THE EFFECTIVENESS OF THE UNIVERSITY OF NAMIBIA OSHAKATI CAMPUS SCIENCE FOUNDATION PROGRAMME IN PREPARING STUDENTS FOR DEGREE PROGRAMMES

A DISSERTATION SUBMITTED IN FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE

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ABSTRACT

The purpose of this study was to investigate the effectiveness of the Oshakati campus Science Foundation, Programme (SFP) in preparing students for degree programmes at the University of Namibia (UNAM). The study was situated in qualitative and quantitative research paradigms. The population of the study consisted of all the former students who went through the UNAM SFP from 2005 to 2016 at the Oshakati campus (approximately 1298), as well as all SFP lecturers. The sample consisted of 100 former SFP students and five SFP lecturers. Out of the 100 former SFP students, 50 were selected by using the stratified random sampling method according to the degree programmes they had enrolled in. Snowball sampling was further used to select 30 SFP graduates who had completed their studies and 20 who were not enrolled in any of the degree programs at UNAM. The 100 participants completed a questionnaire with open and closed-ended items. Convenience sampling was then used to select five SFP lecturers for individual interviews. The research tools for data collection were a questionnaire, an interview guide, and document analysis. Descriptive statistics were used to analyse quantitative data. Qualitative data were coded into common themes that emerged from the findings.

The findings of the study showed that 80% of the students had successfully completed the SFP. The results also revealed that 80% of former SFP students had furthered their studies at tertiary institutions. Sixty-three percent of those who passed the SFP were still studying with different tertiary institutions. The remaining 37% had already completed their further studies and were all employed. It also emerged from the findings that from 2006 up to 2016, more former SFP students passed their first year at UNAM and progressed to the second year of their studies.

All five SFP lecturers were of the view that the SFP was very effective in preparing students to take up further studies in science-related fields because more students managed to pass the 1st year of their studies. The lecturers further indicated that there was no specific model used in the teaching of the SFP. The researcher therefore has designed and suggested the use of the Foundation Programme Outcome Based Approach (FPOBA) as a possible teaching model for the SFP. This

model is informed by the programme evaluation theory and incorporates the teaching and learning strategies that were reportedly effective. It is hoped that by using this model, the SFP could become more efficient and effective in preparing students for tertiary education in science-related fields of study at UNAM.

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LIST OF ABBREVIATIONS AND/OR ACRONYMS

ACHSR	Advisory Committee for Human Sciences Research
AIDS	Acquired Immune Deficiency Syndrome
ASPs	Academic Support Programmes
BED	Bachelor of Education
BETD	Basic Education Teachers Diploma
CA	Continuous Assessment
DNEA	Directorate of National Examinations and Assessment
ETSIP	Education and Training Sector Improvement Programme
FPOBA	Foundation Programme Outcome Based Approach
HIV	Human Immune Virus
ITS	Integrated Tertiary System
IUM	International University of Management
MBESC	Ministry of Basic Education, Sport and Culture
NQA	Namibian Qualification Authority
NSFAF	Namibian Student Financial Assistance Fund
NUST	Namibia University of Science and Technology
NPC	National Planning Commission
SFP	Science Foundation Programme
SWAPO	South West African People's Organization
UK	United Kingdom
UNAM	University of Namibia

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May you be blessed in abundance by the God Almighty himself.

DEDICATION

This thesis is devotedly dedicated to:

My lovely Children: Tuapewa Memory Shoombe and Frans Helao Moncada Shoombe for their patience; they were young and in need of my full love, support and care during the time that I stole from them as I was carrying out this study.

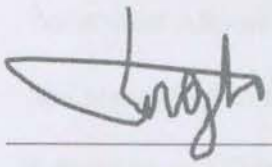
My parents: Mr Alfeus Nghipandulwa and Mrs. Lydia Nghipandulwa for their patience, love, support and encouragement during the time when I was carrying out this study.

"Commit to the Lord whatever you do, and your plans will succeed" (Proverbs 16:3).

DECLARATION

I, Leena Lahja Tileni Nghipandulwa, hereby declare that this study is my own work and is a true reflection of my research, and that this work, or any part thereof has not been submitted for a degree at any other institution.

July 2020



Signature of Student

15 July 2020

Date

CHAPTER 1

ORIENTATION OF THE STUDY

a. Introduction

This study was carried out in order to investigate the effectiveness of the Science Foundation Programme (SFP) to prepare students for degree programmes at the University of Namibia (UNAM) Oshakati campus from 2005 to 2016. In this chapter the background of the Namibian education system before independence is discussed. Also discussed are the reforms and transformations that took place in the Namibian education system after independence.

The problem statement, aims of the study, research questions, and the significance of the study, are presented. Limitations and delimitations are presented. Definitions of key concepts, and the outline of the thesis, are presented in this chapter. A brief summary of the chapter is presented.

1.2 Background of the study

As in most African countries, formal education in Namibia prior to independence was limited and segregated in the sense that it was based upon ethnic, racial and tribal lines (Ministry of Education and Culture [MEC], 1993). Education provision in Namibia prior to independence was unfair, discriminatory and fragmented. There were eleven education authorities; each catered for a particular tribal or racial group. The main reason for this kind of education administration was the entrenched apartheid system introduced by the South African regime. South Africa regarded Namibia as its fifth province. The South African racial and discriminatory policies had to also be in force in Namibia (Kasanda, 1995).

At independence in March 1990, a new Ministry of Education, Culture, Youth and Sport was established, which developed a new teaching and learning paradigm that would dismantle the previous regime's policy of segregation and inequality of access; it had to reflect the new government's priorities of equity, access, quality, and democracy in education (Angula, 1990). Expanding access, as well as ensuring equity and equality in education, were a priority of the new Namibian government (MEC, 1993). Immediate measures were taken to open up access routes to higher education for able Namibians who were disadvantaged by inferior secondary education, and opportunities must be expanded for adult citizens to benefit from higher education through extension programmes, distance education and in-service training (Wallace, 2018). UNAM joined the government in responding to the needs of disadvantaged learners; especially those in rural and remote regions from the capital city, Windhoek. This was necessary because UNAM had a limited number of students from formerly disadvantaged communities, especially in the science-related fields that used to be for the elite (Chirimbana, 2014).

The Oshakati campus is in the Oshana region; it is a satellite campus of UNAM. The campus is more than 730 km from the main campus in Windhoek (Uugwanga, 2006). Students who cannot reach Windhoek because of the long distance barrier enrol at this campus to further their studies. This results in increased access to higher education for most of the Namibian people. Namibia is divided into 14 regions (Van Rensburg, 2015. 12) as shown in Figure 1.1.

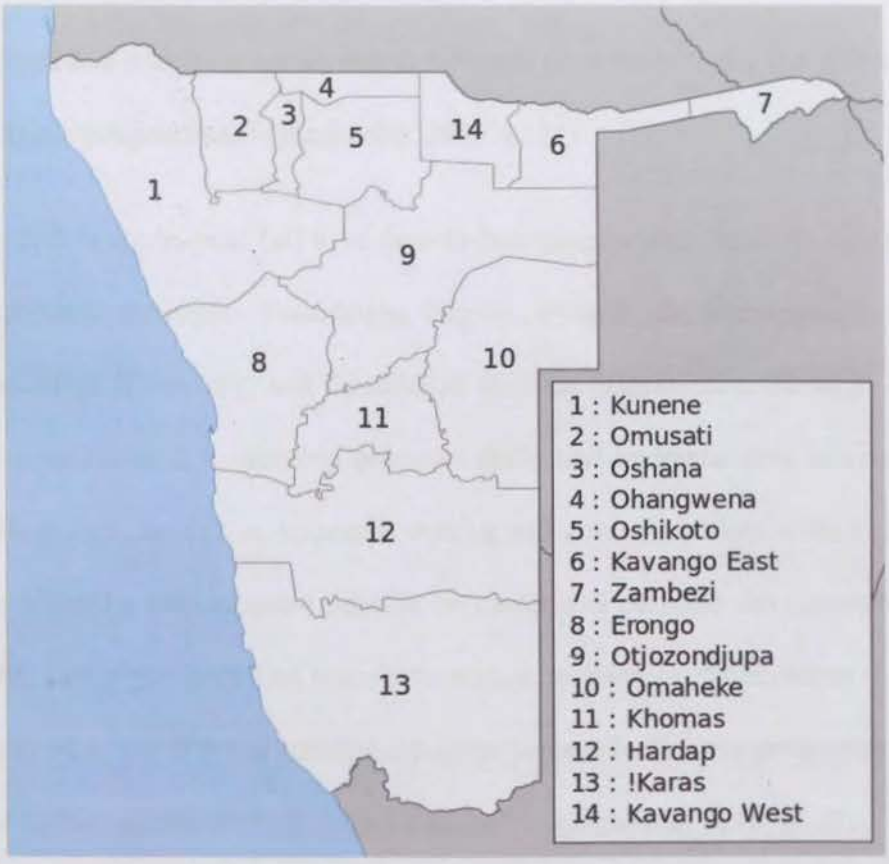


Figure 1. 1: Map showing 14 regions in Namibia (adapted from Van Rensburg, 2015, p.12).

The Oshakati campus' mandate is to extend access to UNAM learners from previously disadvantaged communities in rural areas of Namibia through the development of undergraduate programmes, and to develop educational programmes to improve the socio-economic status of the people of the northern and central regions (Uugwanga, 2006). The Oshakati campus first piloted the idea of increasing access to higher education. An English access programme, which was an university entry programme, was introduced between 2000 and 2004 (Chirimbana, 2014). In 2005 the senate approved the implementation of the SFP at the Oshakati campus. The SFP is a reconceptualised and transformed access programme. The introduction of the SFP was UNAM's attempt "to redress the inequities of the past; resolving

the constraints to the expansion of the University caused by the weak academic preparation of students and widening access and at the same time maintaining the standards and quality of its academic programmes" (Naukushu, 2005, p. 23).

The SFP is a one-year full time face-to-face programme. Students enrol for five compulsory examinable subjects: Foundation English, Foundation Mathematics, Foundation Biology, Foundation Chemistry, and Foundation Physics (Chirimbana, 2014, p. 20). The emphasis of the programme is to develop practical skills and understanding of concepts in science and mathematics, as well as scientific writing and communication skills in English. Students are also offered a non-assessed module on career and personal development which includes life skills, career guidance and basic information technology. "According to the Senate-approved course plan, the SFP has additional tutorial support built in the programme, that is provided via face-to-face and/or through online courses" (Chirimbana, 2014, p. 25).

The SFP is offered to Grade 12 certificate holders who show potential to pursue a degree in science-related fields but do not meet the university entry requirements of 25 minimum points in five subjects. The aim of the SFP is to widen access, equity and equality to higher education; especially for previously disadvantaged and/or marginalised groups by giving them an opportunity to enrol in science-related degree programmes at UNAM. Another outcome of the SFP is to increase the number of graduates in science-related fields (Naukushu, 2005). The admission criteria for the SFP are a combination of Grade 12 results, teacher assessment/ranking of the students, and an aptitude test (Uugwanga, 2006). Some students are admitted on special case appeal. This includes students from the marginalised indigenous tribes in Namibia: the Himba and San communities. Special cases normally do not meet all the admission criteria; students are admitted based on affirmative action guidelines (Naukushu, 2012).

The minimum pass for a SFP student to be admitted to a degree programme is a 60% (C) average score, whereas a minimum of a B average score from the SFP is required for medicine and engineering degrees (UNAM, 2005). The SFP was planned such that students would secure automatic admission to the first year of science degrees of their choice upon successful completion of the SFP (Chirimbana, 2014).

1.2.1 Namibian education system post-independence

Before Namibia's independence the education system was mainly characterised by inequalities brought about by apartheid. In an effort to maintain social, economic and academic segregation, the architects of apartheid fragmented Namibia into eleven education authorities based upon ethnicity (Dunn, 2003). This system was designed to inculcate racism, the philosophy underlying the apartheid-era education system; it was premised on the notion that Blacks were incapable of learning mathematics and science (Clegg, 1989). According to Naukushu (2015), in 1980 the Namibian education system was reformed, presumably to meet the needs of all Namibian people. This reform was done by the South African based Advisory Committee for Human Sciences Research (ACHSR). The process included the introduction of a pre-primary programme, which was previously not available to Namibian natives. The primary phase consisted of a six-year course instead of seven. Tertiary institutions were mandated to provide diploma courses and eventually degrees with little emphasis on science and mathematics (Dunn, 2003). The focus was not to make the Black Namibians mathematically literate, but to train them for simple non-technical jobs while they were under the supervision of their White masters.

The challenges Namibia faced prior to independence, such as unequal and limited access to quality education, high unemployment, and high levels of poverty, are similar to those of many

other emerging nations in Africa and elsewhere. Since independence Namibia has established succinct policies which respect the diversity of the nation (Samuels, 2017). Following a protracted armed struggle for liberation, Namibia gained independence from South Africa on 21 March 1990. The apartheid regime left as its legacy an educational system shaped by divisive and dehumanising imperialist policies (Chirimbana, 2014). After independence, the education system in Namibia was reformed to accomplish four goals: access, quality, equity, and democracy (Ministry of Education and Culture (MEC), 1993). As SWAPO dismantled the discriminatory and inequitable Bantu educational system, the Namibian government embarked on and adopted a new praxis. The new curriculum offered a wide range of subject options that included: English, civics, mathematics, hygiene, science, economics, bookkeeping, and commerce (Amukugo, 1993).

The shortage of eligible students with adequate preparation for higher education, especially competence in the new official language, English, and in mathematics and science, will be a critical limiting factor in Namibian higher education development for many years. (Wallace, 2018). Elizabeth Amukugo and her colleagues examined ''Namibia's policy framework for long-term national development (Vision 2030)'' and concluded that ''the provision of quality education is an imperative for the realization of Vision 2030'' (Amukugo et al. 2010, p. 109). The authors then discussed the meaning of quality education, reflecting on UNESCO's perspective that quality education should focus on learners' cognitive development and make reference to commonly shared values (Amukugo et al. 2010, p. 109).

According to Amukugo (1993), the movement to reform mathematics and science education in Namibia began in the mid-1980s in response to the documented failure of traditional methods of teaching science subjects. The curriculum changes were necessitated by the widespread

availability of computing devices, and to a major paradigm shift in the scientific study of science learning. Amukugo (1993) further asserts that a fair comparison of the two types of education systems offered to the Namibian people before and after independence clearly shows that the education system developed by the new Namibian government provides a relatively high level of quality education as compared to that of the South African one. Achieving access and quality education has been a challenge to the Namibian government since independence (Naukushu et al., 2012). Naukushu et al. (2012) emphasise that despite the government's efforts to alleviate the challenge of lack of access, and quality in the provision of education, many schools, mainly in rural areas, still do not have some resources; they are not as well equipped as schools in the urban areas. Learners graduating from the schools with poor resources persistently do not attain the same level of understanding and educational achievements required for admission into and success in tertiary institutions compared to those that attend well-resourced schools (Nambahu et al., 2005).

The National Planning Commission (NPC) (2003) indicates that 60% of the Namibian population live in the rural areas of the northern and central regions (i.e. Oshana, Oshikoto, Omusati and Ohangwena regions). Most learners from these regions live in what the Ministry of Education and Culture (MEC, 1993) terms a poor educational background. Since mathematics and science are innovation crucial disciplines to professions driving economic development, it can be concluded that the development of mathematical, numerical and scientific understanding are crucial in achieving vision 2030 and development of Namibia as a whole (Naukushu, 2015). Also, in terms of global competitiveness, "Namibia is ranked 110th in the higher education and training index" (Schwab, 2016, p. 256). This means that Namibia has to redouble its effort if it is to be classified as a developed and industrialised nation by the year 2030. In 2005 UNAM introduced a science bridging course (SFP) for undergraduate

science and mathematics at its Oshakati campus (Naukushu et al., 2012). It was one of innovation crucial disciplines for the professions driving economic development towards the realisation of 2030 in Namibia.

In an attempt to rebuild the nation, the Namibian government developed a vision 2030 framework which anticipates that the country will be developed and industrialised by the year 2030 (National Planning Commission (NPC), 2003). The NPC (2003) underscores the need to cultivate a knowledge-based economy that is underpinned by scientific and mathematical disciplines. The call for a knowledge based economy hence requires new and innovative teaching and learning strategies in mathematics and science: learner-centred teaching and learning, for example. The Namibian curriculum was revised in 2006 to suit the demands of a new and growing Namibian nation. According to Naukushu (2015) the SFP offered at the Oshakati campus was one of UNAM's strategies to answer the call for a knowledge-based economy that requires new and innovative teaching and learning strategies in mathematics and science.

1.2.2 Brief history of the SFP at UNAM

The aim of the SFP is to provide an alternative entry to university degree courses, especially in mathematics and science (Naukushu, 2012). It was designed to identify academically talented but underprepared high school graduates who want to pursue degree studies in mathematics and science (Chirimbana, 2014).

The SFP at the Oshakati campus started with 60 students in 2005 and there was one lecturer per subject; the plan was to increase student numbers to 120 in subsequent years (UNAM, 2005). The plan was to have two teaching staff for each subject to meet the needs of an increasing number of students, and also to have two support staff to assist with laboratory work

and administrative support (UNAM, 2005). The 2019 student number is 110; the staff complement is five teaching staff (one per subject), and one laboratory technician, who is also tasked with administrative support duties. The admission criteria of the SFP are based on Grade 12 results, as well as the successful completion of an aptitude test (UNAM, 2005). An applicant should have a minimum of 17 points in the best five Namibia Senior Secondary Certificate (NSSC) subjects or equivalent to Grade 12 qualification, with the following subjects: English (minimum E), mathematics (minimum E), biology (minimum E), and physical science (minimum symbol D). These requirements were revised in 2015 by the University of Namibia Faculty of Science (UNAM, 2015). They were changed to a minimum of 22 points in the best five NSSC subjects or equivalent grade 12 qualification: English (minimum E), mathematics (minimum E), biology (minimum D), and physical science (minimum D). On completion of the above five subject's students can, after the successful completion of the SFP, then enrol in mathematics and science-related fields at UNAM.

According to Ngololo and Nekongo (2013) the SFP's specific objectives are:

1. To provide students from disadvantaged backgrounds with guaranteed conditional offers in science-related undergraduate programmes at UNAM.
2. To support students in gaining entry into undergraduate science programmes.
3. To widen access, equity and equality to higher education, especially by previously disadvantaged and/or marginalised groups, by giving them an opportunity to enroll in science-related degree programs at UNAM.
4. To provide students with subject focused modules designed and delivered by UNAM academics.
5. To provide students with a range of academic study skills to enable them to succeed in their undergraduate studies.

6. To improve their overall English proficiency.
7. To introduce students to the UNAM academic culture.

These objectives can only be achieved if the stakeholders and UNAM conduct a thorough analysis including field research on how well the SFP is functioning. It was for this reason that this study was carried out.

The SFP does not award students an academic degree upon completion; it does however guarantee a certain level of qualification that allows them to follow a higher education degree such as a bachelor's degree (Kamati, 2012). Due to the high demand for the SFP, in 2014 it was extended to the Khomasdal campus in Windhoek (Chirimbana, 2014). This was done to cater for more students.

1.2.3 Characteristics of the SFP at the Oshakati campus

According to Chirimbana (2014), science subjects and mathematics are taught in three different classes identified as classes 1-3 in the SFP. Students are assessed using continuous assessment (CA). This constitutes 60% of the total assessment. An examination constitutes 40% of the overall pass mark. A student is said to have passed the SFP if he or she achieves an overall pass mark of 60% in all five subjects (i.e. mathematics, chemistry, English, biology and physics). In the science subjects, students are assessed using five (5) formal tests, five (5) homework submissions, ten (10) practical activities. and five (5) assignments that are spread throughout the academic year (UNAM, 2005). All SFP subjects are year courses i.e. examinations are only written at the end of each academic year in November.

The main SFP teaching approach is the traditional lecture method for class sizes of less than 50 students (Naukushu & Chirimbana, 2012). However, studies by Chaplin (2007), and

Handelsman, Miller & Pfund (2007), show that lectures are not effective in ensuring meaningful learning and teaching; the lecture method is the most inefficient way of teaching the bridging students.

SFP students may sometimes be taught by more innovative student-centred methods, but when they enter the mainstream of undergraduate studies, they need to take responsibility for their own learning in contexts where a lecture is the main mode of delivery (Rollnick & Holtman, 2010). In the SFP the traditional lecture has been pepped up by technology, and yet this is often a mixed blessing (Kamati, 2012). Kamati (2012) found that the students she taught effective presentation skills to felt insulted and neglected by lecturers who read their lectures from PowerPoint (PPT) slides. Kamati points out that when lecturers replaced the chalkboard with the overhead projector, they did not change their teaching method. Similary in the teaching of the SFP students, a PPT presentantion does not change a bad presentation into a good presentation or an ineffective presenter into a good presenter. Lecturers are reminded that PPT should enhance a presentation, and not replace effective communication (Kamati, 2012).

The SFP at the Oshakati campus draws students from a large pool of high school leavers with poor grades in their Grade 12 examinations. Some of the challenges faced by Namibian learners include: floods, HIV and AIDS effects, lack of qualified teachers, and lack of educational resources (Chirimbana, 2013). These learners are often from lower socio-economic groups, characterised by isolated rural communities, and inadequate exposure to career guidance and counselling. They are financially disadvantaged and are not usually exposed to science outside a classroom because they do not come from a media-rich environment (Potgieter et al., 2007).

