thus related in some way (Field, 2005). This non-parametric statistical method is used when the independent variables are not normally distributed or when all

the variables are discrete. When some variables are continuous they are recoded into discrete or categorical variables. Assumptions for a Chi-square test are firstly that at least 80% of cells should have expected frequencies counts of 5 or more and secondly, a repeated measure design is not used (Field, 2005, p. 686; Pallant, 2007, p. 214).

4.5.5.4. *Multiple regression analysis*

The purpose of a regression analysis is to determine the relationship between a number of independent variables with a dependent variable (Tabachnick & Fidell, 2007, p. 118). The intention of a regression analysis is to predict a dependent variable based on a number of independent variables, or to determine if a variable adds anything to the prediction equation when entered with covariates, or to find the best prediction equation by entering various sets of independent variables in a model (Tabachnick & Fidell, 2007).

Multiple regression analysis can have either continuous or dichotomous (binary) independent variables. Discrete variables have to be dummy coded to be dichotomous. The dependent variable is continuous. A standard multiple regression analysis was performed, where all predictor variables are entered into the analysis and each variable is evaluated in terms of what it adds to the prediction of the dependent variable (Tabachnick & Fidell, 2007, p. 136).

The assumptions of multiple regression analysis are:

- *Sample size*: According to Tabachnick and Fidell (2007) there should be an adequate sample size and the number of predictors should not be too many. A reasonable rule of thumb is $N \geq 50 + (8 \times$ number of independent variables) for testing multiple correlation and $N \geq 104 +$ number of independent variables (Tabachnick & Fidell, 2007, p. 123).
- *Absence multi-collinearity*: Multi-collinearity refers to the strength of the inter-correlations between independent variables. The strength of the relationship

between variables should not be high as they could complicate the model without significantly improving the prediction (Pallant, 2007; Tabachnick & Fidell, 2007).

- *Absence of outliers*: Outliers refers to cases that do not have the same characteristics as that sample group and would not be predicted to fall in the correct group and could influence the goodness-of-fit of the model (Tabachnick & Fidell, 2007, p. 124).

- *Normality, linearity, homoscedasticity of residuals*: The assumption of normality refers to the errors of prediction that are normally distributed around each predicted dependent variable score. Linearity refers to the relationship between predicted dependent variables scores and the errors of prediction. 'Failure of linearity of residuals in regression does not invalidate an analysis so much as weakens it' (Tabachnick & Fidell, 2007, p. 127). The assumption of homoscedasticity refers to the standard deviations of errors that are equal for all predicted dependent variable scores (Tabachnick & Fidell, 2007).

4.5.5.5. *Classification tree analysis*

Classification tree analysis aims to predict membership of cases, constructs or items to a dependent variable. The method used by classifications tree analysis is to sort independent variables according to some criteria to get the most accurate prediction. Each independent variable placed in the model is independently associated with the dependent variable to determine its effect (StatSoft, Inc, 2010). This produces a hierarchical structure with the least number of variables to predict the dependent variable. Both Classification & Regression Tree (C&RT) analysis and Chi-square Automatic Interaction Detector (CHAID) analysis can be used to predict continuous or categorical dependent variables (StatSoft, Inc, 2010). CHAID analysis requires the independent variables to be categorical and in approximate equal number of cases, while C&RT analysis allows for continuous and categorical independent variables.

In CHAID analysis an F-score will be computed for a continuous dependent variable and a Chi-square test will be computed for a categorical dependent variable (StatSoft, Inc, 2010). C&RT analysis computes a Chi-square measure and a G-square measure (which is similar to the maximum likelihood Chi-square). In both CHAID and C&RT analysis these measures are used to determine the goodness-of-fit of the branch node. CHAID

analysis will provide non-binary trees that have more predictor variables or categories to a branch, while C&RT analysis will produce only binary trees (StatSoft, Inc, 2010).