1.3 Statement of the problem

A total of 1298 students have attended the SFP from 2005 to 2016 (University of Namibia, 2016). During this period, 90% of these students passed and managed to enrol in various degree programmes of UNAM (University of Namibia, 2016). The remaining 10% did not enrol in first year undergraduate study programmes because they failed to obtain 60% or higher in each of the SFP subjects and were not admitted to degree programmes (Chirimbana, 2014). A few studies have been carried out to assess how SFP students performed in particular subjects. Kapenda and Ngololo (2007) studied the effectiveness of SFP mathematics versus the performance of students in their first year mathematics course. The correlation between the two was a weak positive one; it was not significant (Kapenda, & Ngololo, 2007). However, since the introduction of the SFP at the Oshakati campus in 2005, no study has been carried out to evaluate this programme. There is therefore a need to assess the effectiveness of the SFP as a whole in preparing students for their first year of study; specifically, at UNAM in science degrees. It is against this background that this study seeks to assess the effectiveness of the SFP from 2005 to 2016 in preparing students for degree programmes at the Oshakati campus. This study also seeks to determine the extent to which the programme has achieved its stated objectives of widening access, equity and equality to higher education; especially by previously disadvantaged and/or marginalised groups by giving them an opportunity to enroll in science-related degree programmes at UNAM.

1.4 Research questions

The following questions are addressed in this study.

1. What is the performance of the SFP graduates in their 1st year of the degree programmes at UNAM from 2005 to 2016?

2. What are the perceptions and experiences of the former SFP students regarding the SFP in preparing them for science and science-related courses at UNAM?
3. What are the perceptions and experiences of the SFP lecturers regarding the SFP in preparing students for science and science-related courses at UNAM?
4. What educational teaching model can be used in the SFP to effectively prepare SFP students for further studies?

1.5 Significance of the study

The findings of this study might inform UNAM in determining whether the SFP is achieving what it was intended to achieve. The findings might further inform UNAM management and the SFP lecturers about the shortcomings of the programme that might need to be addressed in order to improve the programme and make it better for the benefit of the students. Furthermore, the findings might help UNAM management and the SFP lecturers to determine which areas of the SFP need improvement and also to determine whether it has achieved its objectives of preparing students for the first year of their degree programme in science and mathematics. The findings of this study might also enable UNAM management to arrive at decisions that might help the SFP to be more effective and efficient. Lastly, it is hoped that the findings of this study might inform UNAM management to determine which educational teaching model should be used by the lecturers in the SFP to effectively prepare students for further studies.

1.6 Limitations of the study

The researcher could not find any published studies that were carried to evaluate the SFP in Namibia. This was a limitation in this study because most of the literature reviewed was from outside Namibia. Another limitation was that it was not easy to locate most of the students who

had gone through the SFP and had already graduated from UNAM as many had changed their contact details. This was a challenge to the researcher because it hindered her from getting all the necessary information from those particular students. The researcher however overcame that challenge by using the snowball sampling technique; that is using those graduates that she was able to locate and involving them in locating other students who had gone through the same programme. Some weaknesses of research methods are inevitable and this was not peculiar to the interview guide used in this study. For instance, one shortcoming of an interview guide is that a researcher has less control over the data produced and that interviews can deliver biased responses (Flick, 2008). In this study, the researcher attempted to overcome this by moderating and validating the interview guide with the respondents during a pilot study phase to ensure that the face-to-face structured interview instrument measured what it was supposed to measure.

1.7 Delimitations of the study

The main aim of this study was to assess the effectiveness of the SFP at the Oshakati campus, in preparing students for degree programmes. The study only focused on those students who had done the SFP at the Oshakati campus from 2005 to 2016 and all the current SFP lecturers at the Oshakati campus.

1.8 Definition of terms

The following key terms are defined in the context of this study.

Evaluation: Patton (1999) defines evaluation as a systematic process aimed at understanding what a programme does and how well it does it. In this research, evaluation is defined as a process of measuring the effectiveness of the SFP.

Assessment: Terenzini (2000) defines assessment as the systematic process of collecting, evaluating, and using information about an educational programme undertaken for the purpose of determining how well learning expectations are being met in order to improve student learning. In this study, assessment is defined as the process of gathering information using various methods to systematically gauge the effectiveness of the institution and academic programmes to document student learning, knowledge, behaviours, and skills as a result of their collegiate experiences.

Perceptions: Perceptions are defined as views or opinions or thoughts on any given matter (Richard & Zangwill, 1990). In this study the perceptions of the SFP students and lecturers are defined as their views and opinions or their thoughts regarding the SFP in preparing students for science and science-related courses at UNAM.

Effectiveness: Effectiveness is defined as the degree to which objectives are achieved and the extent to which targeted problems are solved or the degree to which a programme is successful in producing a desired result or success (Peter, 2006). This study sought to find out the extend that the SFP was successful in producing a desired result or success of preparing students for degree programmes.

Programme evaluation: In this research, programme evaluation is defined as a systematic method of collecting, analysing, and using information to answer questions about projects, policies and programmes, particularly about their effectiveness and efficiency (Funnel & Rogers, 2011). This study sought to assess the degree to which the SFP at the Oshakati campus has accomplished and continues to accomplish its objectives of laying a sound basis for future

study, thereby bridging the educational gaps between teaching at a university and high school level content.

Formative evaluation: Formative evaluation is defined as a systematic method of collecting, analysing, and using information to judge the worth of a programme while its activities are still in progress (Yin, 2003). In this this study, a formative evaluation of the SFP was done with the intention to furnish information for guiding programme improvement and to help form or shape the programme better.

Summative evaluation: Summative evaluation is defined as a systematic method of collecting, analysing, and using information to investigate the extent that a programme/intervention is achieving its outcomes in the target population (outcome evaluation), and to investigate the results that have occurred as a result of a programme intervention (impact evaluation) (Yin, 2003). In this study, both outcome and impact evaluation were conducted in order to solicit the findings that might inform UNAM management to determine whether the SFP is achieving what it was intended to achieve: to prepare students for a first year university degree study.

1.9 Dissertation outline

This dissertation is divided into six chapters. In chapter, one an introduction and orientation of the study is provided. A brief outline of the reforms and transformations that the Namibian education system went through, and a brief history of the SFP at UNAM are provided. The statement of the problem, aims of the study, research questions and significance of the study are also presented. Limitations, delimitations, definitions of the key concepts and the outline of the dissertation are presented. A brief summary is presented.

In chapter two the theoretical framework underpinning the SFP in general is discussed. The discussion focuses on the programme evaluation theory underpinning this study. This includes describing and justifying why it was used in this study. Paradigms supporting the programme evaluation theory are discussed. Reasons for undertaking a programme evaluation are presented as well as when to conduct a programme evaluation according. Literature relevant to the aspects of foundation programmes are reviewed including how writers have defined the foundation programme and analysed the origins of foundation courses. The importance of foundation programmes is explored. The characteristics of foundation programmes in general are analysed in order to present the characteristics of the SFP at the Oshakati campus.

How the study was carried out is discussed in chapter three. A mixed methods approach and justification of its use to collect the empirical data are discussed. The population, sample size and the sampling procedures that were utilised are described. An explanation is provided on the data collection procedure used to collect data from the sample, and the methods utilised to analyse that data. A discussion of the pilot study and its impact on the conducting of the main study is provided. Research ethics, validity and reliability concerns are presented.

In chapter four, the quantitative and qualitative findings of the study are presented. The quantitative findings from the student open-ended questionnaire and an interview with the SFP lecturers are presented. Document analysis is covered to provide a thorough description and evaluation of the programme. The qualitative data obtained are used to provide a thorough description and evaluation of the SFP. Special attention is made on specific research questions to be answered in the study.

In chapter five the quantitative and qualitative findings of the study are discussed. Special attention focuses on the specific research questions to be answered in the study.

In chapter six, a summary of the study is provided, as are the main findings. Conclusions are drawn and recommendations are made based on the data collected in this study. The qualitative and quantitative findings are pooled, compared, and triangulated. The latter was the thrust of this study. Also explained is the contribution of this study to the existing knowledge of this study.

1.10 Summary

In this chapter the orientation of the study was described. The background of the study was presented. This was followed by an overview of the Namibian education system before independence, and the reforms and transformations that the Namibian education system went through. An overview of the history of the SFP at the UNAM Oshakati campus was presented. The problem statement, research questions of the study, and the significance of the study were presented. Also presented were limitations, delimitations, and the definitions of key concepts. In the next chapter, a literature review that pertains to foundation programmes is presented. Also included are reviews of literature regarding the programme evaluation theory as it underpins this study.

CHAPTER 2

THEORETICAL FRAMEWORK AND LITERATURE REVIEW

2.1 Introduction

In this chapter the theoretical framework that underpins this study is discussed. A review of foundation programme literature is presented.

2.2 Theoretical framework

This study is underpinned by the programme evaluation theory (Bickman, 2012). This theory can be used to provide a conceptual framework for monitoring, for evaluation, or for an integrated monitoring and evaluation framework. It is very useful to bring together existing evidence about a programme, and to clarify where there is agreement and disagreement about how a programme is understood to work, and where there are gaps in the evidence. It can be used for a single evaluation, for planning cluster evaluations of different projects funded under a single programme, or to bring together evidence from multiple evaluations and research (Benjamin & Greene, 2009).

A programme evaluation generates information about programme effectiveness and how to improve programmes; programme evaluation supports evidence-informed decision-making (Funnel & Rogers, 2011). The researcher used the programme evaluation theory to assess the effectiveness of the SFP in preparing students for tertiary education, and to generate information about the effectiveness of the SFP, and how to improve it at the UNAM Oshakati campus.

Programme evaluation theory helps evaluators and programme stakeholders to identify the performance dimensions most critical to a programme's success and, hence, those that may be most important to assess. Louw (1999, p. 321) emphasized

> Programme evaluation theory is now playing an important role in needs assessment, programme planning and design, evaluability assessment, in providing a basis for informed decisions about measurement and evaluation methods, in enabling evaluators to disentangle the success or failure of programme implementation from the validity of the programme's conceptual model, and for facilitating a cumulative wisdom about how programmes work and how to make them better.

The results of this study might be used for the betterment of the SFP at the Oshakati campus. Programme evaluation theory is used to determine whether a programme brings about changes in the manner theorised. All human service programmes are designed to make a difference in the lives of people. Identifying and assessing the strength of a programme are critical for increasing the likelihood that a programme will be effective (Donaldson & Lipsey, 2004). In the public and private sectors, stakeholders often want to know whether the programmes they are funding, implementing, voting for, receiving or objecting to, are producing intended effects. Programme evaluations can involve both quantitative and qualitative aspects of social research (Louw, 1999). The researcher chose the programme evaluation theory to generate findings that might inform stakeholders involved in the establishment of the SFP at the Oshakati campus, whether the programme is producing the intended effects on its beneficiaries, and whether it is making a difference in the lives of its beneficiaries.

Programme evaluation theory has been used for designing, improving, and evaluating programmes (Louw, 1999). In this study the theory was used to gain information that may inform the stakeholders, responsible for the establishment of the SFP at the Oshakati campus,

and whether this programme was achieving its objectives in terms of redesigning it. In this way a programme evaluation could help improve the SFP. Another important role of the programme evaluation theory is that of helping evaluators assess the likelihood that programmes will be able to accomplish certain objectives. In this study the programme evaluation theory was used to determine the extent to which the SFP was achieving its stated objectives of widening access, equity and equality to higher education; especially by previously disadvantaged and/or marginalised groups by giving them an opportunity to enrol in science-related degree programmes at UNAM.

2.2.1 Programme evaluation theory and describing how the programme evaluation theory works

Programme evaluation theory is defined by Mertens and Wilson (2012) as a systematic method for collecting, analysing, and using information to answer questions about projects, policies and programmes; particularly about their effectiveness and efficiency. Program evaluation can also be broadly defined as the "systematic assessment of the operations and/or outcomes of a pro-gram, compared to a set of explicit or implicit stands, as a means of contributing to the improvement of the program (Alkin, 2018).

In this study, the programme evaluation theory was used so that the researcher could systematically collect, analyse and use the collected information to answer questions about the effectiveness and efficiency of the SFP at the Oshakati campus in preparing students for tertiary education. This theory involves the systematic collection and analysis of information about a programme using research tools. The following research tools were used in this study: a questionnaire, interview guide, and document analysis. They were used to systematically collect and analyse the information about the SFP at the Oshakati campus. This theory seeks

multiple sources of information as a means to improve programme implementation and to understand programme effectiveness (Funnel & Rogers, 2011). Its use in this study entailed obtaining information from questionnaires administered to former SFP students, and an interview guide for face-to-face interviews with SFP lecturers. These tools were used as a means of improving the SFP implementation and of understanding its effectiveness in preparing students for tertiary education.

The above theory definition of Funnel and Rogers (2011) supports that of Donaldson and Lipsey (2004). The latter emphasised that the theory deals with the assumptions that guide the way specific programmes, treatments, or interventions are implemented and expected to bring about changes.

Programme evaluation theory is a social science activity directed at collecting, analysing, interpreting, and communicating information about the working and effectiveness of social programmes in order to inform social action and thus improve social conditions (Guba & Lincoln, 1991). From this perspective the researcher used the programme evaluation theory to assess the degree to which the SFP accomplished and continues to accomplish its objectives of laying a sound basis for future study, thereby filling an educational gap between teaching at a university and high school level (Naukushu, 2012). The function of a programme evaluation theory is to ascertain the theoretical sensibility of a programme to help evaluators understand why a particular programme works or fails (Guba & Lincoln, 1991). The goal of program evaluation is to establish the value or worth of a program based on a systematic assessment of the program results, where the term "program" refers to resources and activities directed towards accomplishing some goal or goals. Where feasible, program evaluation also attempts to establish the extent to which the measured results can be attributed to the program activities

(Alkin, 2018). Therefore, in this study, the researcher sought to determine whether the SFP at the Oshakati campus was working or failing, and why.

The programme evaluation theory, according to Yin (2003) and Pal (2017), is also called a logic model or impact pathway; it is an assumption in the way a programme is designed; how a programme's actions are supposed to achieve intended outcomes. This 'logic model' is often not stated explicitly by people who run programmes, it is simply assumed, and so an evaluator will need to draw out from staff how exactly a programme is supposed to achieve its aims, and to assess whether this logic is plausible (Mark, Henry & Julnes, 2000). This theory looks beyond the theory of what a programme is supposed to do; it evaluates how a programme is being implemented. For example, this study assessed how the SFP was being implemented at the Oshakati campus. An evaluation determines whether the components, identified as critical to the success of a programme, are being implemented. This type of evaluation determines whether target populations are being reached, whether people are receiving the intended services, and whether staff is adequately qualified (Yin, 2003).

According to Louw (1999, p. 105) this theory entails: process evaluation, impact evaluation, and outcome evaluation. Process evaluation is an ongoing process in which repeated measures may be used to evaluate whether a programme is being implemented effectively and the way it must be implemented. An impact evaluation determines the causal effects of a programme. This involves trying to measure whether a programme has achieved its intended outcomes (i.e. programme outcomes). An outcome is the state of a target population or social conditions that a programme is expected to have changed. Programme outcomes are the observed characteristics of a target population or social conditions and not those of a programme. The concept of an outcome does not necessarily mean that the targets of a programme have actually changed or that a programme has caused them to change in any way (Chen, 1994).

For this study, an assessment of how the SFP was being implemented was done. This study also assessed the outcome of the SFP and its impact. Its implementation was assessed to determine whether the components, identified as critical to the success of the SFP at the Oshakati campus, were being implemented. An assessment of a programme's outcome and its impact is a systematic way to assess the extent to which a programme has achieved its intended outcomes. These serve to help evaluators understand whether or not a programme is effective, and also to clarify one's understanding of a programme (Rossi et al., 2004). The theory focuses around this definition, but important considerations often include how much a programme costs per participant, how it could be improved, whether it is worthwhile, whether there are better alternatives, if there are unintended outcomes, and whether a programme's goals are appropriate and useful (Mark, Henry & Julnes, 2000).

2.2.2 Paradigms supporting the programme evaluation theory

Programme evaluation theory, or social science theory, can enhance evaluators' planning as they discern in which paradigm they will work and which evaluation model or approach they will use during an evaluation of any programme. Potter (2006) identifies three broad paradigms within programme evaluation theory: the positivist approach, the transformative approach, and the critical-emancipation approach. Potter (2006) and Pal (2017) identifies three broad paradigms within programme evaluation theory: the positivist approach, the transformative approach, and the critical-emancipation approach.

In the positivist approach, evaluation can only occur where there are objective, observable and measurable aspects of a programme, requiring predominantly qualitative evidence. The positivist approach includes evaluation dimensions, such as need assessment, assessment of

programme theory, assessment of programme process, impact assessment, and efficiency assessment (Potter, 2006).

The interpretive approach requires that evaluators should develop an understanding of the perspective, experiences and expectations of all stakeholders, which are crucial before one is able to make judgements about the merit or value of a programme (Guba & Lincoln, 1991).

The critical emancipatory approach is largely based on action research for the purpose of social transformation (Potter, 2006). For the purpose of this study, the positivist approach was identified to be appropriate because the researcher assessed how the SFP was being implemented and also the programme's outcomes or impacts (Rossi, Lipsey & Freeman, 2004).

2.2.3 When to conduct programme evaluation

A programme evaluation may be conducted at several stages during a programme's lifetime, according to Rossi, Lipsey and Freeman (2004). That is why this study was carried out at this particular stage of the SFP's lifetime at the Oshakati campus. Each stage raises different questions to be answered by an evaluator, and correspondingly different evaluation approaches are needed. A programme evaluation is often developed during the planning stage of a new intervention. It can also be developed during implementation and even after a programme has finished. When an evaluation is being planned, it is useful to review the programme theory and revise or elaborate it if necessary (Chen, 1994). In the case of this study, the evaluation of the programme was done during the implementation of the SFP since the programme was operational at the Oshakati campus.

Rossi, Lipsey and Freeman (2004) suggest five kinds of assessment that may be appropriate at these different stages.

1. Assessment of the need for a programme
2. Assessment of programme design and logic/theory
3. Assessment of how a programme is being implemented. Is it being implemented according to plan? Are the programme's processes maximising possible outcomes?
4. Assessment of a programme's outcome or impact (i.e. what it has actually achieved)
5. Assessment of a programme's cost and efficiency.

This study was informed by the above first bullet: assessment of the needs for a programme. In other words, conducting assessment on educational programmes such as the SFP based on the expressed and observed needs of the people. Programmes such as the SFP can only be successful when they focus on clearly defined needs of targeted clientele and stakeholders.

The study was also informed by the third bullet: assessment of how a programme is being implemented. Is the SFP being implemented according to plan? Are the programme's processes maximising possible outcomes?

Bullet four also applied to this study: assessment of a programme's outcome and impact. What is it that the SFP has actually achieved so far?

Programme evaluation theory is important, in terms of summative evaluation, to inform policy-makers (in this case UNAM management) whether or not their policy (that informed the establishment of the SFP) has achieved what it was intended to achieve and, *mutatis mutandis* (considering the changes that must be made), whether or not the intended results were achieved despite the policy and not because of it (Guba & Lincoln, 1991). Programme evaluation theory

allows policy-makers to learn and take ownership of a learning process. It does this by providing a frame of reference for them to relate to (and respond within) when making decisions that affect a learning process (Rossi, Lipsey & Freeman, 2004). The researcher therefore assumed that by using the programme evaluation theory in this study, it would provide a frame of reference for the policy-makers to relate to when making decisions that affect the learning process within the SFP. The researcher also assumed that by using the programme evaluation theory it would allow the policy-makers to learn and take ownership of the learning process within the SFP.

2.3 Literature review

2.3.1 Foundation Courses

As a basic definition, bridging/foundation education aims to 'enable currently unqualified people to upgrade their knowledge sufficiently to qualify them to enter tertiary programmes Smith, 2018). Generally, foundation programmes or bridging courses are used as an alternative entry to university studies, and as such are designed to identify academically talented but underprepared high school graduates who want to pursue degree studies (Grayson, 1997). Grayson further observes

> These programs help students to develop their potential in order to succeed in their university studies. In general, models of Foundation Programmes try to identify the underlying skills and attitudes as well as resources that would help students succeed then work to help students acquire these in an efficient way. Thus, curricula for Foundation Programmes emphasize issues of cognitive skills, developing effective study skills and strategies, coping skills and communication skills to be able to understand university textbooks, as well as self-esteem and confidence building (p.120).

According to Trigwell and Corrigan (2009), preparatory and bridging courses are those that fill a gap between knowledge, skills and attitudes of students wanting to enrol at a university and the actual requirements for a tertiary course. They are usually taken by students who do not yet have a tertiary entrance but are hoping to apply for a university place on the basis of successful completion of a course. Preparatory courses are useful to increase school learners' knowledge, confidence and study skills.

According to Grayson (1996, p. 213)

> Science Foundation Programmes are usually a one year Programme that precedes entry into the sciences facilities for under-prepared, English second language students who show academic ability. Students complete selection tests for admission to SFP. The SFP was designed to equip the students with the skills, resources and self –confidence in order for them to qualify for a science degree. In Science Foundation Programme, students study the following subjects: Mathematics, Physics, Chemistry, Biology and an English language development course.

The SFP at the Oshakati campus of UNAM was designed in such a way that it prepares students for university education; its emphasis is on developing practical skills and understanding of concepts in science and mathematics as well as scientific writing and communication skills in English (Naukushu & Chirimbana, 2012).

According to Trigwell and Corrigan (2009), the foundation course in the United Kingdom (UK) is a one or two year preparatory course for school-leavers who want to qualify for a place on a bachelor's degree course in art, design or architecture. It is the dominant form of entry to university and art college degree courses in the UK; versions of it also exist in other countries, particularly where British influence over art education has been historically strong. The course is almost entirely practical in nature, although increasingly elements of art and design history

have been introduced, and it is considered sufficient to qualify those who pass it to move on to a degree course without further study (Trigwell & Corrigan, 2009). The SFP at the Oshakati campus is a one year, full time, face-to-face programme; students enrol for five compulsory examinable subjects: English, mathematics, biology, chemistry and physics (Chirimbana, 2014). Kloot, B., Case, J. M., & Marshall, D. (2008).

Foundation programmes are defined by Kloot, Case & Marshall (2008) as academic developmental programmes meant to assist disadvantaged students and underprepared students to enrol in tertiary instituitions. The term foundation emerged to describe a set of courses that attempt to lay the necessary academic foundation for tertiary education (Holtman, Marshall & Linder, 2004). De Beer (2006) points out that these programmes lay a sound basis for future study thereby bridging educational gaps between teaching at a university and high school. The SFP at the Oshakati campus was developed to assist disadvantaged, underprepared and/or marginalised students, from remote secondary schools across the northern and central regions of Namibia, to enrol at UNAM for degree courses in science.

According to Grayson (2000, p. 263) these programmes are designed "to fill the gap between one's current level of qualification and knowledge and the level needed to be admitted to a Bachelor's or Master's degree at the university". They complement any knowledge or qualification that learners might still be lacking after finishing high school. The definition by Grayson (2000) can be linked to what is happening at the Oshakati campus. The SFP is offered to Grade 12 school-leavers who do not meet the university entry requirements of a minimum of 25 points in five subjects. They do however show potential to pursue a degree in science-related fields.

2.3.2 Origins of foundation programmes

According to De Beer (2006) foundation courses date back to the 1970s in the North of England, when William Coldstream began teaching at King's College, Newcastle, and Harry Thubron at Leeds College of Art. Together they established a team to deliver a new form of art preparation course. They called it the basic design course. Its aim was to teach what were considered to be the basic skills that underpin all art and design activities, including architecture. This resulted in projects designed to develop skills in using colour, articulating two and three-dimensional space, defining form, and experimenting with diverse materials.

Naukushu (2005) reviewed literature on the origins of foundation programmes and noted that about thirty years ago a number of tertiary institutions in the UK, America, and other western countries, realised the need for implementing foundation programmes (FPs) to widen access to an ever-growing, education-hungry population. Chirimbana (2014) also reviewed literature on the origins of FPs and noted that their origin was traced by Van der Flier, Thijs, and Zaaman (2003) more than 30 years ago when a number of tertiary institutions in the UK, America, and other western countries, realised the need for implementing FPs to widen access to university education. Uugwanga (2006) notes that this trend spilled over to Africa; a number of African universities now offer access to potential students by way of FPs or bridging programmes. The UNAM Oshakati campus is not an exemption.

According to Donaldson and Lipsey (2004, p. 152) "during the last decade a variety of efforts were made to address the needs of school-leavers who were not ready to enroll for higher education. A route often chosen to address the needs of this group is by way of bridging courses". This can be compared to the UNAM SFP which was developed to cater for Grade 12

school-leavers who did not meet the university entry requirements but showed potential to pursue degree programmes in science-related fields (Chirimbana, 2013).

The SFP was introduced in Namibia in 2005 but its history can be traced to the early 1980s (Kloot, Case & Marshall, 2008). It is interesting to note that it took more than 14 years after independence before the introduction of the SFP in Namibia (Chirimbana, 2014). It was in the early 1980s, in the latter days of the apartheid era, within a fragmented education sector that the SFP emerged in Namibia. The first 'bridging' programmes were offered at English-medium universities at which academic support was offered to assist a small number of black students in Namibia. These initiatives can be considered an early form of SFP. In many cases they were financed by corporate capital that articulated concerns about a black skills shortage in the job market (Kloot et al., 2008).

The National Planning Commission (NPC) (2003) indicates that the inequities in education due to the colonial legacy made it difficult for schools to be at the same standard throughout the country. Therefore, UNAM at its Oshakati campus re-conceptualised and transformed its access programme into a science bridging course for undergraduate science and mathematics: the SFP.

Foundation programmes focuses on 'filling the gaps' left by inadequate schooling in the hope that students would then be able to cope with the demands of tertiary study. Kapenda and Ngololo (2007, p.11) point out that "Academic Support Programmes (ASPs) were a 'reactive response' to the problem of poor academic performance of black students and that they started with 'no or little theoretical underpinnings". Their aim, according to Kapenda and Ngololo (2007), was simply to assist black students from inferior schools in predominantly white tertiary institutions; taking an extra year by black students to bridge the 'educational gap' was

considered a necessary measure. However, growing criticism towards the ASPs prompted universities to look more seriously at the issue of under-prepared students; hence the genesis of the SFP at the UNAM Oshakati campus in 2005.

There has been a worldwide trend to broaden access to universities (Grayson,1997). Like other developing countries, South Africa, and its neighbouring African states (Namibia included), suffer a serious skills shortage with a lack of suitably qualified manpower in the sciences. Identifying the potential for students from academically disadvantaged backgrounds to succeed in the sciences is a crucial factor for Southern African tertiary institutions. The selection of students for sciences, particularly those that are academically disadvantaged but have the potential to succeed in tertiary studies, continues to be a complex and dynamic process at most of the South African universities (Grayson, 1997).

Mabila et al. (2006) observed that in South Africa for instance, the pathways to higher education programmes aimed at increasing graduation rates at public universities by giving promising students, in mathematics, science, and agricultural fields, an opportunity to learn, excel and contribute positively to economic growth and development. Participating institutions of the pathways programmes in South Africa include North West University, University of Fort Hare, University of Limpopo, University of Venda, and the University of Stellenbosch with a cumulative number of pathway students numbering nearly 2300. UNAM worked together with some South African universities (such as North West University, University of Fort Hare, University of Limpopo,) that had participated in the pathways to higher education programmes (Uugwanga, 2006); this collaboration resulted in establishing the SFP at one of its satellite campuses (the Oshakati campus) to increase the number of science students entering UNAM.

Entry into tertiary institutions is generally restricted to those who have obtained appropriate school performance in Grade 12 (De Beer, 2006). This is also the case in Namibia where tertiary institutions have predetermined entry requirements for students to get admission for any studies of their choice. However, as the International Panel on Social Progress (2000) pointed out there is poor quality teaching in many schools; most universities in Africa have introduced some form of academic support programme to improve the quality of teaching in those schools (Portgieter, Davidowitz & Mathabatha, 2007). Through support programmes institutions can extract candidates who are likely to succeed from a pool of those students who have not satisfied initial entry requirements, i.e. those students who have the potential, but are held back by their poor schooling (De Beer, 2006). Mabila, Malatje, Addo-Beniako and Kazeni (2006) argue that bridging courses for undergraduate mathematics and science subjects are viewed as vehicles towards achieving this goal and consequently are the priority areas of the education sector in any country, Namibia included as well. There is thus a greater need in Namibia to increase the quantity and quality of graduates in the areas of science and mathematics (Handelsman et al., 2007).

2.3.3 Characteristics of foundation courses

According to Handelsman

> Preparatory and bridging courses are concerned with filling gaps between the statistical knowledge and skills of enrolling students and the requirements of a tertiary course, students' conception of the subject and its actual nature, students' level of confidence and study skills and those required by a tertiary course, the linguistic and cultural background of students and the level of language and background cultural knowledge required by tertiary courses, students attitudes to and experience with appropriate technology (Handelsman, 2007, p 203).

The purpose of learning in a bridging course should be on how to think in order to keep pace with incessantly changing knowledge demands of the 21st century; students should be equipped with skills that will allow them to work in dynamic work environments (Holtman et al., 2004). The type of education offered in the bridging course for undergraduate science and mathematics education at the Oshakati campus is intended to equip these students fully with academic and professional skills for them to grow from novices to experts in the work environment (Chirimbana, 2014).

Lecture-based learning approaches have dominated most tertiary education systems and have been in use for so many years and are known to be content-driven (Amutenya, 2002). In the past these teaching approaches were seen to be appropriate and did prepare students at tertiary level to meet the professional demands of the olden days. The emphasis was not on making students autonomous thinkers who should apply their education to solve day-to-day real life problems but as myopic (dependent or narrow minded) thinkers who could not think out of the box. Education has changed in most African countries; lecture based-learning is being substituted by learner-based learning (Trigwell & Corrigan, 2009). The latter, according to Trigwell and Corrigan (2009), has the advantage over lecture-based learning because it engages students and develops their abilities. This educational approach helps students develop skills such as decision-making, problem-solving, team work, and presentation skills that are relevant to current labour needs

Trigwell and Corrigan emphasise

> Campaigners of bridging programs also had to face the critique expressed by the opponents e.g. that it is not worth -while the effort and money, that these students are simply not higher

education material that they will in any case drop out somewhere along the line. Those false expectations are created (2009, p 121).

Therefore, for advocates of bridging programmes, like the SFP at the Oshakati campus, their obligation is to engage in vigorous research to prove that these programmes are indeed worthwhile and have a place in higher education.

In the past, review of access to the science field of studies focused on initiatives worldwide and which provided access for historically excluded and academically disadvantaged students in sciences at a tertiary level; the range of types of programmes was shown to vary greatly between countries such as UK, America and other western countries (Rollnick, 2007). It was found that there were difficulties in assessing the success of access programmes and determining the most successful mode of intervention. These difficulties included lack of evaluation of programmes and differences in the measure of success. Some used the number of students that had ultimately registered for tertiary studies; others used first year university success rates or the number of students graduating. There has been however little acknowledgement of the contribution the South African science access programmes have made in increasing the quality of graduates (Rollnick, 2007). This is similar to the case of Namibia. Since the introduction of the SFP at the Oshakati campus in 2005, no study has been carried out to evaluate it except for a few studies that were carried out to assess how the SFP students perform in particular subjects.

Foundation courses are undergraduate programmes designed for students who do not have the qualifications necessary for direct entry to an undergraduate degree. A programme typically lasts one year; students who are successful in completing the course can progress to a suitable degree programme at university level (Rollnick, 2007). The SFP at UNAM lasts for one year,

and students who successfully complete this programme might become suitable candidates for degree programmes at UNAM.

2.3.4 Foundation programmes: the Namibian perspective

Achieving access and quality education has been a challenge to the Namibian government since independence (Naukushu et al., 2012). Naukushu et al. (2012) assert that despite the government's efforts to alleviate the challenge of lack of access and quality in the provision of education, many schools, mainly in rural areas, still do not have some resources and they are not as well equipped as schools in urban areas. Learners graduating from poorly resourced schools persistently attain lower level understanding and educational achievements required for admission into and success in tertiary institutions compared to those who attend well-resourced schools.

Moreover, UNAM faced significant challenges including responding to the needs and demands of the disadvantaged society, often those living in rural areas and far outlying regions (Uugwanga, 2006). The SFP was established in 2005 by the UNAM Senate after the realisation that there were few graduates in science-related professions in Namibia (Uugwanga, 2006). The establishment of the SFP at UNAM aligns with social accountability and equity imperatives of tertiary institutions, assists in addressing inequities in secondary education outcomes experienced by under-served communities and supports a widening participation agenda for tertiary education (Smith, 2018)

According to Ngololo and Kapenda (2012) the SFP aims at increasing access to UNAM science-related faculties. Many of the few students who gain direct access to the university do so without the critical knowledge and skills required to comprehend the subject matter in

sciences and mathematics in the first year. This is attributed to the fact that learners graduating from historically disadvantaged schools often do not attain the same level of understanding and educational achievement as the ones who attend well-resourced schools (Chirimbana, 2013).

A foundation programme is a relatively new concept in the Namibian context as there has not been any of its kind (Naukushu, 2005). It is a relevant concept for an industrialising and developing nation like Namibia. The Namibian government has clearly identified, in Vision 2030, the need for scientific knowledge as a core element of living and participating in the 21st century and in the development of a dynamic and knowledge-based economy (Chirimbana, 2014). There is ample evidence from the Directorate of National Examinations and Assessment (DNEA, 2008) that there is a high failure rate due to the failure of the secondary education system to meet the demands of high education in aspects of quality and quantity. This was observed particularly in all areas of mathematics and science; hence it was deemed necessary to establish a platform that prepares students in these subjects and English to enable them cope with the demands of higher education in the science and mathematics disciplines (Uugwanga, 2006). The Namibian government entrusted UNAM to come up with a new programme that would prepare students in mathematics, sciences and English to meet the demands of tertiary education in aspects of quality and quantity. This is what led to the formation of the SFP at the Oshakati campus in 2005.

Admission to higher education in South Africa is mainly done on the basis of student end-of school year results. The matriculation examination is taken after Grade 12. Higher education institutions generally specify their entrance standards in terms of required student performance in the matriculation examination (Grayson, 2000). In Namibia, admission to tertiary institutions is also done based on a student's Grade 12 end-of-year results (Chirimbana, 2014). "South

Africa higher education institutions find it increasingly difficult to deal with school leavers, who are ill prepared for higher education, but institutions are obliged to meet national goals in terms of access and increased pass rates. However, the hard realities of educational back loops remain a challenge in most African Countries" (Holtman et al., 2004, p. 352). Namibia is not an exception.

Therefore, the formation of the SFP was a response to the previous educational injustices the Namibians suffered during the apartheid era (Ngololo & Kapenda, 2012; Naukushu et al., 2012). The formation of the SFP goes hand in hand with what has been defined in the Education and Training Sector Improvement Programme (ETSIP) document that articulates the Namibian strategy for improving education. It is envisaged that the new strategy of addressing the previous educational injustices in Namibian to improve education will foster benefits that are critical to development, including poverty reduction and social equity through education programmes that will allow Namibia to supply its own manpower. The SFP serves as a tool that will provide the necessary academic skills (Naukushu et al., 2012)

The reviewed literature (Naukushu et al., 2012; Uugwanga, 2006; Mabila et al., 2006; Holtman et al., 2004; Rollnick & Holtman, 2010) assert that all FPs offer an alternative entry route into universities by expanding admission criteria, and, most importantly helping those students that do not meet the standard set of admission criteria. The main focus of FPs in South Africa is to help formerly marginalised and educationally disadvantaged students to gain entry into universities to follow degree and diploma courses of their choice. As a result, these students should in due course make an impact on the socio-economic status quo of individuals, the community and the country (Portgieter, Davidowitz & Mathabatha, 2007).

2.3.5 Importance of foundation programmes

There has been a growing recognition that both bridging and foundation education have more to offer than the facilitation of tertiary access More recent descriptions of bridging/foundation education acknowledge their role in providing 'successful transition to and participation in the destination programme or workplace' support for students to 'develop the skills necessary in later college-level courses' and ideally assist students to know how to learn and to 'succeed as critical thinkers and independent learners at the next level of education(Smith, 2018).

Uugwanga (2006) observes that in South Africa, for instance, the pathways (bridging courses) to higher education programmes aim at increasing graduation rates at public universities by giving promising students in the mathematics, science, and agricultural fields an opportunity to learn, excel and contribute positively to economic growth. According to Pandor (2004), research has shown that students who access university programmes through foundation programmes stand a better chance to complete their studies in time compared to those who access universities with a Grade 12 qualification. This is because during the year that students do a SFP course they are equipped with enough expertise and experience necessary for them to outshine in their selected degree programmes; this is not always done at Grade 12 level (Pandor, 2004). This was one of the main objectives of this study whereby the researcher wanted to find out whether former SFP graduates were able to complete their studies on time as a result of having gone through the SFP.

Some authors of foundation programmes (Grayson, 2000; Kloot et al., 2008, Handelsman, 2007; Mabila et al., 2006; Trigwell et al., 2009) have identified the some of the advantages of studying through a foundation programme. These are presented and discussed below.

- Increased chances of admission

By completing a foundation programme, students will be fully qualified to start an undergraduate or graduate degree at the university level. Most students that follow a foundation programme get into prestigious universities in their countries (Grayson, 2000). Just like in the case of the SFP where students who successfully complete the SFP are eligible to start an undergraduate degree or diploma at UNAM.

- Better language proficiency

By completing foundation programmes, students might advance their English speaking skills to meet university admission requirements. Foundation programmes in Africa always include language courses to help students communicate during their studies and in their daily lives (Kloot et al., 2008). The SFP at the Oshakati campus includes English as one of the major subjects to help students communicate better during their future studies at UNAM and also in their daily lives. English is the official language and medium of instruction in Namibia.

- Direct access to universities

Science foundation programmes (SFPs) help students to discover a university that they plan on attending during their bachelor's or master's studies and to decide if it is the right academic institution for them. SFPs help students to learn more about requirements, practices, and their country's cultures, by communicating with teaching staff and students at a university; students might get a unique insight into their possible futures (Grayson, 2000). The SFP at the Oshakati campus not only academically prepares students; it also gives them career guidance. A foundation programme is very useful when a person has decided to study a degree at a local university or at an international university but does not have the required admission qualifications. A good foundation programme focuses on the particular interests of the students,

providing them with the best chance to become qualified for admission (Handelsman, 2007). This is one of the objectives of the SFP at the Oshakati campus: to provide students from underprivileged circumstances with guaranteed conditional offers in science-related undergraduate programmes at UNAM.

- Relevant qualification for one's future studies

A foundation programme provides students with a specific set of skills and knowledge necessary for university admission. This targeted preparation makes studying infinitely easier and provides them with a unique advantage over other students who have not gone through a FP (Mabila et al., 2006). Students who had gone through the SFP might find it easier and might excel in their studies once they enrol for degree courses because they are already familiar with university life in comparison to those who enter university directly from secondary schools without the SFP experience. This is one of the objectives of the SFP at the Oshakati campus; to provide students with specific sets of skills and knowledge that are necessary for university admission.

- Reduced culture shock

By spending one year in at university where students wish to study should make it much easier for them to move to other universities even in a foreign country. This should make the beginning of their studies a lot smoother and comfortable. This experience also provides them with knowledge about all the paperwork and formal procedures that they will need to go through to study at a university (Trigwell et al., 2009). The SFP students spend a year at the Oshakati campus doing their foundation year; by so doing this makes their studies a lot smoother and comfortable to study at UNAM or any other tertiary institution.

2.4 Summary

The programme evaluation theory was discussed in this chapter in terms of it being the theoretical framework that informed this study. Motivations were presented as to why it was used in this study. Literature related to foundation programmes was reviewed. The origins of foundation programmes, in some countries in the world, were discussed. Also discussed were the characteristics of foundation programmes in general, including the characteristics of the SFP at the Oshakati campus. Literature on foundation programme was reviewed from a Namibian perspective. This was followed by the importance of foundation programmes. The research methodology used in this study is presented in the next chapter.

CHAPTER 3

METHODOLOGY

3.1 Introduction

In this chapter the methodology used for collecting and analysing the data is described. Research design and the justification for its use are provided. The population, sample, the sampling procedures, and the research instruments utilised to gather data from the participants, are described. Validity and reliability in terms of the trustworthiness of the results of this study are also discussed.

3.2 Research design

A research design, according to Bennett (2010), refers to the overall strategy a researcher chooses in order to integrate different components of a study in a coherent and logical way to address a research problem. Bennett (2010) adds that the function of research design is to ensure that the evidence obtained enables researchers to effectively address their research problems as unambiguously as possible. Cresswell (2012) notes that research design constitutes a blueprint for collection, measurement, and analysis of data. In social science research, obtaining evidence relevant to a research problem generally entails specifying the type of evidence needed to test a theory, to evaluate a programme, or to accurately describe a phenomenon (Polit & Hungler, 2007). The type of design that was used in this study was the survey design.

There are four worldviews within which a study can be located: the post positivist worldview where a researcher intends to verify an already existing theory; the pragmatic worldview where a researcher deals with real-world practice; the constructivist worldview where a researcher

maintains that knowledge is constructed by scientists and it opposes the idea that there is a single methodology to generate knowledge; and the participatory world view where a researcher intends to bring a change in a system based on findings of a study (Cresswell, 2012). The participatory worldview was used in this study because it aimed at identifying the shortcomings of the SFP that may need to be overcome by the University of Namibia (UNAM) in order to improve the programme and make it more effective and efficient. The participatory world view was adopted because the study aimed at looking at how much the SFP had achieved in preparing students for further studies, and to determine whether the SFP was achieving its goals and objectives of preparing students for their first year of study at UNAM's science degree programmes.

A mixed-method quantitative and qualitative research design was utilised to assess the effectiveness of the SFP at the Oshakati campus in preparing students for degree programmes, Patton (1999), and Polit and Hungler (2007), maintain that the choice of the research design is more beneficial if a mixed methods design is utilised as opposed to a single design. A mixed methods design allows a researcher to collect two kinds of data: quantitative and qualitative. Both complement each other and form a strong basis of findings.

Cresswell (2012) identifies two different types of mixed-methods designs: convergent parallel and explanatory sequential. In a convergent parallel design, qualitative and quantitative data are collected at the same time. The results are analysed, compared and interpreted concurrently. In an explanatory sequential design, qualitative results are collected and analysed, and then followed by the collection of the quantitative data. Similarly, quantitative data are collected first and analysed, and then followed by the collection of qualitative data. This study adopted the convergent parallel design since both qualitative and quantitative data were simultaneously

collected, merged, analysed and the findings were compared. In this study quantitative and qualitative data were collected separately. Both datasets were analysed separately, and the results from the analysis of both datasets were compared and interpreted in terms of whether the results supported or contradicted each other. A direct comparison of the two datasets provided a convergence of data sources.

3.2.1 Qualitative inquiry

Qualitative inquiry enables an understanding of the views of individuals in terms of experiencing a particular phenomenon from their point of view (Patton, 2000). The experiences and the perceptions of former SFP students and lecturers regarding the programme were qualitatively studied to find out the perceived impact of the programme on the lives of the students. A qualitative inquiry was also used to determine the effectiveness of the SFP in preparing students to take up career choices in the science fields. Qualitative data were collected through interviews by using a case study method whereby the SFP lecturers were individually interviewed. The active role of a researcher with subjects of a study is one of the strengths of a qualitative inquiry (Straus & Corbin, 1998). Patton (2000) asserts that qualitative methods typically produce a wealth of detailed information about a much smaller number of people; this increases the understanding of a cases and situations being studied but reduces generalisations of the results. Both quantitative and qualitative data were valued in this study; the researcher saw them as approximately equal sources of information.