4.5.5.6. *Data analysis of the exit interviews*

Data were qualitatively analysed using the principles of content analysis. Content analysis is a qualitative technique to gather and analyse the content of texts (Neuman, 1997, p. 273). According to Neuman (1997) the content of the text can be quantified with systematic counting and recording procedures, like absolute frequencies, cross-tabulations or Chi-square analysis. Constructs that are to be measured are identified and placed in a 'codebook', which is a set of instructions and list of themes that indicate how the content should be analysed (Neuman, 1997).

When developing a codebook, one can approach it both inductively (explore patterns emerging from the content) or deductively (applying or validating researched patterns). The codebook that was developed during a pilot study in 2006 was used deductively during the analysis of students' feedback. Additional items that occurred during the analysis phase were added to the codebook (inductive analysis). According to Neuman (1997, p. 275), coding the content of a text according to a codebook is called 'manifest coding' and it allows one to count the number of times a phrase, word or construct appears in a written text. Consistency of assigning the codes between the interviewers was established by cross-referencing between interviewers. The coded data was then quantified for statistical analysis utilizing SPSS.V17® statistical software package.

4.6. MISSING DATA

Missing data in the analysis were deleted 'pairwise' and 'listwise'. Descriptive analysis and correlations made use of the pairwise exclusion of cases. The factor analysis and logistical regression analysis, together with the multiway frequency analysis made use of the listwise exclusion of cases. This was done to explore a hierarchical categorical

model that is sensitive to missing values. According to Pallant (2007, p. 57), in pairwise exclusion a case is excluded only if the data for that analysis is missing. In listwise exclusion a case is excluded if any of the data is missing. There were six cases with frequency missing on more than 10 items. They ranged between 11 and 62 missing items with and an average of 24.5 missing items.

## 4.7.	DEFINITION OF KEY VARIABLES

### 4.7.1.	Retention

Retention refers to the ability of an institution to retain a student from admission to the university through graduation (Berger & Lyon, 2005). The basic assumption of the Successful Coarse Completion Ratio (SCCR) is that students who enrol for a degree are declaring the goal of completing the programme (Hagedorn, 2005, p. 98). Hagedorn proposes four types of retention based on the level of analysis, namely institutional, system, retention in the major (programme) and retention in the module. Institutional retention will be used as the level of analysis for this study and refers to the proportion of students who remain enrolled at the same institution from year to year (Hagedorn, 2005). System retention refers to the measure of retention across institutions. Retention in a major or programme refers to the monitoring of migration between programmes. Retention in the module refers to completion of units within a programme.

According to Mortenson (2005, p. 32) various measures can be used to measure retention. These include retention rates, completion rates, and cohort survival rates. These data are gathered to assess educational performance. These rates determine how students are progressing through the student life cycle and how many students have withdrawn or transferred to other schools of faculties (BIRAP, 2008). The SCCR, according to Hagedorn (2005), indicates a mathematical calculation of completion ratios. The SCCR measures completion ratios by comparing the proportion of courses that a student completes to the number of courses students enrol for. The weakness of the SCCR is the inconsistency of the calculation result, because the use of various

secondary data which if interpreted could mean retention has dropped, increased or stayed the same.

It is also important to measure the persistence rates of first-year students because of their vulnerability at the beginning of their studies. According to empirical findings in American higher education institutions, the institutions that are highly selective tend to have higher persistence rates for undergraduate graduation, compared to open or less selective universities (Mortenson, 2005). Students with the most successful academic records in high school are more likely to be academically successful in higher education institutions and institutions who admit these students will have better retention rates.

4.7.2. Withdrawal

Withdrawal refers to the departure of a student from a university campus (Berger & Lyon, 2005). Just as in Tinto (1993, p. 36) we need to define the different forms of withdrawal. A cross-sectional view of withdrawal will typically indicate the type of student that is more likely to withdraw and according to Tinto (1993) this refers to a descriptive approach to student departure. The tendency of this research is to take a cross-sectional view of withdrawal. The uses of questionnaires focus on the traits or dispositions that students have or use when functioning in a specific environment and imply a descriptive perspective. Our next focus is on a working definition of withdrawal.