Qualitative research usually is some form of a naturalistic observation such as ethnography or unstructured interviews (Loraine, 2004). A researcher observes and documents opinions in terms of responses and patterns as presented in the extracts of the answers of the respondents. In order to draw meaning from such data means that data are first analysed by a researcher. To

understand the social world from the experiences and subjective meanings that people attach to it, interpretivist researchers favour to interact and to dialogue with the studied participants (Straus & Corbin, 1998). They prefer to work with qualitative data that provides rich descriptions of social constructs. Interpretivists use a narrative form of analysis to describe specifics and highly detailed accounts of a particular social reality being studied, termed the idiographic approach, which describes the research goals that focus on the individual rather than focusing on or generalising individual results to the entire population (Neuman, 2011). Qualitative data gathered would then be used to lead to an inductive approach, whereby a researcher begins with as few preconceptions as possible, allowing theory to emerge from the data.

The researcher in this study concurs with Loraine (2004) who affirms that a high level of comprehension is achieved by means of approaching research from a qualitative point of view. The reason is that it allows a researcher to get into a deep conversation with participants to gain a better understanding of the data as well as the nature of the participants. Qualitative approaches are also advantageous in that they allow an investigator to get a better understanding of the world of participants and therefore obtain results that are of high quality (Patton, 2000).

3.2.2 Quantitative inquiry

A quantitative inquiry when used solely relies on the collection of numerical data; it relies on collecting data based on precise measurement using structured and validated data collection instruments (Johnson & Christensen, 2008). In this study, the total number of former SFP students currently enrolled in degree programmes at UNAM (they are approximately 979), the performance of the former SFP students in their 1st year of their degree programmes at UNAM,

and also the total number of students who completed their degree programmes, were quantified in order to determine the effectiveness of the programme in preparing students to take up career choices in the science fields.

Quantitative studies have the advantage of providing empiricist data that are descriptive and therefore are viewed to be credible. Patton (2000) says the strength of a quantitative design is that by performing statistical analysis a researcher can obtain essential facts from research data, including preference trends, differences between groups, and demographics. For example, Loraine (2004) contends that despite its weakness that it cannot enter into the world of respondents and draw meaning from it, the use of quantitative data has gained favour in the sense that it orients itself to quantifiable means; the use of quantitative data possesses proof grounded on logical empiricism or positivism as conceptual frameworks. Therefore, the quantitative data about the performance of the SFP graduates in their 1st year of the degree programmes at UNAM, from 2005 up to 2016 were collected by the use of survey methods.

The complementary roles of qualitative and quantitative methods were essential in this study as both methods were combined in order to compensate for their mutual weaknesses. Mixed methods research provides strengths that counterbalance the respective weaknesses of quantitative and qualitative. It provides a more complete and comprehensive understanding of a research problem than either a quantitative or qualitative approach alone provides (Polit & Hungler, 2007).

3.2.3 Justification for using a mixed methods design

Some researchers advocate the use of a mixed-methods approach. For example, Patton (2000), Polit and Hungler (2007), MacMillan and Schumacher (2006) and Neuman (2011). They argue

that to avoid conflict between the two kinds of data, it is necessary to present them in the same chapter in order to allow them to complement each other. The researcher hoped that by combining both qualitative and quantitative methods of enquiry that a more complete understanding of the research problem would be provided as to opposed to either approach used alone.

Some authors (Polit & Hungler, 2007; MacMillan & Schumacher, 2006) declare that there is a need to distinguish between qualitative and quantitative methods. There is however a precaution that has to be taken into account to ensure that splitting of the two methods does not compromise the quality of the data obtained. Polit and Hungler (2007), as well as MacMillan and Schumacher (2006), emphasise that qualitative and quantitative research designs do not exist to bring conflict against each other but rather to complement each other in improving the quality of the data.

Neuman (2011) observed that qualitative inquiry research is mostly open-ended; if it is used alone then participants have more control over the content of the data collected. A researcher might then not be able to verify the results objectively against the scenarios stated by the participants. It is for this reason that in this study quantitative and qualitative research methods were combined to collect data.

The two research designs were used to collectively yield responses to the research questions and to offer means of triangulation to provide a better outcome for the study. This was done because of the richness of data obtained from the two approaches when mixed, as compared to when used separately.

3.3 Population

Henning, Van Rensburg and Smith (2004), define population as a group of individual people and objects that have one or more characteristics in common which are of interest to a study. The population of this study consisted of all former students (they are approximately 1298) who went through the UNAM SFP from 2005 to 2016 at the Oshakati campus, as well as five full time lecturers who offered courses in the SFP.

3.4 Sample and sampling procedures

A sample of 100 (n=100) former SFP students was selected from the population (n=1298). Stratified random sampling, and snowball sampling were used. Fifty (n=50) students were selected by means of random stratified sampling according to the degree programmes they had enrolled in. There were 30 former students from each academic year (2010 to 2016) who had completed their studies; they were selected by means of snowball sampling. Since UNAM degree courses take four years to complete, students from 2010 to 2015 could have completed their studies by 2016. The sample also included 20 students who had not enrolled in any of the degree programmes at UNAM, they were also selected by means of snowball sampling. This study also included SFP lecturers (n=5). Convenient sampling was used to select them.

3.5 Research instruments

Three research instruments were used to obtain data from the sampled participants. A questionnaire, an interview guide, and document analysis were used to collect data to answer the four research questions in this study. MacMillan and Schumacher (2006) underscore that the quality of the data is enhanced if obtained with triangulated tools. Triangulation means using more than one method to collect data on the same topic. It refers to the use of multiple

methods or data sources in qualitative research to develop a comprehensive understanding of phenomena (Patton, 2000). Triangulation enabled the researcher to compare the findings from the various information sources. Johnson and Christensen (2008) state that triangulation provides a better understanding of the phenomenon being investigated compared to a single method of data collection.

3.5.1 Questionnaire

Johnson and Christensen (2008, p.170) define a questionnaire as a "self-report data collection instrument that each research participant fills out as part of a research study". They further indicate that researchers use questionnaires so that they can obtain information about the thoughts, feelings, attitudes, beliefs, values, perceptions, personality and behavioural intentions of research participants. The use of self-administered questionnaires as data collection instruments in this study had several advantages. A questionnaire can be completed within a short time. The main cost incurred in this study was that of printing and distributing of questionnaires. According to Gillham (2008) a questionnaire is objective and cheaper to design to collect a lot of information in a short time period. These were some of the reasons why the researcher chose to use this research instrument. Two questionnaires were developed by the researcher, whereby: one was for the students who were still studying at UNAM and had not yet graduated after completion of the SFP, as well as those students who did not enroll in any UNAM programme after completing the SFP (questionnaire for students admitted for further studies plus those that were not admitted for further studies). The second questionnaire was for students who had already graduated from tertiary institutions (tertiary graduates' questionnaire) such as UNAM, International University of Management, Namibia University of Science and Technology (formerly the Polytechnic of Namibia), and the four former Colleges of Education. All the two questionnaires where self-developed and self-administered. The two questionnaires

were constructed based on the 2nd research questions (2. What are the perceptions and experiences of the former SFP students regarding the SFP in preparing them for science and science-related courses at UNAM?)

Each questionnaire had open and closed ended questions. An open-ended question enables participants to respond in any way that they please and therefore provide primarily qualitative data; closed–ended questions require participants to choose from a limited number of responses that are predetermined by a researcher and therefore provide primarily quantitative data (Johnson & Christensen, 2008).

One advantage of a questionnaire is that potentially a lot of information can be collected from a large portion of a group; this is not the case with other methods of data collection such as one-to-one interviews (Munn & Drever, 2004). In this study, two questionnaires were used to generate a large pool of data that could be triangulated with the interview results and the results from document analysis. Oppenheim (2000) reasons that the potential of a questionnaire in creating a larger pool of data is not often realised because returns from questionnaires are usually low. The researcher addressed this weakness by personally delivering the questionnaires to the participants. They all returned their completed questionnaire to the researcher: a return rate of 100%.

If all participants are provided with the same set of questions (i.e. a standardised questionnaire) and the same system of coding responses is used, then it may be necessary to explain some points in the questions that participants might misinterpret (Leung, 2001). This was partially dealt with by piloting the questionnaires. The pilot study is discussed in detail in 3.7 below.

According to Foddy (1994), and Gillham (2008), respondents may not be willing to answer questions. For example, they might not wish to reveal information or they might think that they will not benefit from responding perhaps even being penalised by giving their real opinion (Foddy, 1994). The researcher thus explained to all participants that the collected information could be beneficial to them. They were assured that their responses would not affect their formal academic marks or jeopardise their employment opportunities. They were thus asked to reply honestly. They were told that if their response was negative it could just be as useful as a positive response.

3.5.2 An interview guide

An interview is considered as one of the major approaches used to collect data. It "attempts to understand the world from the subject's point of view, to unfold the meaning of people's experiences, to uncover their lived world prior to scientific explanations" (Flick, 2008, p. 164). An interview guide is a list of questions an interviewer uses to obtain answers from interviewees (Bell, 2004). A structured interview guide was developed by the researcher based on research question number 3 and 4 (3. What are the perceptions and experiences of the SFP lecturers regarding the SFP in preparing students for science and science-related courses at UNAM? and 4 (4. What are the teaching models used in the implementation of SFP to effectively prepare SFP students for further studies?) This structured interview guide was used to interview the five SFP lecturers. Each lecturer was asked the same question in the same order.

There were several reasons why the researcher chose to use a structured interview during this study. Firstly, it provided an opportunity to establish rapport with the participants while at the same time capturing in-depth information from them (Flick, 2008). A face-to-face, interview

created an opportunity for the researcher to note each lecturer's tone in terms of verbal cues. Secondly, the face-to-face interviews with the SFP lecturers were useful in obtaining detailed information about personal feelings, perceptions and opinions (Bell, 2004). Thirdly, the researcher was able to clarify ambiguities in some questions and to probe further. Fourthly, face-to-face interviews with the SFP lecturers allowed for wording of questions to be personalised; the precise meaning of questions could be clarified so that they understood what was being asked.

3.5.3 Document analysis

Document analysis means that documents are interpreted by a researcher to give voice and meaning around an assessment topic (Platt, 2001). Payne and Payne (2004) describe document analysis as a technique used to categorise, investigate, interpret, and identify the attributes of a certain variable.

In this study the researcher analysed the University Integrated Tertiary System (ITS) database to extract student data in order to find out how many former SFP students had registered for degree courses; and also to find out the performance of these students in their courses of study at UNAM. Data mining techniques are "the practice of automatically searching large stores of data to discover patterns and trends" (Nong, 2003, p. 23). These were used to extract data from the University ITS database using Oracle 9i software. The students' marks for all subjects, contact details, and information about graduation were extracted in order to find out the performance of the SFP graduates in their 1st year, 2nd year, 3rd year and 4th year of their study at UNAM. Payne and Payne (2004) assert that a key advantage in conducting documentary analysis is that a researcher can eliminate the effect that a researcher might have on a person or situation where the research is being conducted: in other words, "the researcher's effect".

3.6 Validity and reliability

Validity, as defined by Loraine (2004), is the degree to which a measurement instrument assesses what it is supposed to measure. Johnson et al. (2010) also define validity as the best approximation to the reality or falsity of a proposition. The validity of and trustworthiness of this study were enhanced by using multi-methods in collecting data: a questionnaire, an interview guide, and document analysis. The researcher is of the opinion that these three techniques were an interwoven web of all the interactive techniques used in collecting data. According to Bell (2001), the use of multiple methods, which do not share the same inherent weaknesses, enhances the chances and reduces a problem of being one sided. Bell (2001) adds that validity of both quantitative and qualitative methods can be improved by using multi-methods strategies of collecting data. In this study the face and content validity were both determined. In assessing face validity, instruments should be sent to a carefully selected sample of experts who can report back with a judgement that the measure appears to be a good measure of a construct (Depoy & Gitlin, 2008). In this study, the researcher ensured face validity by submitting the research instruments to experts in the field of study. The instruments were evaluated by three academic supervisors in relation to the research questions in chapter one. This was done in accordance with what is recommended by Polit and Hungler (2007). The experts also assessed whether the instruments were representative of the purpose of this study. Revisions that were suggested by them were incorporated into the data collecting tools to ensure that they contained the desired contents. This was carried out to ensure that the questions assessed the characteristics that were targeted by the study.

Content validity was also taken into account. A researcher essentially checks the operationalisation of questions against the relevant content domain for a construct (Depoy &

Gitlin, 2008). Content validity was ensured by the researcher through a comprehensive reviewing of existing literature on the programmes of SFP. When the questionnaires had been evaluated, an interview guide and a checklist were developed and handed to the academic supervisors to scrutinise and to give comments on the instruments. This was done to ensure that the content that was going to be asked was up to date, and that the questions actually assessed issues related to SFP. The researcher sought the input from her supervisors so that she could improve the quality of the content of the interview guide, the questionnaires, and the checklist to ensure that the questions met the intended purposes. Comments from the supervisors were incorporated into the interview guide and the questionnaires to improve the quality of the content and to ensure that the questions that were asked were for the intended purpose.

The reliability of the research instruments was also addressed in this study. Reliability pertains to the quality of measurement. Loraine (2004) defines reliability of a tool as its ability to measure what it is supposed to measure consistently. In this study, agreement reliability was used. According to McMillan and Schumacher (2006, p. 245) "agreement reliability is described as consistency of ratings". To determine the reliability of the instruments in this study, the procedure involved two or more persons to be rated through an interview. Five SFP lecturers were interviewed. The researcher prepared a questionnaire for 100 former SFP students. For document analysis the researcher analysed the University Integrated Tertiary System (ITS) database to extract student data. The researcher used all three instruments to solicit the same information from the respondents by triangulation. The latter involves the use of different data sources or collection processes to corroborate data, which in turn serve as evidence to build a coherent justification for a particular finding or set of findings (Depoy & Gitlin, 2008).

The similarities of the outcome of these three processes were an indication of the reliability of the research instruments. The researcher conducted a pilot test of the instruments on 15 former SFP students and one former SFP lecturer. None of them were included in the actual study. The pilot study is presented in 3.7 below.

To determine the accuracy of the findings of this study required that the researcher made sure that each lecturer agreed with her descriptions of the face-to-face interview discourses, discussions, and her interpretations of the descriptions. This checking exercise was done to establish whether the given descriptions and interpretations were accurate presentations of the SFP lecturers' responses and interactions as expressed during their respective face-to-face interviews (Creswell, 2012).

3.7 Pilot study

Pilot testing is a feasibility study or a small-scale trial run, of all the procedures planned for use in a main study (Given, 2009). It is pretesting or the trying out of all the research instruments to be used in a main study. One of the advantages of conducting a pilot study is that it gives advance warning about where the main research project could fail, where research protocols may not be followed, or where proposed methods or instruments are inappropriate or too complicated (Stoffels, 2005). It is important to pilot the instruments to ensure that the questions are understood by respondents and that there are no problems with the wording or measurement (Patton, 2000). Pilot testing involves the use of a small number of respondents who are as similar as possible to the target population to test the appropriateness of the questions and their comprehension

The main aim of pilot testing is to test the research process and to determine whether the instruments will give the expected information, and that everyone in the main sample should understand the questions in the same way (Patton, 2000). Another aim of pilot testing is to develop and test the adequacy of research instruments, to collect preliminary data, as well as to help discover whether repetitiveness or redundancy are bothersome or what topics were not covered that participants expected (Holloway, 2010). Moreover, it allows a researcher to seek information from the pilot study participants to determine the degree of clarity of questions and to identify problem areas that need attention (Neuman, 2000). All participants in the pilot study were not invited to take part in the main study.

Before commencing with the main research, the two questionnaires were administered to former SFP in exactly the same way as they were to be administered in the main study. Fifteen (n=15) former SFP students participated in the pilot study; they were requested to give their inputs, comments and suggestions on how the instruments could be improved. Eight former SFP students, who were still studying with UNAM, were chosen conveniently and were given a questionnaire to complete. The other two former SFP students who were not enrolled in any of the degree programmes at UNAM were conveniently selected from the Oshakati town by using the snowball sampling method. They were also given a questionnaire to complete. The five remaining former SFP students used for pilot testing were tertiary graduates and were conveniently selected by using the snowball sampling method from the two secondary schools (where they were teaching) in Oshakati town. All the questionnaires were hand delivered to the former SFP students by the researcher. The completed piloted questionnaires (n=15) were collected after one week. The inputs were taken into consideration; the instruments were revised accordingly; Some questions were reworded and ambiguous questions were deleted.

During the piloting stage, the instruments were subjected to a test-retest technique. The questionnaires and interview guide were twice given to the same 15 former SFP students and one former SFP lecturer at different times to see if their responses were the same. This was done on the assumptions that the "phenomenon to be measured remains the same at two testing times and that any change is a result of random error" (Depoy & Gitlin 2008, p. 203). This was the rationale for piloting both the questionnaires and the interview guide. Furthermore, during the face-to-face interviews, the researcher tried to minimise any bias by not letting her personal beliefs and knowledge influence the discourse and discussions. In particular, she tried as far as possible not to allow her own assumptions, feelings and disposition to direct the interview. She allowed each lecturer's responses to lead the way as guided by the structured interview guide.

The interview schedule was administered to one former SFP lecturer in exactly the same way as done in the main study. One former SFP lecturer was chosen conveniently from one of the UNAM campuses and was individually interviewed. This lecturer had resigned from the SFP a year ago. A former SFP lecturer was chosen to participate in the pilot study to avoid contaminating the study results. If incumbent SFP lecturers had been used in the pilot study their responses might have contaminated the results of the main study because they would have already been exposed to an intervention. Their responses might then be different from those who were potential participants. The piloted face-to-face 30 minutes' interview was conducted at one of the UNAM campuses. It was audio recorded (with permission of the participant) and was transcribed later.

The pilot study covered several issues.

- The participants were asked for feedback to identify ambiguities and difficult questions.
- The participants were asked to note the time taken to complete the questionnaire.

- An interview was conducted to determine whether the instrument was reasonable.
- Unnecessary, difficult or ambiguous questions were not included in the final instruments.

Appendix 2 provides a description of the action taken after the pilot study. The information obtained from the pilot testing was used to improve the instruments whereby pitfalls and errors that could have proven to be costly in the study were identified in the pilot testing and eliminated from the instruments (see Appendix 2).

3.8 Data collection procedure

An ethics clearance certificate was sought from, and granted by the UNAM Research Ethics Committee (UREC). This certificate allowed the researcher to collect data from the participants as well as to access data from the UNAM system. The registrar of UNAM, the Director of the Computer Centre, as well as the Director of the Oshakati campus where the SFP is located, were informed about the study so that they could allow the study to take place at two campuses.

As discussed above the SFP students' data were extracted from the Integrated Tertiary System (ITS) of UNAM. Data mining techniques were used to extract data from the University ITS Database using Oracle 9i software. The student marks for all subjects for the years 2005 to 2016, their contact details, as well as information about graduation were extracted from the UNAM database.

Two different questionnaires were compiled. One for the students who were still studying at UNAM and had not yet graduated after completion of the SFP, as well as those students who did not enroll in any UNAM programmes after completing the SFP (Appendix 3). The second questionnaire was for students who had already graduated from tertiary institutions (Appendix

4). The questionnaires were delivered to the SFP graduates via two methods: hand delivery and electronic mail and then they were self-administered. The questionnaires that were self-administered were designed specifically to be completed by a respondent without any intervention of the researcher. The questionnaires had three sections. The first section covered demographic information of the student participants; the second section covered the experiences and perceptions of the SFP students regarding the SFP in preparing them for university education; the last section contained items to determine the effectiveness of the SFP in preparing students to take up further studies in the science fields.

The five SFP lecturers were conveniently selected and were individually interviewed by the researcher. The interview was conducted face-to-face and lasted 30 minutes. The interview guide had four sections. The first section sought biographical information; the second consisted of questions on the experiences and perceptions of the SFP in preparing the students for university education; the third contained questions to determine the effectiveness of the SFP in preparing students to take up career choices in the science fields; the last section consisted of questions to elicit what teaching models the lecturers used in teaching the SFP students.

3.9 Data analysis

Qualitative data were collected in order to provide a thorough description and evaluation of the programme. The interviews with lecturers were audio-recorded and then transcribed later. The interview transcripts were colour-coded to identify common themes. This analysis helped the researcher in answering the questions about the perceptions and experiences of the SFP lecturers and that of the former SFP students regarding the SFP in preparing students for science and science related courses at UNAM; and how effective they thought the SFP was in preparing students to take up career studies in the related degree programmes at UNAM. Data

from the questionnaires and data mining techniques were analysed using descriptive statistics. Frequency tables, graphs and charts were used to analyse the data on the performance of the SFP graduates in the 1st, 2nd, 3rd and 4th year degree programmes at UNAM to determine how many SFP graduates had completed their studies on time, and also to determine the total number of former SFP students who were currently enrolled in degree programmes at UNAM. This information enabled the researcher to answer the 1st question on the performance of the SFP graduates in their 1st year of the degree programmes at UNAM from 2005 to 2016.

3.10 Ethical considerations

Ethics refers to human philosophy concerned with appropriate conduct and virtuous living (Given, 2009). Ethics involves an entire research process. In other words, the nature of the problem under investigation, reporting the theoretical framework underpinning the study, the research context, and data collection instruments and methods utilised, the research participants involved, and the procedures used to analyse the data (Creswell & Garret, 2008). This study involved human subjects thus special precautions had to be taken to protect their rights.

Ethical clearance was obtained from the UNAM Research Ethics Committee. The researcher provided written information to the participants. They were informed about the nature, purpose and benefits of the research. They were also informed that their participation was voluntary and that they were free to withdraw from the research at any time without penalty. In addition, they were also given a consent form to sign to assent to take part in the study. They were assured that their information would be treated with the utmost confidentiality by using codes on the data collection instruments to protect their responses. They were assured that anonymity would be upheld throughout the study. They were requested to not list their names on the

questionnaire. The researcher did not write down the names of the lecturers that were interviewed. They were assigned pseudonyms to protect their identities.

The data from this study has been kept in a password protected personal computer and will be deleted after 5 years. All hard copies will be shredded upon completion of the study. The findings of this study will be used to generate academic publications, e.g. conference papers and journal articles.

3.11 Summary

In this chapter, the methodology that was utilised in this study was presented. The researcher discussed the research design that was used and presented the justification of the dual nature of the data collected. The population, the sample and the sampling procedures, as well as the research instruments, were discussed. Issues of validity and reliability were also elaborated upon in this chapter. The pilot study was presented. The different data analysis procedures employed for each set of data collected in the study were discussed. Finally, ethical considerations were also discussed. The next chapter presents the quantitative and qualitative data.

CHAPTER FOUR

PRESENTATION OF QUANTITATIVE AND QUALITATIVE DATA

4.1 Introduction

The quantitative and qualitative data of the study are presented in this chapter to address the four research questions.

1. What is the performance of the SFP graduates in their 1st year of the degree programmes at UNAM from 2005 to 2016?
2. What are the perceptions and experiences of the former SFP students regarding the SFP in preparing them for science and science-related courses at UNAM?
3. What are the perceptions and experiences of the SFP lecturers regarding the SFP in preparing students for science and science-related courses at UNAM?
4. What educational teaching model can be used in the SFP to effectively prepare SFP students for further studies?

Quantitative and qualitative data were collected by means of questionnaires from former SFP students, an interview guide for the SFP lecturers, and document analysis. Six themes emerged from the data: background information of the participants; success rates of students; teaching success rate in the SFP; effectiveness of the SFP in preparing students to take up further studies in science and science-related fields; views on teaching and learning strategies used in the SFP; employment opportunities for former SFP students; the organisation and running of the SFP at the Oshakati campus; document analysis results; and a proposed

teaching model to improve the teaching process in the SFP. Each theme is presented and discussed below.

4.2 Background information of the participants

The sample for this study, as discussed in chapter three (see section 3.4) consisted of 100 former SFP students. They all completed the questionnaire. There were 60 females and 40 males (60%:40%). Three female SFP lecturers and two male lectures participated in the study (see section. 3.4).

The lecturers (n=5) were asked to indicate the names of the subjects they taught in the SFP. Each taught one subject: mathematics, physics, biology, English or chemistry. They were asked to indicate the number of years that they have been teaching in the SFP. Two had taught for 12 years, one for eight years, one for seven years, and one for three years. Their mean teaching experience was 8.4 years (12+ 12+ 8+ 7+ 3 = 42\5 = 8.4).

The former SFP students were asked to indicate the name of the region where they completed their secondary education. Their responses are presented in Figure 4.1.

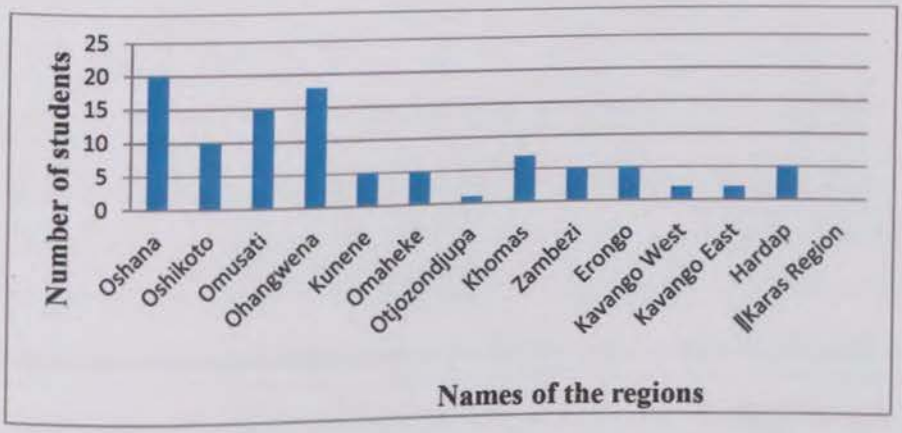


Figure 4. 1: Regions where students completed their secondary education (n=100).

As shown in Figure 4.1, most students completed their secondary education in the Oshana region (20) followed by the Ohangwena region (18), the Omusati region (15) and the Oshikoto region (10) (n = 63). The others were from the Khomas region (7), and five respectively from the Kunene region, the Omaheke region, the Zambezi region, the Erongo region and Hardap region (n=32). Two were from Kavango West and Kavango East, respectively (n=4), and one from the Otjozondjupa region (n=1).

4.3 Success rates of students

Students need 17 points at Grade 12 and above to be registered in the SFP. The former SFP students were asked to indicate the points obtained in Grade 12 before they joined the SFP. Table 4.1 shows their responses.

Table 4. 1: Points obtained in Grade 12 by the former SFP students (n=100)

Points obtained in Grade 12	**Frequency (%)**
17	5 (5)
18	8 (8)
19	13 (13)
20	8 (8)
21	10 (10)
22	9 (9)
23	1 (1)
24	6 (6)
25	15 (15)
26	10 (10)
27	7 (7)
28	9 (9)
29	2 (2)
31	1 (1)
32	3 (3)
33	2 (2)
34	2 (2)
Total	**100**

Table 4.1 indicates that 15 students obtained 25 points in Grade 12; there were 13 who obtained 19 points; ten obtained 26 points; and ten obtained 21 points. Two however obtained 34 points in Grade 12.

The students were asked to indicate whether they had completed the SFP within one year as stipulated. All (100%) gave affirmative replies. They were asked whether they had obtained 60% or more in the SFP. The majority (n=80) did achieve this pass mark; 20 indicated they

had not successfully completed the SFP. The 80 who had successfully completed the SFP were asked what helped them most to complete the SFP. Their responses are presented in Table 4.2.

Table 4.2: What helped students to successfully complete the SFP (n=80)

What helped them to successfully complete the SFP	**Frequency**
Motivation to study further.	25
The lecture notes that were provided, by the SFP lecturers made it easier for them to understand their subject content better.	25
The SFP lecturers always assisted them in all the topics that they did not understand and also encouraged them to study very hard and that the SFP lecturers were very friendly and dedicated in teaching all their subjects.	15
In the SFP, they were provided with study materials for all the five subjects and that the SFP lecturers used the best teaching strategies to make them understand better, the subject content.	15
Total	**80**

The 20 students who indicated that they had not successfully completed the SFP were asked what prevented them from doing so. Their responses are presented in Table 4.3.

Table 4. 3: What prevented students from successfully completing the SFP (n=20)

Student responses	**Frequency**
Because they were not serious with their studies.	10
Because of language barriers that they could not successfully complete the SFP.	5
Because the SFP lecturers where too strict in their markings.	5
Total	**20**

4.4 Teaching success rate in the SFP

The SFP lecturers (n=5) were asked what average percentage was needed for students to successfully complete the SFP. All stated that students need to obtain an average of 60%. The 100 former SFP students were asked to indicate whether they had successfully completed the SFP with an average of 60% or above; the majority (80%) did successfully complete the SFP.

Lecturers were also asked to indicate their teaching success rates for the time they had been teaching in the SFP. Three lecturers responded that their teaching success rates had been excellent and two said their teaching success rate had been above average. Their verbatim responses are in italics.

The SFP lecturers gave the following reasons as to why they said that their teaching success had been excellent or above average. Two of the lecturers had the same view.

Lecturer 2 responded as follows:

The number of student pass rate has always been more than 75%, and at least 75% of those students managed to take up degree courses at University for all the years that I have been teaching in the SFP (12th February, 2017).

The other two lecturers had the same view as Lecturer 4 who responded as follows.

Most of the students that I have taught in the SFP has completed the SFP with an average of 60% and above (13th February, 2017).

Lecturer 5 on the other hand replied as follows.

For all the years that I have been teaching in the SFP, about 80% of the students have passed my subject very well (14th February, 2017).

The former SFP students were asked to indicate the year in which they completed the SFP. Their responses are in Appendix 1; 20 completed the SFP in 2009, followed by 15 in 2011 (n=35). There were ten who completed the SFP in 2006, 2008, 2010, and 2014 (n=40). Four completed the SFP in 2013 (n=4).

4.5 Effectiveness of the SFP in preparing students to take up further studies in science and science-related fields

The main aim of this study was to investigate the effectiveness of the SFP at the UNAM Oshakati campus from 2005 to 2016 in preparing students for degree programmes. The SFP lecturers were asked to indicate how effective the SFP was in preparing students to take up further studies in science and science-related fields at UNAM.

Three lecturers had the same view as stated by lecturer 3: *the SFP was very effective because more students had managed to pass the 1st year of their studies.*

Two on the other hand indicated: *most students who had successfully completed the SFP had enrolled in science and Science related courses at institutions of higher learning.*

The former SFP students were asked whether they thought the SFP was effective in preparing them for science-related courses at university. Their responses are shown in Figure 4.2.

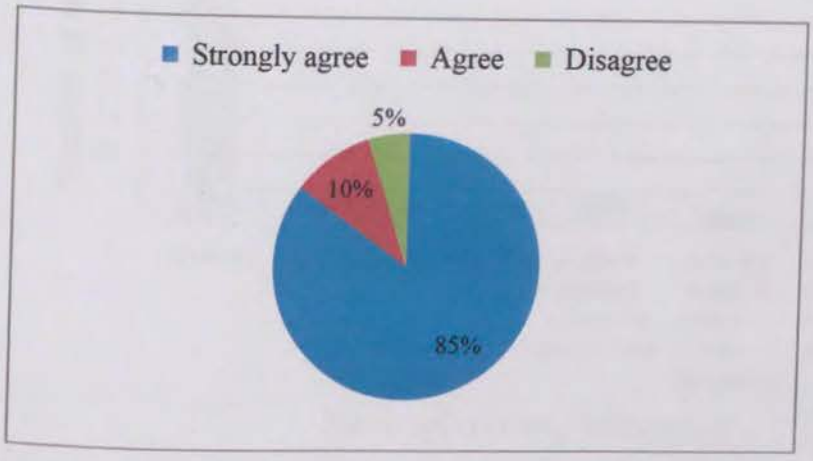


Figure 4. 2: Pie chart showing effectiveness of SFP students in preparing students for science and science-related courses at the university (n=100).

Figure 4.2 indicates 85% strongly agreed that the SFP was effective; 10% agreed and 5% disagreed.

They were asked whether they had enrolled for further studies upon completion of the SFP. The majority (80%) responded that they had; the remainder (20%) did not further their studies. Those who replied in the affirmative were asked to give the name of the tertiary institution where they had enrolled for their further studies. Figure 4.3 shows their responses.

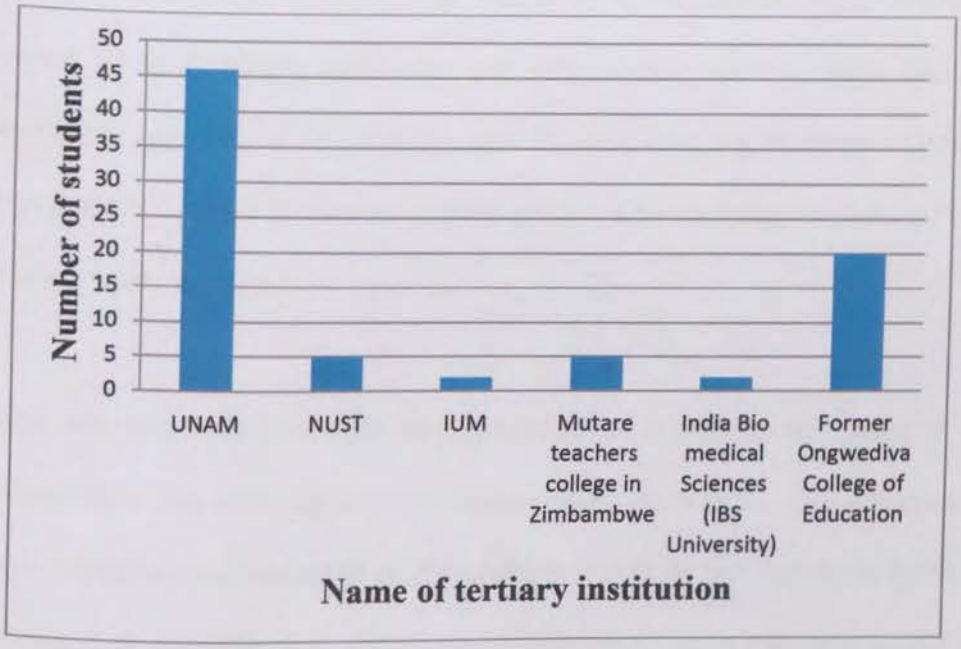


Figure 4. 3: Names of tertiary institutions where students enrolled after completing the SFP (n=80).

As shown in Figure 4.3 the majority (n= 46/58%) enrolled at UNAM, and 20 (25%) enrolled at the former Ongwediva College of Education (now Hifikepunye Pohamba UNAM campus). Six (6%) enrolled at the Namibia University of Science and Technology (NUST), and the Mutare Teachers College in Zimbabwe, respectively. Two (2%) enrolled at the International University of Management (IUM), and two (2%) at the India Bio-Medical Sciences (IBS University) in India. Those who had furthered their studies post the SFP were asked whether they had completed their further studies at their listed tertiary institutions. Fifty (62.5%) indicated they were still studying thus had not yet completed their further studies at the particular tertiary institutions; the remainder (n=30/37.5%) responded that they had completed their further studies at the listed tertiary institutions.

Those (n=50) who were still studying were asked to indicate the course of study that they had enrolled for at a tertiary institution, and year of their current study. Their responses are presented in Appendix 3 which shows that 6% were studying Bachelor of Education (pre and lower primary) in their 3rd year of studies; and 6% were studying Bachelor of Clinical Nursing in their 2nd year of studies.

Those who had completed their studies were asked to indicate the course of study that they had studied at that particular tertiary institution and the year that they completed their studies. Their responses are presented in Appendix 4 which shows that three (10% of n=30) had completed their studies with a Bachelor of Education (upper primary) in 2015. The rest had completed their studies with various qualifications.

The former SFP students were also asked how effective the SFP was in preparing students to take up further studies in science and science-related fields. Their responses are presented in Table 4.4.

Table 4. 4: Effectiveness of the SFP in preparing students to take up further studies in science and science-related fields (n=100).

Student responses	**Frequency**
The SFP was very effective since most of the students did not struggle with their degree courses.	30
The SFP was very effective which is why most of the students are excelling in their studies.	20
The SFP was very effective because the students had improved, especially in Mathematics and English, the subjects that were considered critical in the SFP.	15
The SFP was quite effective because the students managed to pass their first year at UNAM with good marks.	15
The SFP was effective because practicals in science subjects were offered in this programme, and this prepared the students very well for their practicals during their further studies.	10
The SFP was effective because the knowledge that the students received during their being in the SFP were the ones that allowed them to graduate with a Science Degree.	10
Total	**100**

The SFP lecturers were asked the extent to which they thought the SFP was meeting its mandate of preparing students to take up further studies in science and science-related courses at UNAM.

Lectures 1 and 2 had the same view as Lecturer 1 who responded that:

The SFP is doing quite well because many students who had gone through the SFP has enrolled for science related courses, some had even enrolled into the core courses such as engineering and medicine, some have even graduated and are now working (12th February, 2017).

Lecturer 3:

To a greater extent, because more students that went through the SFP had passed their university first year courses (12th February, 2017).

Lecturer 4:

To a greater extend because there are no drop outs recorded on the students who had gone through the SFP, there is also no failing being recorded on the students who are doing their degree courses because they have been given a proper thrust (13th February, 2017).

Lecturer 5:

To a great extent because the SFP provides a basic foundation and study skills, as well as introduction to the University environment (14th February, 2017).

The lecturers were asked what they perceived were shortcomings of the SFP in relation to teaching and learning in the SFP. They identified the following shortcomings.

Lecturer 1:

lack of workshops on subjects that are taught in the SFP to be a shortcoming of the SFP as well as the fact that the SFP students are struggling to secure the government loan with NSFAF (12th February, 2017).

Lecturer 2:

one of the shortcomings of the SFP is the fact that the SFP is not accredited by the NQA, and also the fact that our students still compete with those that are coming directly from grade 12 to get admitted into degree courses (12th February, 2017).

Lecturer 3:

one of the shortcomings is that our students still have to apply for degree courses; they don't automatically get into the degree courses (13th February, 2017).

Lecturer 4:

the certificate that students get once they successfully complete the SFP is not recognised by other institutions internationally, but only by UNAM which might limit the opportunities of the students, this is a shortcoming to the SFP (13th February, 2017).

Lecturer 5:

One of the shortcomings of the SFP is that the SFP only offers one field which is the science field but not in other fields such as the commerce field or social field (14th February, 2017).

They were asked to state their views on how they thought students had benefited from the SFP at the Oshakati campus for the period that they had been teaching the programme. Lecturer 1 and 2 had the same view. The latter replied

the SFP has improved the quantity and the quality of students' admission to science related fields in UNAM (12th February, 2017).

Lecturer 3:

students have managed to get enrolled into degree programmes because they went through the SFP (12th February, 2017).

Lecturer 4:

the SFP has improved the quantity and the quality of students' admission to science related fields in UNAM (12th February, 2017).

Lecturer 5:

many students now have a high confidence in science subjects, especially those that used to be scared of science subjects; their fear has been removed by the SFP (12th February, 2017).

The former SFP students were asked whether they thought the SFP was meeting its goals and mission of preparing students to take up further studies in science and science-related courses at UNAM. Figure 4.4 presents their responses.

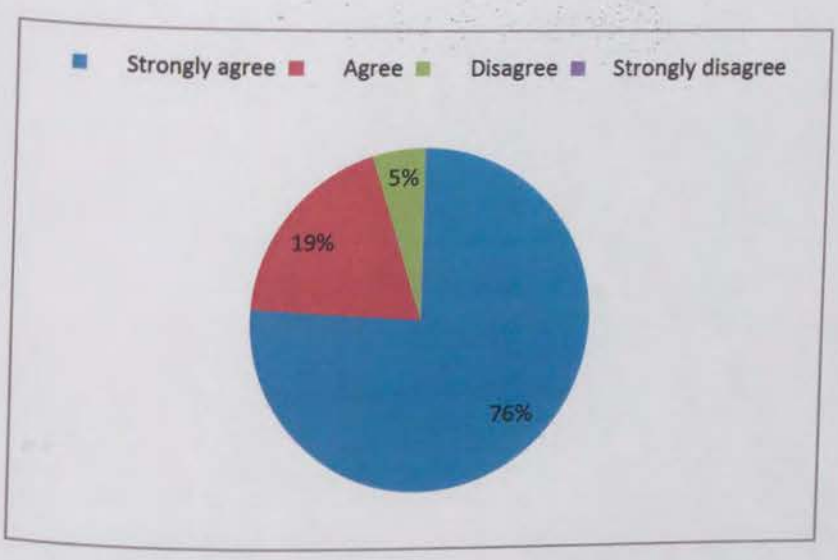


Figure 4. 4: The SFP viewed as meeting its goals and mission (n=100).

Figure 4.4 shows that 76% of the former SFP students strongly agreed that the SFP was meeting its goals and mission of preparing students to take up further studies in science- related courses at UNAM; 19% agreed and 5% disagreed.

They were asked to give reasons why they thought the SFP was meeting its goals and mission. Their responses are presented in Table 4.5.

Table 4. 5: Justification by students whether the SFP is meeting its goals and missions (n=100).

Justification	Frequency
Most of the students were doing science related courses at institutions of higher learning.	40
Students from the SFP do not struggle with the admission at UNAM.	30
Most of the students had graduated with Science degrees because they went through the SFP.	5
Students were able to pass all their science subjects because of the exposure that they got in the SFP.	5
They were not admitted to further their studies, thus they could not really tell whether the SFP was meeting its goals and missions or not.	**20**
Total	**100**

Table 4.5 shows that 40% of the students responded that the SFP was meeting its goals and mission of preparing students to take up further studies in science-related courses at UNAM because most of them were doing such courses at institutions of higher learning; 20% responded that they had not been admitted for further their studies thus could not really tell whether the SFP was meeting its goals and missions or not.

It was reported at the beginning of this section (section 4.4) that the students were asked whether they have gone for further studies upon completion of the SFP; affirmative responses were given by 80 students and 20 indicated that had not enrolled for further studies. If most of the former SFP students enrolled for science-related courses at institutions of higher learning, then this means that most had gone for further studies. In other words, one could argue that the SFP is meeting its goals and mission of preparing students for further studies in science and science-related courses.

The students were asked to state the ways in the SFP helped them to qualify or to take up career choices in science and science-related degree courses at UNAM. Their responses are presented in Figure 4.5.

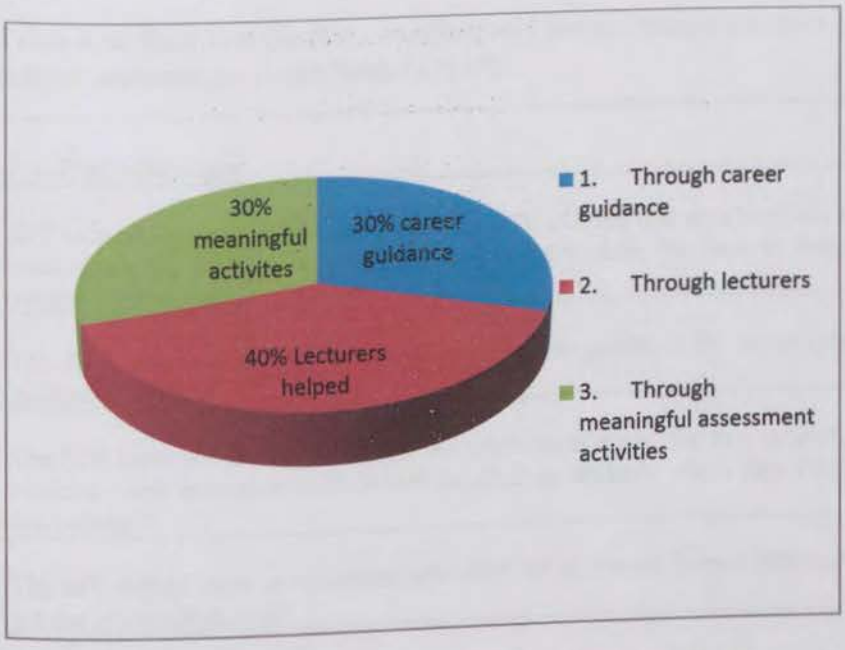


Figure 4. 5: SFP students' views on ways in which the SFP helped them to qualify to enrol in science and science-related degree courses at UNAM (n=100).