Tinto (1993, p. 140) uses the term 'drop-out' to describe withdrawal from institutions. To him an institution has to decide which forms of behaviour are to be defined as withdrawal. This becomes necessary when institutions theorise that all forms of withdrawal can be addressed with a single policy and in essence be treated by institutional action. This term should only be used for a small number of withdrawals where the perception of failure can be applied to both the student and the institution. For example, when there is incongruence between the goals and commitments of the students and the institution, there is not much that the institution can do to stop a student

from leaving. This however does not mean that a student will not come back to the original institution at a later stage. It might, however, mean that a student has transferred to a different institution. It is therefore important to develop a theory that clearly explains the longitudinal process of student withdrawal while taking cognisance of the behaviours that underlie the phenomenon.

Berger and Lyon (2005, p. 7) definitions:

- Drop-out refers to '…students whose initial educational goal was to complete at least a bachelor's degree but who did not complete it.'
- Stop-out refers to '… a student who temporarily withdraws from an institution or system.'
- Mortality refers to '…the failure of students to remain in college until graduation.'
- Attrition refers to '…students who fail to reenrol at an institution in consecutive semesters.'
- Withdrawal refers to '… the departure of a student from a college or university campus.'
- Involuntary withdrawal refers to '…the institution that does not permit the student to reenrol due to poor academic achievement' (faculty discontinuation).

These concepts seem to be synonymous with each other but are only closely related with each other and are not synonyms. Further according to Berger and Lyon (2005, p. 7) it is important to distinguish between 'voluntary' and 'involuntary' withdrawal as well as 'institutional' and 'system' departure. Voluntary withdrawal refers to a student who does not reenrol by his own decision; involuntary withdrawal refers to the institution that does not permit the student to reenrol due to poor academic achievement. Institutional withdrawal describes the departure from an institution and systems departure refers to the departure from the higher education system.

Berger and Lyon (2005) gives a clearer picture of what student withdrawal refers to, according to their synthesis of various authors. Bean (1990) agrees with Tinto that students should not see their withdrawal as failure because the students might have

achieved their goals in the first year of studies. Astin (1977) argues for a sound definition of withdrawal by stating that 'drop-outs' may become 'non drop-outs' in time; the so-called 'stop-outs' according to Berger and Lyon. Once again it is irrelevant to this study if a student returns at a later stage or not. A discussion regarding 'stop-outs' does not fall within the scope of this research. The term 'withdraw' is used to describe the 'state' of the student at a certain point in time.

It is therefore important to decide what constitutes withdrawal and which definition is to be used to describe withdrawal. It is possible to interview a student during deregistration and ask students in 'real time' what their reasons are for withdrawal, have they achieved their stated goals, are they planning to return to the institution or register at another institution and do they see their decision as indicating a failure on their part. This in practice does not happen because some students depart without notifying the institution, they are not willing to talk about the reasons for departure and in many respects information about student departure is received *ex post facto* the departure.

4.7.3. Academic Success

Academic success refers to the number of credits passed at the end of the academic year divided by the number of credits prescribed for that academic year, differentiated by programme. The 21 different programmes offered by the faculty has different prescribed total credits for the first academic year and contributed to the complexity of standardising credit values for the faculty as a whole. A differentiation is made between the students who have a success ratio of 1 and those students who have not passed all of their credits registered, thus with a pass ratio less than 1. There is an overlap, operationally among students included in risk for withdrawal and risk for academic failure. Students with academic failure include students from category D2, D3 and D4 as well as those students who persist but did not pass all registered module credits in relation to the prescribed module credits.