Figure 4.5 shows that 40% of the students were of the view that lecturers helped them in the programme; 30% indicated that meaningful assessment activities helped them; and 30% indicated that career guidance was the key to their success.

The former SFP were asked to suggest how best the SFP could effectively prepare students to take up further studies in science and science-related fields. Table 4.6 presents their responses.

Table 4. 6: How best the SFP can effectively prepare students to take up further studies in science and science-related fields (n=100).

Student responses	Frequency
SFP lecturers should continuously communicate with the first year lecturers at tertiary institutions, on issues related to their subject curriculum for them to decide which subject content best prepares students for first year	40
The SFP lecturers should strengthen their career guidance by introducing career guidance as a subject on its own	30
The SFP lecturers should strengthen the teaching of computer as a subject, to teach students more computer skills which might help students when they enter tertiary institutions"	20
The SFP should have an agreement with NSFAF so that all former SFP students can get the government loan	10
Total	**100**

4.6 Views on teaching and learning strategies used in the SFP

The students were asked to indicate the teaching and learning strategies that they thought were being used in the SFP. Their responses are presented in Figure 4.6.

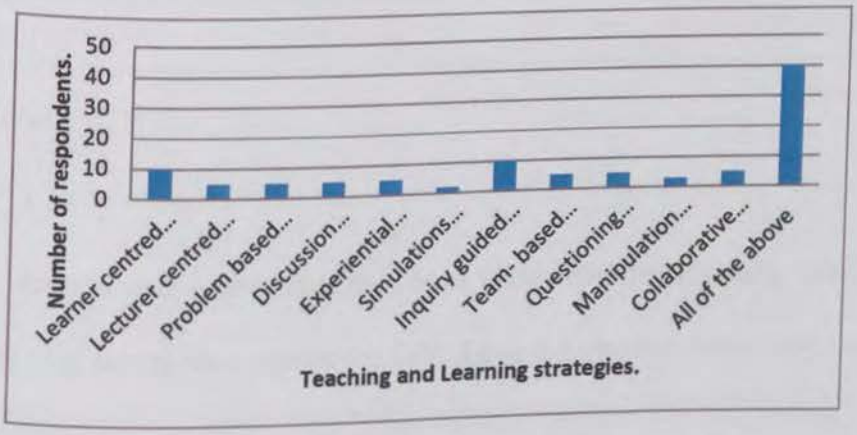


Figure 4. 6: The type of teaching and learning strategies used in the SFP (n=100).

The results show that 40 former SFP students indicated that different teaching and learning strategies were used in the SFP. They were asked what they liked most about the teaching and

learning strategies that were used during their time at the SFP. Their responses are listed in Table 4.7.

Table 4. 7: What students liked most about the teaching and learning strategies (n= 100).

Student responses	**Frequency (%)**
They were not treated like empty vessels by the SFP lecturers, as was the case at secondary school	30
The teaching and learning strategies helped them in experiments and in solving problems	20
They enjoyed practical lessons more	20
The fact that they were given the chance to work together with other students	15
There was good relationships between students and lecturers	15
Total	**100**

The students were asked what they least liked about the teaching and learning strategies that were used during their time at the SFP. Table 4.8 displays their responses.

Table 4. 8: What students liked the least about the teaching and learning strategies in SFP (n=100).

Student responses	**Frequency (%)**
All the teaching strategies were good so they liked all of them.	70
They least liked cooperative learning simply because some students were not that cooperative and some students were lazy.	10
Some lecturers were very strict with the marking of the assignments and tests".	5
The fact that in team work, some students were stingy with their knowledge, they did not want to share it with others.	5
Some lecturers were very fast in their teaching.	5
The fact that some lecturers did not answer all the student questions.	5
Total	**100**

The lecturers were asked to state the kind of teaching strategies that they used in the teaching of their specific subject(s) in the SFP.

Lecturer 1:

I use group work, individual presentation and problem based learning" (12th February, 2017).

Lecturer 2:

I use group teaching, face to face teaching and problem based learning" (12th February, 2017).

Lecturer 3:

I use participatory or learner –centred teaching strategy (13th February, 2017).

Lecturer 4:

I use group discussions, presentations, practical sessions and report writing" (13th February, 2017).

Lecturer 5:

I use both learner-centred and teacher centred teaching strategies (13th February, 2017).

They were asked to give reasons for choosing the teaching strategies that they had specified above. They gave the following justifications.

Lecturer 1:

Because all those methods [group work, individual presentation and problem based learning] proved to be more effective in presenting my lessons (12th February, 2017).

Lecturer 2:

Group work was good because the weaker learners used to learn from the stronger learners. Face to face on the other hand was good because it allowed me to pick on individual problems with the students. Problem based was good in order to elicit critical thinking of my students (12th February, 2017).

Lecturer 3:

I use learner centered teaching approach in order to ensure that students were actively involved in learning (13th February, 2017).

Lecturer 4:

Those 2 methods [learner-centred and teacher centred teaching strategies] allowed better understanding of the subject content of my subject (13th February, 2017).

Lecturer 5:

I used all those methods in order to get all my students to get involved in the learning of my subject, those methods also made teaching and learning fun for me and the students, it also made teaching much easier for me (14th February, 2017).

The SFP lecturers were also asked to state the kind of teaching and learning support they usually gave to their SFP students. Their responses are displayed in Table 4.9.

Table 4. 9: The kind of support SFP lecturers gave to students in teaching and learning in the SFP (n=5).

Respondents	**The kind of support given to students**
Lecturer 1	*I usually give them extra work, tutoring and motivate them time to time.*
Lecturer 2	*I do academic tutoring and one on one subject specific tutoring when approached by students or by identifying those students that needed help.*
Lecturer 3	*I do regular class exercises, academic tutoring and mentoring.*
Lecturer 4	*I do face to face consultations, tutoring and mentoring.*
Lecturer 5	*I offer remedial face to face and also offer academic tutoring to students.*

They were asked what they liked most about teaching in the SFP at the Oshakati campus.

Lecturer 1:

I like the fact that the SFP is a work conducive environment with a supportive management (12th February, 2017.)

Lecturers 2 and 3 were of the same opinion and the latter stated the following.

I enjoy teaching in the SFP because of the conducive working environment; high level of congeniality between the staff members and also because of the excellent team work spirit (12th February, 2017).

Lecturer 4:

I like the fact that we staff members work as a team in order to improve the lives of our students through science education (13th February, 2017).

Lecturer 5:

I mostly like the fact that I meet unique students with unique perceptions towards my subject, I get to learn something new each and every day. We also have a good supporting team as colleagues in the SFP (14th February, 2017).

The students were asked to comment on the effectiveness of the teaching and learning strategies that were used in the SFP. The majority (80%) responded that the teaching and learning strategies were very effective; and 20% indicated that they were effective.

The students were asked to give reasons for their responses on the effectiveness of the teaching and learning strategies. The majority (80%) stated "the teaching and learning strategies were effective because most of them were busy doing science related courses at institutions of higher learning in the country". Ten percent indicated that they "were effective because students were well trained to cope with university challenges". The other 10% responded that "the teaching and learning strategies used in the SFP were effective because the strategies helped them to

successfully complete the SFP with an average of 60% and also prepared them well for their studies at institutions of higher learning".

4.7 Employment opportunities for former SFP students

The students who indicated that they had completed their studies were asked whether they were employed or not. All 30 (100%) students responded that they were employed. Their job titles are presented in Figure 4.7.

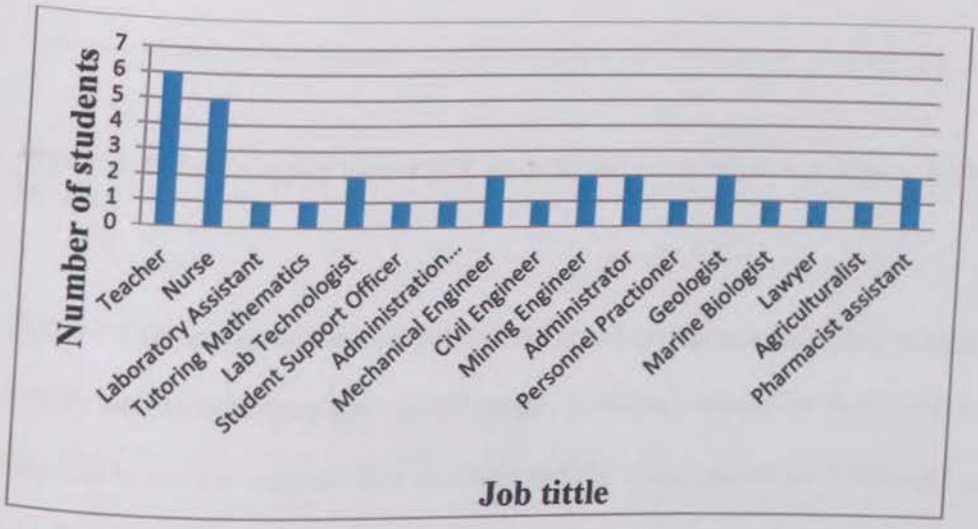


Figure 4. 7: The kind of job done by the former SFP students who had graduated from tertiary institutions (n=30).

Figure 4.7 indicates that six out of 30 (20%) students were employed as teachers, and five as nurses. The rest were employed as laboratory technologists, mechanical engineers, mining engineers, administrators, geologists, and pharmacist assistants.

Twenty out of 100 students that indicated that they had not gone for further studies (see section 4.4). They were asked to give reasons why they had not enrolled at any tertiary institution. Figure 4.8 shows their responses.

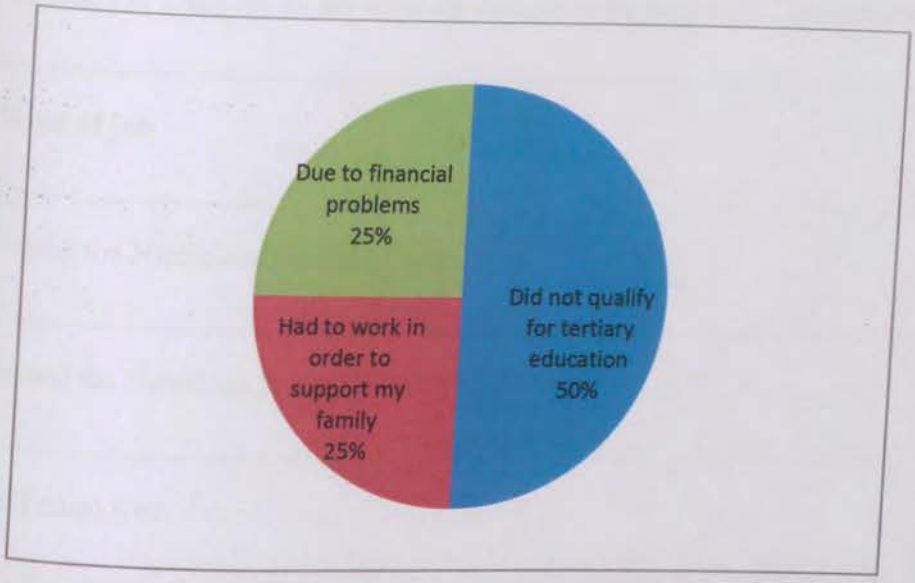


Figure 4. 8: Reasons why former SFP students did not enroll at any tertiary institution (n=20).

Figure 4.8 shows that half (n= 10/50%) of the students responded that they did not enrol at any tertiary institution because they did not qualify for tertiary education; five (25%) indicated that they had to work to support their families; and the remaining five (25%) indicated that they had financial problems. The results seem to indicate that not all SFP students qualified for tertiary education.

The 20% of the students that indicated that they did not go for further studies were then asked to indicate what they had been doing since they did not go for further studies. Their responses are presented in Table 4.10.

Table 4. 10: The kind of job done by students who did not go for further studies (n=20).

Kind of job	**Frequency**
Joined the Namibian Defense Force	5
Joined the Namibian Police Force	5
Self employed	5
Working for Old Metropolitan Namibia	2
Working for Ongwediva Town Council	1
Working for Old Mutual Namibia	2
Total	**20**

As shown in Table 4.10 five students joined the Namibian Defense Force; five joined the Namibian Police Force; and five were self-employed. All 20 former SFP students who did not enrol at any tertiary institution were productive members within their societies.

4.8 The organisation and running of the SFP at the UNAM Oshakati campus

A question of whether the former SFP students liked the way the SFP was organised and run at Oshakati Campus elicited the following responses. The majority (80%) liked the way in the SFP was organised and run at the Oshakati campus. The remainder (20%) gave a negative

response. The majority (80%) were asked to provide reasons for their positive responses and are presented in Table 4.11.

Table 4. 11: Reasons why students liked the way in which the SFP was organised and run at the UNAM Oshakati campus (n=80).

Reasons	**Frequency**
Continuous assessment made it possible for them to successfully complete the SFP.	30
They were provided with career guidance, which made it easier for them to choose the field of study that they wanted to follow.	20
Students were divided into three classes that were manageable and that they liked the fact that Physical science was divided into physics and chemistry.	10
Students were awarded for good performance at the end of the year.	10
All students in the SFP were given a personal tutor (a lecturer) to monitor their academic progress and to identify any problems throughout the whole year, which was a motivation to them.	5
Lecturers of the SFP treated all students equally and that there was no discrimination and tribalism in the SFP.	5
Total	**80**

The minority (20%) who gave negative responses provided their reasons as shown in Table 4.12.

Table 4. 12: Reasons why students did not like the way in which the SFP was organised and run at UNAM Oshakati campus (n=20).

Reasons	Frequency
The fees for the SFP were very high and not every student could afford to pay	6
The SFP cannot be repeated.	3
60% average was too high for all students to obtain.	3
The SFP only focused on science subjects but not on other fields of study.	3
Students who are doing the SFP were not given the government loan to pay for the SFP.	2
We used to write two tests per day.	2
SFP lecturers were very strict in their marking.	1
Total	**20**

The SFP lecturers were asked their perceived shortcomings of the SFP in relation to teaching and learning in the SFP. They identified the following shortcomings.

Lecturer 1:

> *lack of workshops on subjects that are taught in the SFP to be a shortcoming of the SFP as well as the fact that the SFP students are struggling to secure the government loan with NSFAF (12th February, 2017).*

Lecturer 2:

> *one of the shortcomings of the SFP is the fact that the SFP is not accredited by the National Qualification Authority (NQA), and also the fact that our students still compete with those that are coming directly from grade 12 to get admitted into degree courses (12th February, 2017).*

Lecturer 3:

one of the shortcomings is that our students still have to apply for degree courses; they don't automatically get into the degree courses (13th February, 2017).

Lecturer 4:

the certificate that students get once they successfully complete the SFP is not recognised by other institutions internationally, but only by UNAM which might limit the opportunities of the students, this is a shortcoming to the SFP (13th February, 2017).

Lecturer 5:

one of the shortcomings of the SFP is that the SFP only offers one field which is the science field but no other fields such as the commerce field or social field (14th February, 2017).

They were asked their views on how they thought the students had benefited from the SFP at the Oshakati campus for the period that they had been teaching in the programme. They responded as follows.

Lecturers 1 and 2 had the same opinion. Lecturer 2 stated:

the SFP has improved the quantity and the quality of students' admission to science related fields in UNAM (12th February, 2017).

Lecturer 3:

students have managed to get enrolled into degree programmes because they went through the SFP (12th February, 2017).

Lecturer 4:

the SFP has improved the quantity and the quality of students' admission to science-related fields in UNAM (12th February, 2017).

Lecturer 5:

many students now have a high confidence in science subjects, especially those that used to be scared of science subjects; their fear has been removed by the SFP (12th February, 2017).

If an educational programme is not working well, it might need to be changed to improve it (Scott, 2006). It was for this reason that the students and lecturers were asked whether they thought teaching and learning in the SFP should be changed. The majority (70%) of students responded that the SFP should continue as is; the others (30%) indicated that changes should be made. Their respective different reasons are presented in Tables 4.13 and 4.14.

Table 4. 13: Explanations as to why the SFP should continue as is (n=70)

Explanations as to why the SFP should continue as is	**Frequency**
The programme made it possible for most students to get admitted at tertiary institutions.	30
The SFP was well set up already and it was already fine the way it was.	20
Students did not experience any problems when they did the SFP and the teaching and the learning strategies that are used in the SFP were already the best.	10
The subject content, the lecturers and the learning environment is already at the best level, so nothing should be changed.	10
Total	**70**

Table 4. 14: Reasons given by students as to why they thought the SFP should be changed (n=30)

Reasons why the SFP should be changed	**Frequency**
The SFP former students should be given automatic admission to UNAM degrees upon successfully completing the SFP; they do not have to apply anymore.	15
The former SFP students should be prioritized by the Namibian Student Financial Assistance Fund (NSFAF) in order for all of them to receive the government loan when furthering their studies.	10
Foundation English should not prevent the former SFP students from getting admission into degree courses.	5
Total	**30**

Four lecturers had the same opinion as the majority (70%) of students. According to the former "the teaching and learning in the SFP should continue as is because it is already fine like that". The fifth lecturer disagreed and indicated that "the teaching and learning in the SFP should be changed in order to catch up with time".

The Namibian government has developed Vision 2030 which anticipates that the country will be developed and industrialised by the year 2030 (National Planning Commission (NPC), 2004). Vision 2030 requires changes in all sectors of development including the educational sector. The lecturers were therefore asked to indicate which aspects of the SFP needed to be changed in order to help improve the programme and also to contribute to the attainment of Vision 2030. They responded as follows.

Lecturer 1:

> *The teaching and the learning should continue as it is but the department should find a mechanism to liaise with other lectures who are teaching first year courses at UNAM in order to share ideas (12th February, 2017).*

Lecturer 2:

> *The content of the SFP needs to be changed every after 2 years, it should be adjusted in order to meet the new challenges facing the programme (12th February, 2017).*

Lecturer 3:

> *The programme should allow the adding of new topics as the needs arises (13th February, 2017).*

Lecturer 4:

> *The teaching and learning in the SFP should only change when the teaching and learning of the 1st year also changes (13th February, 2017).*

Lecturer 5:

Nothing should be changed on the SFP; everything has been running smoothly (14th February, 2017).

They were asked to give suggestions on how the SFP could best be improved to effectively prepare students for further studies in science and science-related fields at UNAM.

Lecturer 1:

SFP lecturers should be allowed to add the content with minimum control based on the need of the students (12th February, 2017).

Lecturer 2:

The content of the subjects that are offered in the SFP should not be rigid but should be reviewed regularly in order to improve its relevance (12th February, 2017).

Lecturer 3:

There is a need for a uniform teaching model in the SFP to be used by all lecturers who are teaching in the SFP. Collaboration between the SFP lecturers and the 1st year lecturers should be strengthened in order to effectively prepare students for their 1st year (13th February, 2017).

Lecturer 4:

The Programme need to be reviewed so that it can maybe become a certificate in science, and it also need to be expanded in order to cater for more students (13th February, 2017).

Lecturer 5:

Admission of the SFP students should be extended to other Universities not only limited to UNAM, a certificate or a diploma can replace the qualification that is currently offered (14th February, 2017).

They were asked to comment on the way the SFP was organised and run at the Oshakati campus.

Lecturer 1:

I am very happy with the way the programme is being organized because students are allowed to be more independent. I also applaud the use of the continuous assessment marks that is used in the SFP; the use of this method keeps all the students of the SFP very busy during the course of the year, and in the long run, improves their performance at the end of the year (12th February, 2017).

Lecturer 2:

The programme is very well organized, it has been in existence for almost 11 years now, and it is still continuing (12th February, 2017).

Lecturer 3:

The SFP is well organized because it caters for students from different tribes (13th February, 2017).

Lecturer 4:

I like the fact that all students in the SFP are treated equally irrespective of their educational and cultural background (13th February, 2017).

Lecturer 5:

Students in the SFP are divided into 3 classes, which make it easier to reach to individual students because students have different abilities (14th February, 2017).

4.9 Document analysis results

Table 4. 15 shows the intake of students into the SFP from 2005 to 2016 (University of Namibia, 2016).

Table 4. 15: Student intake into the SFP from 2005 up to 2016.

Year	Number of students in the SFP
2005	50
2006	60
2007	66
2008	72
2009	100
2010	120
2011	147
2012	130
2013	137
2014	141
2015	140
2016	135
Total	**1298**

The researcher analysed the University Integrated Tertiary System (ITS) database to extract student data to find out how many former SFP students have registered so far, for which degree courses, under which faculty or school, and the performance of these students in their courses of study at UNAM. This was done to address the research question: What is the performance of the SFP graduates in their 1st year of the degree programmes at UNAM from 2005 to 2016?

Data mining techniques, as described by Nong (2003), were used to extract data from the University ITS database using Oracle 9i software. Table 4.16 presents the performance of the SFP graduates in their first year of degree programmes at UNAM from 2005 to 2016. Also shown are the number of former SFP students by their field of study, the number that passed their first year, the number that failed their first year, and the number that were not admitted to write the final examination in their first year of studies at UNAM.

Table 4. 16: Performance of the SFP graduates in their 1st year of a degree programme study at UNAM from 2005 to 2016 (n=979).

Performance of the former SFP students on their first year at Unam																																													
Faculty School Name	2006				2007				2008				2009				2010				2011				2012				2013				2014				2015				2016			
	E	P	F	N	E	P	F	N	E	P	F	N	E	P	F	N	E	P	F	N	E	P	F	N	E	P	F	N	E	P	F	N	E	P	F	N	E	P	F	N	E	P	F	N
A & NR	1		1		3	3			2	1	1		13	13			11	9	1	1	10	9	1		10	8	2		11	9	2		10	9	1		8	7	1		10	8	1	1
E & MS	1	1											1	1			1		1		3	3			3	2	1		1	1			1	1			10	5	3	2	3	2	1	
EDU	10	7	2	1	13	10	2	1	13	12	1		9	6	2	1	10	8	2		32	30	2		50	47	2	1	43	40	2	1	50	45	3	2	55	52	3		58	53	3	2
E & IT									6	5	1		7	6	1										1	1			7	4	2	1												
ES -U																																										1	1		
SOM																					2	1	1																							
SOP																																					1		1		1	1			
SON	10	8	2		7	5	1	1	18	16	1	1	8	7	1		21	20	1		10	9	1		16	16			6	6			17				15	15			20	19	1	
H & SS					3	3			3	3			4	4			6	6			5	5			2	1	1		4	3	1		7	17	1		11	10		1	8	5	3	
LW													1	1																				6			1		1					
SOC																																									3	2	1	
SCI	21	19	2		29	26	2		9	8	1		18	17	1		26	23	2	1	30	25	3	2	40	35	5		20	16	4	1	40	35	3	2	34	31	3		24	22	2	
Grand Total	43	36	7	1	55	47	5	2	51	45	5	1	61	55	5	1	75	66	7	2	92	82	8	2	122	110	11	1	92	79	11	3	125	113	8	4	135	120	12	3	128	113	12	3
Progerssion rate	84%				85%				88%				90%				88%				89%				90%				86%				90%				89%				88%			

***Table 18:** Information taken from University of Namibia (2016). UNAM database, 2005-2016.

KEY TABLE

P	Pass
F	Fail
N	Not admitted to write the examination
E	Enrolled
Progression rate	Pass/enrolled x 100
A & NR	Agriculture & Natural Resources
E & MS	Economic & Management Science
EDU	Education
E & IT	Engineering & Information Technology
ES – U	External Studies - UNAM
SOM	SH: School of Medicine
SOP	SH: School of Pharmacy
SON	SH: School of Nursing
H & SS	Humanities and Social Sciences
LW	Law
SOC	School of Computing

Table 4.17 compares the student intake in the SFP with the enrolment rate of UNAM degree or diploma courses from 2005 to 2016. Comparative data were used to find out how many former SFP students had enrolled at institutions of higher learning.

Table 4. 17: SFP student intake vs student enrollment in UNAM first year of study from 2005 to 2016.

Year	Student intake into the SFP (A)	Students enrolled into UNAM degree or diploma courses (B)	Percentage Progression rate into UNAM degree or diploma courses (B/A*100)
2006	50	43	86
2007	60	55	92
2008	66	51	77
2009	72	61	85
2010	100	75	75
2011	120	92	77
2012	147	122	83
2013	130	92	71
2014	137	125	91
2015	141	135	96
2016	140	128	91

Table 4.17 shows that in 2015 the highest number (96%) of the SFP students enrolled in UNAM degree or diploma courses; followed by 92% in 2007. As shown during the period 2006 to 2016 more than half of STP students enrolled in UNAM degree or diploma courses.

Comparative data in Table 4.18 show the total enrollments of the SFP students in their first year at UNAM against their total passes, and progression rates into the second year of their studies from 2006 up to 2006.

Table 4. 18: Total enrollment number passes and failures and student progression rates into the second year of their studies from 2006 up to 2016.

Years (1st year)	Enrollment rate	Number Passing	Progression rate% 1st to 2nd year of study
2006	43	36	84
2007	55	47	85
2008	51	45	88
2009	61	55	90
2010	75	66	88
2011	92	82	89
2012	122	110	90
2013	92	79	86
2014	125	113	90
2015	135	120	89
2016	128	113	88

Table 4. 18 shows that from 2006 to 2016 most students passed their first year at UNAM and progressed to the second year of their studies. The highest progression rate of students into second year occurred in 2009, 2012 and 2014. In 2009 and 2012 the progression rate of former SFP students enrolled into UNAM first year of their studies was 90%.

4.10 The proposed teaching model to improve the teaching process in the SFP

The lecturers were asked to give the specific teaching model(s) that they use in teaching the SFP students. All responded that there was no specific teaching model used in the teaching of the SFP. They all however indicated there was a need for a uniform teaching model to be developed that could be used by all SFP lecturers. The researcher therefore proposes a teaching model for possible use in the SFP termed the "Foundation Programme Outcome Based Approach (FPOBA)" as shown in Figure 4.9. The eight stages of the FPOBA teaching model are discussed in Chapter five.

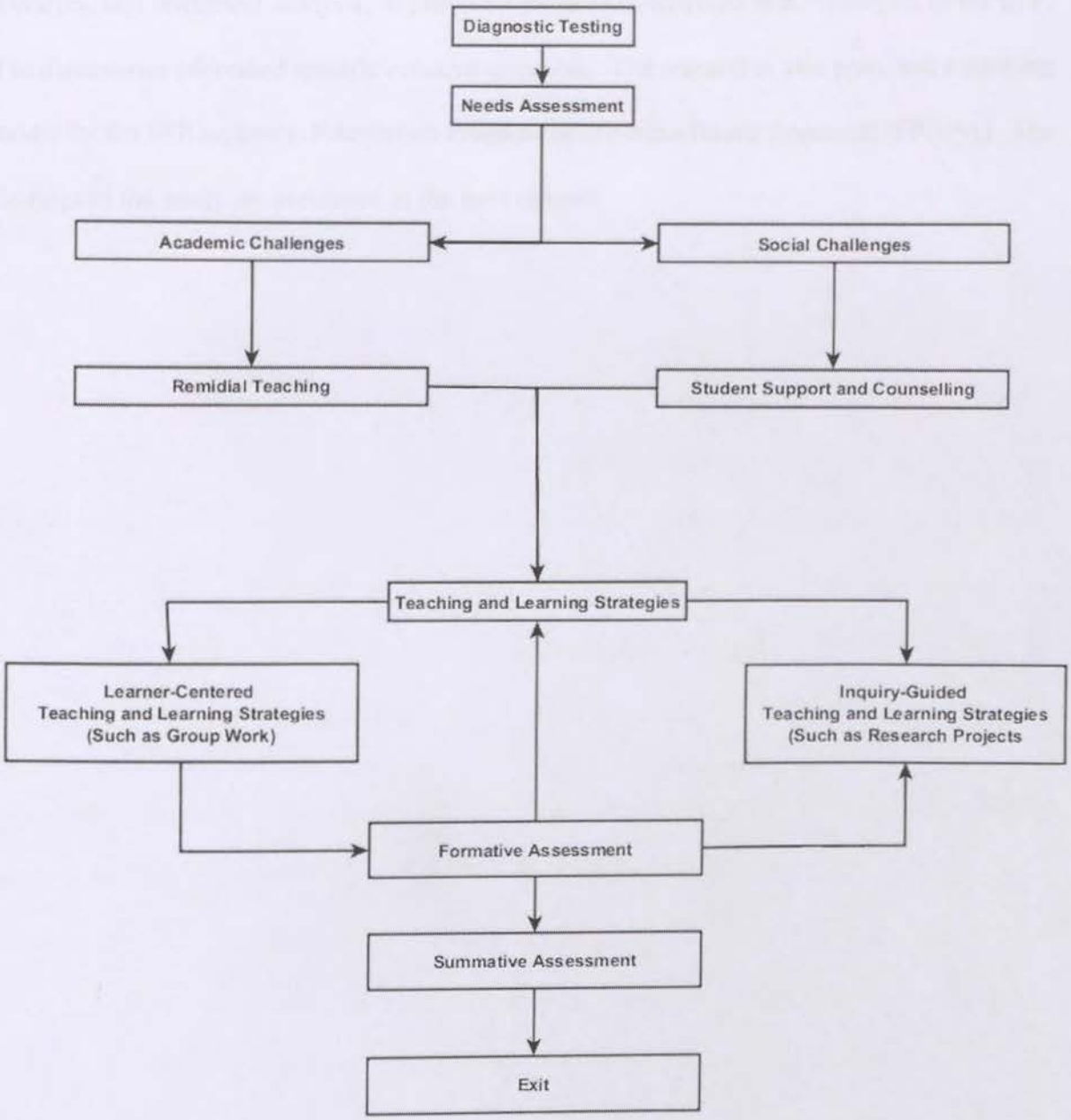


Figure 4.9: The Foundation Programme Outcome Based Approach (FPOBA) teaching model.

4.11 Summary

The findings of quantitative and qualitative data were presented in this chapter. Data were collected by means of student questionnaire for the students, an interview guide for the SFP

lecturers, and document analysis, to provide a detailed description and evaluation of the SFP. The discussions addressed specific research questions. The researcher also proposed a teaching model for the SFP lecturers: Foundation Programme Outcome Based Approach (FPOBA). The findings of the study are presented in the next chapter.

CHAPTER FIVE

DISCUSSION OF THE RESULTS

5.1 Introduction

The quantitative and qualitative results of the study are discussed in this chapter. The approaches and strategies employed to analyse the collected data are presented. Miles and Huberman (1994) regard data analysis as a process of categorising, ordering, manipulating and summarising of data to obtain answers to the research questions. In data analysis the data are reduced to an intelligible and interpretable form so that the relationships of research problems can be studied, tested and conclusions drawn (Miles et al., 1994).

The main aim of conducting this study was to assess the effectiveness of the SFP in preparing students for degree programmes from 2005 to 2016 at the Oshakati campus of UNAM. Nine themes were outlined in the previous chapter and are presented in this chapter. The themes are: background information of the participants; success rates of students; teaching success rate in the SFP; effectiveness of the SFP in preparing students to take up further studies in science and science-related fields; views on teaching and learning strategies used in the SFP; employment opportunities for former SFP students; the organisation and running of the SFP at the UNAM Oshakati campus; document analysis results; and the proposed teaching model to improve the teaching process in the SFP.

5.2 Background information of the participants

The first theme that emerged from the study was on background information of the participants. There were more females than males in the SFP at the Oshakati campus. According to the Trading Economics (2016, p. 152), "the sex ratio of the total population in Namibia, females (% of total) was reported at 51.37% in 2016, according to the World Bank collection of development indicators, compiled from officially recognized sources, meaning that on average there were 94 men for every 100 women in the country". This could be one reason why the female percentage (60%) was higher than the male percentage (40%) in this study. The female-to-male ratio of the SFP lecturers was 3:2 (60%:40%).

Another reason for more females than males in the Oshakati campus SFP could be that the SFP was trying to put in reality the adage "when you educate a woman, you educate the whole nation" (MHSS, 2001, p.20). Hayes (1992, p.321) emphasises that "educating boys and girls, men and women, is morally right, but educating girls and women is especially effective because when we educate them, the benefits are felt throughout the whole community, it's a magic multiplier in the development equation". More educated women are better able to educate their own children who, in turn, will be more likely to receive school education themselves (McMahon, 2006). It is reasonable to argue therefore that the higher percentage of female students in the SFP in this study indicates that the UNAM Oshakati campus supports educating more women than men.

An extra year of secondary education can increase a woman's income as much as 25% a year (MHSS, 2001). By participating in the labour market, an educated woman helps boost economic productivity, leading to greater wealth for her community as well (MHSS, 2001). It is therefore an attractive proposition to invest in women and girls; the benefits will flow not

only to them but to everyone around them. If girls and women are denied education, then the whole community might suffer; in most cases women take care of households. Women who are educated are more likely to get a good job with good salaries; this then could make their households a better place to live in.

According to the results each subject in the SFP was taught by one lecturer only (see Section 4.2). SFP subjects are taught in three different classes identified as classes 1-3 (Chirimbana, 2014). From the lecturers' responses, it is clear that each SFP lecturer taught one subject for three classes. This could be an advantage for SFP students; to avoid overcrowding they are not taught in one large group or class. Dividing students into three classes may allow lecturers to give individual attention to all students; this could result in improved student performance in the SFP subjects and hence them successfully completing the SFP.

As reported in Section 4.2 the results were that the SFP lecturers had been teaching the programme for three or more years. The lecturers were asked to indicate the number of students they usually had in each of their SFP classes each year, for the period they had been teaching in the SFP. All five indicated that the number of students varied from year to year; there were usually between 38 and 50 students per class per year. The Namibian national policy of education on teacher-student ratio (Ministry of Education and Culture [MEC], 1993) prescribes and recommends that the teacher-student ratio should be 1:30. A maximum of 30 students per class allows for more effective communication between teachers and students. It seems from the results of this study that the SFP classes are overcrowded as the number of students per class was beyond 30. This may be viewed as a weakness in the SFP and could prevent meaningful learning and teaching taking place. Class size and student teacher ratio have a great impact on the quality of education and on the academic success of students (Cuban, 2010).

The questionnaire for former SFP students required them to indicate the name of the region where they completed their secondary education (see Section 4.2). Most of them (20%) had completed their secondary education in the Oshana region; a few (2%) indicated that they had completed their secondary education in Kavango West and Kavango East; one had completed his\her secondary education in the Otjozondjupa region; and none had completed their secondary education in the ǁKaras region. The distance from ǁKaras region to the Oshana region is 1,180 kilometers; the distance from the Kavango region to the Oshana region is 892 kilometers. The distance between these regions is vast and this could be why fewer students from far off regions attended the SFP (see Figure 4.1). Since the SFP is located in the Oshana region this could be a reason why most students who had gone through the SFP were from this region. As evident in Figure 4.1 there is a difference in the numbers of learners from all 14 regions; some regions are more represented in the SFP while others are not represented at all. In Namibia, as in many other African countries, education is considered a basic human right and should be available to all people (Ministry of Education and Culture [MEC], 1993). One of the major goals towards achieving education for all in Namibia is equality; all learners and students are supposed to have equal access to educational opportunities. The SFP seems not to be attaining this goal in education (Nambahu et al., 2005). This can therefore be regarded as a weakness in the SFP because not all regions were represented in this programme during the time span that this study was carried out.

5.3 Success rates of students

As shown in Table 4.1 all the students who had gone through the SFP met the entry requirements, namely, 17 points and above. Two students indicated that they had obtained 34 points in Grade 12 before they joined the SFP. The SFP was established to help students who do not attain 25 points for direct entry into UNAM. However, some students who had entered

the SFP with 25 points and above had an E symbol in English. UNAM requires a student to have a C symbol or better for admission into any degree course (Uugwanga, 2006). Other students entered the SFP with 25 points and above; they had a D or E symbol in mathematics but had wanted to do engineering or medicine which requires an A or B symbol to do these degrees (UNAM, 2005).

It can be said that no student dropped out of the SFP from 2005 to 2016; all (100%) responded that they had completed the one year SFP. This could be said to be one of the strengths of the SFP. Students who go through the SFP to qualify for admission into tertiary institutions need to have successfully completed the SFP with an average of 60% or above (Naukushu & Chirimbana, 2012).

It is clear from the findings (as reported in Section 4.3) that most former students (80%) successfully completed the SFP and thus had qualified to enrol for degree programmes at UNAM. If students successfully complete the SFP they can enrol for any science or science-related course of their choice at UNAM. From the results so far, one may conclude that the SFP at the Oshakati campus met its mandate of ensuring that most students were admitted to degree courses of their choices at UNAM.

To the question of what helps the former SFP students to successfully complete the SFP it was found that motivation to study further and the lecture notes helped most of the former SFP students to successfully complete the programme (see Table 4.2). Motivation, as defined by Brown (2001, p.111), is "the process that initiates, guides, and maintains goal-oriented behaviours; it is the driving force which helped people to achieve their defined goals". Students who are highly motivated are more likely to reach their goals. Motivation is an influential factor in the teaching and learning process. Successful learning depends on high motivation of

students; it is the key to success in a learning and the teaching process (Brown, 2001). The SFP students seemed to have been motivated intrinsically. They wanted to study further; this is what helped them to successfully complete the SFP.

It is obvious from the former SFP 20 students' responses, in terms of what prevented them from successfully completing the SFP, was that "they were not serious with their studies" (see Table 4.3). If students are not serious they might not put in much effort into their studies, and this might in the long run prevent them from successfully completing the SFP.

5.4 Teaching success rate in the SFP

The teaching success rate for the SFP is determined by the number of students who successfully complete the SFP, and also by the number of students who had enrolled into degree programmes at UNAM. It is therefore clear from the findings (as reported in Section 4.4) that most students had successfully completed the SFP and thus had qualified to enrol for degree programmes at UNAM. It is obvious from the SFP lecturers' responses that their teaching success rate in the SFP had been a success because more students got admitted to degree programmes of their choice at UNAM

The former SFP students were asked to indicate the year in which they completed the SFP (see Appendix 1). The difference in the number of students completing the SFP in different years might be attributed to the difference in the annual intake of SFP students. There was varying annual enrollment in the SFP and this resulted in more students completing the SFP in particular years. Fewer students in some years enrolled in the programme.

5.5 Effectiveness of the SFP in preparing students to take up further studies in science and science-related fields

Bridging/foundation programmes are often provided by tertiary institutions to increase equity in access and academic performance of students from under-served communities. Little empirical evidence exists to measure the effectiveness of these bridging/foundation programmes on undergraduate academic outcomes (Valencia, 2017). The lecturers were asked how effective the SFP was in preparing students to take up further studies in science and science-related fields at UNAM (see Section 4.5). Three (60%/n=5) responded that it was very effective because more students had managed to pass the 1st year of their studies. Their response was similar to the former SFP students because 85% (see Figure 4.3) strongly agreed that "the SFP was effective in preparing students for science related courses at University".

The SFP at the Oshakati campus was established as a bridging course to UNAM degree courses. As evident the results in Figure 4.4 show that the SFP does not only prepare students for UNAM because students can seek admission at any other institutions of higher learning both inside and outside of Namibia. This is positive since students might be admitted to other institutions of higher learning that offer fields of studies that are not offered at UNAM. In other words, they could enrol for courses of interest to them.

The students' responses (see Section 4.5) show that most former SFP students were still studying and had not yet completed their tertiary education. The responses also show that most of those who were still studying at tertiary institutions had not dropped out of university before completing their studies. This finding is in keeping with the literature. According to Pandor (2004), students who access university programmes through foundation programmes stand a better chance of completing their studies in time compared to those who access universities with a Grade 12 qualification. This is because during a foundation year students are equipped

with adequate study skills and competencies necessary for them to excel in their chosen degree programmes; this is not always done at Grade 12 level (Pandor, 2004).

Eighty percent of the students, who indicated that they were still studying (see Section 4.5), were asked to indicate the course of study that they had enrolled in at a tertiary institution and the year of their current study. From the responses it is evident that 24 of 50 of the former SFP students had enrolled in the Faculty of Education in the Hifikepunye campus, and the School of Nursing in the Oshakati campus (see Appendix 2). This might be because the SFP is offered at the UNAM Oshakati campus in the same region where both the Bachelor of Clinical Nursing and the Bachelor of Education degree courses are offered.

One of the aims of the SFP is to prepare students for tertiary education. The results from Section 4.4 indicate that 80% of the students who had gone through the SFP had also furthered their studies at UNAM. In terms of the results of the questionnaire 85% of the former SFP students strongly agreed that the SFP was effective in preparing students for science related courses at university. These results are in accord with the responses of two SFP lecturers who indicated that most students who successfully completed the SFP enrolled in science and science-related courses at UNAM. De Beer (2006) points out that a foundation programme lays a sound basis for future study by bridging the educational gaps between teaching at a university and high school. One can thus argue that the SFP at the Oshakati campus was achieving one of its aims of widening access to tertiary education by reducing the gap between the rich and the poor because it produced students, including those from marginalised and disadvantaged communities, who had furthered their studies. In other words, the programme can be viewed as being successful as students continued studying.

Half of the former SFP students (n=15) who had completed their tertiary education had studied to become teachers (see Appendix 3). Quality education is a sustainable development goal (SDG) of the United Nations and it requires that teachers provide quality, accessible, equitable and lifelong education (Hayes, 2000). Teachers can only do this if they have knowledge and expertise that are usually attained from institutions of high learning such as UNAM.

Figure 4.5 shows that 76% of the former SFP students strongly agreed that the SFP was meeting its goals and mission of preparing students to take up further studies in science-related courses at UNAM. The researcher found the same results from her document analysis in terms of the SFP meeting its mandate and achieving its goals and objectives of preparing students for the first year of their studies at tertiary institutions. Each year more students progressed into their second year of studies at UNAM. The foundation laid during the SFP may have contributed to former SFP students passing their first year and progressing to the second year of their studies at UNAM.

The lecturers' responses (see Section 4.5) indicate that SFP students benefitted from the programme in terms of access to UNAM degree programmes. The mandate of the SFP at the Oshakati campus is to ensure that by the time students leave this programme they will not have difficulties in enrolling for any degree course of their choice. It is clear from their responses (as reported in Section 4.5) that the SFP was fulfilling its purpose of preparing students to take up further studies in science and science-related courses at UNAM.

The former SFP students suggested that for the SFP to effectively prepare students for their first year at tertiary institutions, there should be continuous communication between the SFP lecturers and the first year lecturers at institutions of higher learning so that they can discuss student related and teaching issues. Such communication should address issues of curriculum

changes if there are any, as well as the teaching and learning methods that both role-players could use to best help SFP students since the latter are being prepared for the first year of studies at UNAM.

5.6 Views on teaching and learning strategies used in the SFP

As shown in Figure 4.7, 40 former SFP students indicated the 11 teaching and learning strategies that they thought were being used in the SFP. Many successful science teachers do not confine themselves to a single method; they synthesise from a variety of teaching and learning approaches in teaching because students have different learning styles (Dewey, 2008). It is obvious from the former SFP students' responses in Figure 4. 7 that a variety of teaching and learning strategies were used by lecturers in the SFP at the Oshakati campus. By using different teaching and learning approaches the SFP lecturers could respond to the needs of all students in the SFP, which in turn helped more students to successfully complete the programme and to enrol into degree programmes of their choices at UNAM.