4.7.4. Non-Cognitive Variables

Non-cognitive refers to variables relating to adjustment, motivation and self-concept (Sedlacek, 2005). According to Sedlacek (2005) non-cognitive variables are useful to predict performance in all students, but they are particularly useful for non-traditional (African-American) students. Certain non-cognitive factors also seem to be positively related to retention and graduation. Certain non-cognitive measurements can also be used for admission, counselling, teaching, and in student service programmes. Sedlacek (2005) indicates that non-cognitive variables can refer to various attributes such as student involvement (Astin, 1993), academic and social integration (Braxton, Hirschy & McClendon, 2004; Tinto 1993), and socio-economic background that can also be categorised in one of Camara's broad categories.

Table 4.1. Defining the independent and dependent variables

INDEPENDENT VARIABLES	DEFINITION
Achievement motivation orientation	The degree to which one has an intrinsic interest in higher education and an expectation to achieve academically.
Learning-efficacy	The degree of confidence in one's own ability to achieve one's academic goals.
Goal orientation	The degree to which one is able to plan for learning by setting task-specific goals.
Integration/support	The degree to which the student experience institutional, social, family and financial support.
Reading behaviour	The degree to which one enjoys reading for pleasure.
M-score	An aggregate score based on the six best senior certificate subjects and ranges between 0 - 30.
Credits registered	A count of the number of credits registered for during the first year.
Parental education at UP	One or both parents completed a degree at the University of Pretoria.
Housing	Where a student lives while attending university.
Distance of school	Distance of school from the university, clustered by Province.
Race language	Combination between race, home language and preferred language of tuition.
Gender	Differentiation between male and female students.
DEPENDENT VARIABLES	**DEFINITION**
Risk for withdrawal (Binary)	Students, who were discontinued, are on probation or have withdrawn.
Risk for failure (Binary)	Students who passed less than 100% of the credits registered for and who are at risk for withdrawal.
Academic success (Continuous)	Ratio representing the number of credits passed over the number of credits prescribed by the programme.

4.8. LIMITATIONS

African students were under-represented in the sample, compared to white students, thus the sample could have been biased in the results of the analysis. Students were conveniently targeted during the orientation week. Attendance at the orientation week is compulsory for all first-year students, but not all students attend it. The students who do not attend the orientation week seem to place themselves at risk because they do not receive valuable information about the university, what is expected of students and where students can receive support. These students also miss out on the social dimension of the orientation week and to a lesser extent become integrated within the social and institutional system of the university. Students who miss the orientation week are therefore by default 'at risk'.

It might be argued that the African students in the sample are mostly students in good academic standing. Referring to the sample, it could be that the African students who attended the orientation week are least in need of support and have adequate support, applied and enrolled in time and are therefore less at risk than the African students who did not attend. REAP (Jones et al., 2008) information shows that their students enrol and have bursaries prior to the orientation week, but that similar disadvantaged students without the needed support frequently did not enrol in time, do not have sufficient funds and quite frequently are still trying to register and search for accommodation.

The M-scores of the African and white students were not similar and contrary to the above argument, the majority of African students' M-scores were lower on average than the white students' M-score and there was a good distribution for both racial groups. The argument that mostly high academic achieving African students enter, does not hold in this case.

4.9. CONCLUSION

In this chapter an overview of the sample design and methodology was provided. A quantitative and qualitative approach for the research design was proposed. A structured questionnaire was used as part of the quantitative study to measure the non-cognitive readiness characteristics. Data from BIRAP was used to mine demographic variables associated with readiness as well as high school academic achievement. Interviews were conducted as part of the qualitative part of the study to determine salient reasons for withdrawal.

The various statistical techniques used to analyse the quantitative and qualitative data were discussed. The assumptions of each statistical method was mentioned in the discussion, firstly to sensitise the reader to these assumptions and secondly to adhere to these assumptions in the process of standardising the readiness questionnaire. A violation of the assumptions would bring the research results into question by lowering the validity and reliability of the study.

The results of the data collection methods and statistical analysis will be discussed in Chapter 5.