The former SFP students were asked to state what they liked most about the teaching and learning strategies that were used during their time in the SFP. Thirty of them indicated that they liked that they were not treated like empty vessels by the SFP lecturers, as was the case at secondary school level. Research studies have shown that the use of hands-on activities can result in significant improvement in academic performance and attitudes toward science because learners learn best through active involvement with concrete experiences (Handelsman et al., 2007). Handelsman et al. (2007. p. 299) state that "according to the constructivism theory, the classroom is no longer a place where the teacher ("expert") pours knowledge into passive students, who wait like empty vessels to be filled. In the constructivist model, students are urged to be actively involved in their own process of learning, the teacher functions more as a facilitator who coaches, mediates, prompts, and helps students develop and assess their

understanding, and thereby their learning". The SFP lecturers seemed to be practicing the ideology of constructivism as was indicated by the above former SFP students. The latter indicated that they were not treated like empty vessels by the lecturers.

The lecturers' responses (see Section 4.6) reveal that they did use the following teaching strategies in the teaching of their specific subjects in the SFP.

- Group work, group teaching or group discussions
- Individual presentation
- Problem-based learning
- Face-to-face teaching
- Participatory or learner–centred teaching
- Teacher-centred strategies

The SFP lecturers used a variety of teaching strategies to enhance learning in the SFP. These results are in keeping with the literature. According to Dewey (2008, p. 362) teachers should use a variety of teaching strategies in teaching science subjects to cater for all students with different abilities. The lecturers' responses concur with those of the students (n=40) as discussed above in terms of the use of 11 teaching and learning strategies in the SFP.

Teaching and learning methods are important because they determine the activities of teachers and students and the quality of the teaching process; they implicitly send a message about what teaching is, how children learn and what knowledge is (Handelsman et al., 2007). Handelsman et al. (2007) emphasise that teaching and learning methods are very important; they can enhance or prevent teaching and learning effectiveness. It is not possible to recommend one method to suit every context. Different methods are appropriate for different contexts.

The SFP seems to use good learning and teaching strategies. This is evident as 80% (n=40) of the students found them useful for them to successfully complete the SFP. Students or teachers who do not know the use of good learning and teaching strategies often learn and teach passively and ultimately fail in school (Dewey, 2008). This was not the case in the SFP as most students responded that the teaching and learning strategies that were used in the SFP were very effective.

The SFP teaching and learning strategies were effective because 60% of the former SFP students were currently busy doing science and science-related programmes. The responses of these former SFP students are similar to the responses that they gave when they were asked whether they had furthered their studies upon completion of the SFP (see Section 4.4); 80% of the students responded that they had. One can therefore assume that the SFP teaching and learning strategies are effective.

If lecturers are happy with their work, they are most likely to be more productive, which in the long run will contribute to the success rates of students in a programme. Teachers have been identified by governments as a major resource in achieving the important objective of quality education. Teachers are perceived to be in a better position to influence the performance of learners. However, it is not possible for them to positively influence student performance if they themselves are not motivated (Becker, 2003). If the job satisfaction of teachers is high they will be more creative, have better relations with their colleagues, and be better at solving learners' problems (Becker, 2003, p. 300). It is reasonable to assume from the SFP lecturers' responses that they enjoyed teaching in the SFP at the Oshakati campus.

Students need to be supported in many ways so that can learn better and excel in their studies. Teachers have the responsibility of giving support to their students (Dewey, 2008). Teachers

are expected to perform a variety of responsibilities. These include, but are not limited to role modeling, mentoring, nurturing and supporting students (Scott, 2006). Teachers should therefore support their students socially, psychologically, and academically. From the responses of the SFP lecturers it is evident that they did provide a range of support to their students: academic support (academic tutoring, regular class exercises and extra work), social support (mentoring, face-to-face consultations), and psychological support, (remedial work, mentoring and motivation). It is reasonable to argue that this kind of support might have helped the SFP students to successfully complete the programme.

5.7 Former SFP students and employment opportunities

The 30 former SFP students who indicated that they had completed their studies were all employed. One can therefore conclude that the SFP does contribute towards the realisation of vision 2030 by producing students who in later years join the labour market and increase the productivity of the country. One of the basic advantages of education is that it protects against unemployment in any country (Marope, 2003.) Unemployment in Namibia may yield devastating effects on social stability, economy, and human capital. It may increase death, misery, social instability and crime if no necessary measures are put in place to put an end to it. From the responses of the former SFP students the SFP seems to be producing students who are employable or needed in the job market (see Section 4.7). Bhorat (2007) states that more education leads to a greater likelihood of employment.

The results in Figure 4.8 indicate that the SFP is contributing towards the production of more teachers and nurses in Namibia. Teachers and nurses contribute to the efforts to prevent and mitigate the effects HIV and AIDS among the young people. More teachers are needed to help in educating Namibian children on issues related to the HIV epidemic, such as the spreading of HIV and AIDS, preventative measures, stigmatisation of people living with HIV and AIDS,

etc. More nurses are needed to provide better medical healthcare to patients in Namibian hospitals and this could reduce mortality rates in the whole country.

5.8 The organisation and running of the SFP at the UNAM Oshakati campus

Most (80%) of the former SFP students liked the way the SFP was organised and run at the Oshakati campus. The importance of student happiness cannot be underestimated as a determining factor in academic performance, especially in the context of today's universities; lecturers are regarded as catalysts of happiness and hope for students. If students are happy, they tend to achieve higher grades and this promotes their academic performance (McMahon, 2006).

According to the responses of former SFP students, continuous assessment (which is a form of educational examination that evaluates a student's progress throughout a prescribed course) made it possible for them to successfully complete the SFP. The provision of career counselling to them also made it easier for them to choose the field of study that they wanted to follow. Blaxter and Hughes (2010) state that a continuous assessment can provide early indicators of the likely academic performance of students and is something that can be of great help to students in particular, and to teachers in general.

Continuous assessment might therefore be a useful tool in the SFP to help students to successfully complete the programme and enrol for degree courses of their choice. Career guidance on the other hand is a process that focuses on helping one to understand one's own self, as well as work trends, so that one can take an informed decision about one's career and education (Blaxter & Hughes, 2010). Education and career guidance play an important role in a curriculum that supports students' interests, strengths, aspirations and achievements; both enable students to make informed decisions about their subject choices and pathways (Shaw,

2009). Career guidance could therefore help SFP students to become engaged in education and to become highly motivated about their future. It allows them to gain a clear understanding of themselves and how they might live and work when they finish their studies.

In terms of the future of the SFP 70% of the former SFP students want it to continue as is (see Section 4.8). One can assume that they were happy with the way the SFP was being run and organised at the Oshakati campus. If students are happy with an organisation and running of a programme, they are more likely to perform better in their studies. This can be applied to the findings of this study in terms of students' successful completion of the SFP.

Twenty percent of the former SFP students however did not like the way in which the SFP was organised and run at the Oshakati campus. Six (20%) of them gave the high costs of fees as the reason for their negative answers. Many of them could not afford to pay fees. The cost of higher education has become a cause of concern to parents, donors, and governments of many countries; Namibia is not an exemption (Nakale, 2014). Nakale (2014, p.20) points out that "most of the students who are studying at institutions of higher learning in Namibia come from different socio-economic backgrounds, with many of them found to be in unfavorable positions to finance their studies". Tuition fees, according to Wangene-Ouma and Cloete (2012), are seen as the biggest factor that makes higher education unaffordable in many countries across the world. According to Chirimbana (2014, p. 25), "students in the SFP pay a tuition fee of around N$ 15000 per year". Some of the students who had gone through the SFP were from disadvantaged and/or marginalised groups thus may not have been able to enrol in further studies.

The SFP programme was planned in such a way that it could benefit students who had enrolled in it. From the lecturers' responses (see Section 4.8), it seems that SFP students do benefit from

the SFP in terms of access to UNAM degree programmes. If the SFP was not benefitting the students, then one might not see the significance of having such a programme in the first place. The mandate of the SFP at the Oshakati campus is to ensure that by the time students leave the programme, they should not have difficulties enrolling for any degree course of their choice. It was clear from the lecturers' responses that the SFP is fulfilling its purpose of preparing students to take up further studies in science and science-related courses at UNAM.

One can infer from the responses of the students who indicated that the SFP should be changed that they want the SFP graduates to get automatic admission to UNAM degrees; they should not have to apply anymore provided they successfully complete the SFP. If these students had to apply for UNAM degree courses, they would be competing with those students who apply directly from secondary schools. Not all former SFP students would get a chance of getting admitted into degree courses of their choices. The UNAM degree courses usually have a specific number of students that can be admitted into a specific course of study per year (Naukushu & Chirimbana, 2012). This means that those who successfully complete the SFP in one year may not gain admission to the degree course of their choice. This might then discourage SFP students.

The teachers' responses suggest that the following aspects of the SFP need to be changed.

1. Communication between the UNAM SFP lecturers and the UNAM first year lecturers.
2. The SFP curriculum should to be changed continuously to meet new challenges facing the programme.
3. Curriculum changes in the UNAM SFP should run simultaneously with any UNAM first year curriculum changes. When first year lecturers change their curriculum, the SFP lecturers should also change their curriculum to meet the needs of the first year.

The SFP lecturers should constantly communicate with the first year UNAM lecturers for them to see how best they can prepare the SFP students for their first year at UNAM. In addition, they also need to communicate with these UNAM lecturers in order for them to check whether what they are offering in the SFP is needed. The SFP curriculum is meant to be in line with UNAM's first year curriculum because it is supposed to act as a preparatory curriculum for first year degree courses. Nothing remains static and the subject content offered in the first year of the UNAM degree courses might change with time. Therefore, the content offered in the SFP should also change in order to be aligned with UNAM first year programmes.

An extensive literature on job satisfaction in England has shown that teachers who are satisfied with their jobs perform better (Scott, 2006). Job satisfaction refers to a sense of fulfilment, gratification, and satisfaction from working in an occupation; it refers to the degree to which an individual feel that his or her job-related needs are met (Kyriacou, 2000). All five SFP lecturers were satisfied (see Section 4.8) with the way in which the SFP was organised and run at the Oshakati campus. Accordingly, one expects their work performance to increase leading to more students successfully completing the SFP and thus enrolling into science degrees of their choices.

Many educational programmes have shortcomings that need to be identified so that they can be improved (Grant, 2012). The SFP is no exemption. The SFP lecturers identified five main shortcomings of the SFP as listed below.

1. Lack of workshops on subjects that are taught in the SFP.
2. SFP students struggle to secure the government loan with NSFAF.
3. SFP is not accredited by the National Qualification Authority (NQA).
4. Students compete with those from Grade 12 to get admitted into degree courses.

5. Students have to apply for degree courses; they do not automatically get accepted into the degree courses.
6. The certificate that students get when they successfully complete the SFP is recognised by UNAM and not by other institutions internationally. This may limit the opportunities of the students.
7. The SFP only offers courses in the science field. Other fields such as commerce or social sciences are not offered.

If these shortcomings are not resolved, the SFP might not be able to attain its goals and objectives.

5.9 Document analysis results

The SFP was launched in 2005 at the Oshakati campus and there were 50 students (Naukushu, 2012; Chirimbana, 2014). Student numbers have increased dramatically. In 2016 the SFP had 135 students according to the University of Namibia (2016). As evident in Table 4.15 the SFP has been growing and attracting more students within Namibia as students see its relevance in their lives.

As shown in Table 4.17 in 2015 the highest number of the former SFP students (96%) enrolled in UNAM degree or diploma courses, followed by 92% in 2007. As evident in Table 4.17 more than half of former SFP students enrolled into UNAM degree or diploma courses from 2006 to 2016.

The information in Table 4.18 can be viewed that the SFP is meeting its mandate and achieving its goal and objectives of preparing students for the first year of their studies at tertiary institutions. Each year more students have progressed into their second year of studies at UNAM. The students' progression from first year at UNAM into their second year of studies

could be because of the efficient manner the SFP prepared them for the first years of their studies. What happens to the former SFP students from the second year onwards has little to do with the SFP. It is meant to help students enrol in courses at UNAM and succeed in their first year of studies. What happens to the former SFP students from the second year onwards has little to do with the SFP because the SFP is meant to help the students get into UNAM and succeed in their first year of studies like the other students who had gained direct entry from secondary schools. This is why the researcher only looked at the progression rate of students from their first year into their second year of studies.

The response of 95% of former SFP students' points to the effectiveness of the SFP in preparing students to take up further studies in science and science-related fields. It is reasonable to state that since students are excelling in their studies and also passing their first year of tertiary education that this could be due to a strong educational background provided by SFP lecturers. It was reported in Section 4.3 that 60 out 100 of the former SFP had less than 25 points before they enrolled in the SFP at the Oshakati campus. This means that they were not eligible to enrol into any degree course of their choice at UNAM. The SFP therefore made it possible for them to enrol in UNAM degree courses, to excel and also pass their first year at UNAM with good marks.

5.10 The proposed teaching model to improve the teaching process in the SFP

If effective ways to teach were to be critiqued, then a uniform teaching model might help SFP lecturers to gain insights into why some methods of teaching work better with some students while others do not. Such a model could be useful if there is a need to radically modify or redesign existing methods of teaching and instructional delivery so that emerging or altered instructional techniques may better meet the needs of SFP students. It was reported in Section 4.10 that the SFP lecturers indicated there is a need for a uniform teaching model to

be developed in the SFP to be used by all lecturers. The lecturers' responses are in agreement with Ford (2009) who emphasised that all educational institutions need a teaching model that deals with the ways in which learning environments and instructional experiences can be constructed, sequenced, or delivered. An educational model, according to Ford (2009, p. 102) "consists of a gathering or a synthesis of several theories and approaches to teaching, directing teachers to develop programs of studies and systematize the process of teaching and learning".

Educational models are the philosophical foundation of overall approaches and beliefs about learning, instruction, and subject content (Mazur, 2005). Mazur (2005, p. 520) further points out that:

> the educational models deal with the ways in which learning environments and instructional experiences can be constructed, sequenced, or delivered, they may provide theoretical or instructional frameworks, patterns, or examples for any number of educational components such as curricula, teaching techniques, instructional groupings, classroom management plans, content development, sequencing, delivery, the development of support materials, presentation methods, etc.

The teaching model (FPOBA) proposed in Figure 4.10 has eight stages.

1. Diagnostic testing
2. Needs assessment (academic challenges and / or social challenges)
3. Remedial teaching
4. Student support and counselling
5. Learning and teaching strategies
6. Formative assessment
7. Summative assessment
8. Exit

In the FPOBA model, all SFP lecturers would have to give the students a diagnostic test and do a needs assessment in all the subjects that are offered in the SFP at the beginning of each year so that they can identify students with academic and social challenges. The purpose of administering a diagnostic test in the FPOBA teaching model is to try to determine what students already know about the concepts and skills to be covered by a lecturer in each subject, to locate and identify the areas of learning difficulties in each subject, to measure where the students are in terms of their knowledge and skills, and to assess the abilities that students have at a particular time to solve problems or answer questions in a particular subject. SFP lecturers would then use the results of the diagnostic test to assess the students' strengths and weaknesses in a specific subject area. The results would further show the lecturers how much the students know about those particular subjects and also how much more they still need to know before they leave the SFP at the end of the academic year.

In other words, SFP lecturers should conduct a diagnosing test in each subject on all new students that have enrolled into the SFP at the beginning of the year in order to measure what skills and experiences they have, and to determine their needs. The researcher is of the opinion that SFP students cannot be taught effectively without first understanding their needs. This is essential for the SFP to become more effective in preparing students for further studies. The researcher therefore suggests diagnostic testing and needs assessment in order for the lecturers to identify both academic and social challenges that SFP students come with from secondary schools and to find solutions for them. The researcher proposes diagnostic testing and needs assessment because some students that are admitted to the SFP are special case appeals. The latter includes students from the marginalised indigenous tribes in Namibia, such as the Himba and San communities. These special cases normally do not meet all of the admission criteria; they are admitted to the SFP based on affirmative action guidelines. These students might

therefore come with special needs in comparison to those from mainstream groups; their weaknesses and challenges need to be identified and addressed so that they can succeed in their studies.

After the SFP lecturers have carried out the student needs assessment, and identified those SFP students with academic challenges, they can give them remedial teaching. Remedial teaching identifies students with learning difficulties and provides them with the necessary help and guidance to help them overcome their problems, after identifying their areas of difficulty (Becker, 1994). That is why remedial instruction in the SFP should involve the usage of individualised teaching of students who experience difficulties in specific subject areas.

Teaching, according to Marope (2003), involves communication: messages are sent at one end and received at the other end. When the transmitted messages are received exactly as they were transmitted, then effective communication is believed to have taken place. Sometimes messages may not get across at all or may reach the other end in a garbled, distorted and unrecognizable version. In such instances, a gap develops between teaching and learning. This means that students have not learned what a teacher wanted them to learn (Marope, 2003). It is the responsibility of SFP lecturers to get the message across either through repetition or remedial work. Teaching and learning in the SFP will be incomplete without diagnosis and remedial teaching because individual students differ in their abilities to learn. Students of different levels of ability are likely to be present in the SFP class. This means that slow, fast and average learners all have to be catered for in different ways. The researcher proposes that in the SFP, highly talented students should be provided with additional work that requires higher cognitive skills; and the slow learners have to be specially catered for during remedial

teaching in order to bring them to the level of an average student. New learning in the SFP should thus not be permitted until wrong learning has been corrected.

When the SFP lecturers have carried out a student needs assessment, and identified SFP students with social challenges, then they should send these students to a UNAM student counsellor. Social challenges refer to problems that people have when interacting with people in society or engaging in normal social behaviour. Social challenges include anti-social behaviors, poverty, alcohol and drug abuse, prostitution, economic deprivation, sicknesses, sexual abuse, rape, early pregnancy, etc. (Fey, 2010). Chirimbana (2013) states that the SFP at the Oshakati campus draws students from lower socio-economic groups, characterised by isolated rural communities, and inadequate exposure to career guidance and counselling. These students might therefore come into the SFP with some of these social challenges which might affect their academic performance if they are not addressed.

A student counsellor works with the UNAM community in partnership with the learning and support team and school counselling services to enhance student social and emotional wellbeing and learning outcomes (Naukushu, 2015). A UNAM student counsellor further provides both school wide wellbeing initiatives and targeted strengths-based support for students requiring personalised assistance. A student counsellor has a pivotal role in working collaboratively with external child and family support agencies and other government agencies to support students and their families (Chirimbana, 2014). The researcher proposes that in order to help SFP students identified as having social problems, a student counsellor should first listen to the students' concerns about academic, emotional or social problems and then work closely with the family support agencies and other government agencies, parents, and SFP lecturers. This is necessary in order to come up with solutions and set goals for the SFP students, as well as to assist them with career and academic development. A student counsellor

should therefore be worked into the SFP at Unam Oshakati Campus and should be course-content related so that the students are counselled throughout the course (throughout the whole year that they are in the SFP).

This must be done in order to improve student outcomes and to help those students to succeed academically and socially during the SFP and after they have graduated.

The next step in the FPOBA teaching model requires SFP lecturers to decide on teaching and learning strategies that they could use in teaching their specific subjects for all SFP students. Since 20% of students (see Section 4.6) identified learner-centred teaching strategies and inquiry guided learning strategies as the ones that were mostly used in the SFP, the researcher suggests these two teaching and learning strategies should be the main ones used in the SFP. SFP lecturers should however not be restricted and should use other strategies as they see fit depending on the needs of their students in their subjects.

This brings us to the next step of the FPOBA teaching model. SFP lecturers should conduct a formative assessment (see Figure 4.10) during the course of the year. During this stage, the lecturers need to use a range of formal and informal assessment procedures (such as tests, quizzes, homework, games, assignments, practicals, questions, classwork, etc.) during the learning process in order to modify teaching and learning activities to improve student knowledge attainment. The goal of a formative assessment in the SFP should be to monitor student learning and to provide ongoing feedback, which can be used by the lecturers to improve their teaching, and by students to improve their learning. More specifically (i) to help students identify their strengths and weaknesses and target areas that need work, and (ii) to enable lecturers to recognise where students are struggling and address problems immediately.

The formative assessment process in the FPOBA teaching model should provide information needed to adjust teaching and learning while they are still happening, including identifying whether the teaching and learning strategies that are being used by the SFP lecturers are effective in attaining the exit learning outcomes in their specific subjects.

It is proposed that at the end of the year, according to this FPOBA teaching model, the SFP lecturers should carry out a summative assessment (see Figure 4.10). The latter in the FPOBA teaching model should be used to evaluate student learning, skill acquisition and academic achievement at the end of the programme. Summative assessment would be used to determine whether long term learning goals of the SFP have been met. Its goal should be to measure the level of success or proficiency that has been obtained at the end of an instructional unit, by comparing it against some standard or benchmark set by the SFP lecturers. This assessment in the FPOBA teaching model should give the SFP students, parents and lecturers valuable information about each student's overall performance at the end of the SFP. It should provide information about the progress of students in subject knowledge, understanding, skills and capabilities.

Furthermore, both types of assessments, according to the FPOBA teaching model, should inform each other to help instructors improve and refine their teaching practices and help improve students' learning and performance. Summative assessment results at the end of the programme indicate whether the type of formative assessment tools used during the course of instruction were effective, too easy or too difficult, so that lecturers can amend them accordingly. Formative assessment results on the other hand should be able to signpost what should be included in a summative assessment.

After the SFP students complete the programme, they will exit it as the last stage of the FBOBA teaching model in Figure 4.10. They have to successfully complete all the requirements of the programme in order to exit to so they can then enrol for degree courses of their choice at UNAM.

The researcher is of the view that the concepts in the FPOBA teaching model can be generalised to teaching of any bridging course. The FPOBA teaching model should not be restricted to the SFP at the Oshakati Campus; it could be generalised to other bridging programmes at other UNAM campuses in order to make them more effective in preparing students for further studies.

5.11 Summary

In this chapter the quantitative and qualitative findings of the study were discussed. Special attention focussed on the research questions in this study. The results from the student questionnaires, the interviews with the SFP lecturers, and the document analysis were discussed to provide a thorough description and evaluation of the SFP. The proposed FPOBA teaching model was discussed and contextualized in terms of the overarching aim of this study. A summary of the study, conclusions, and recommendations are presented in the next chapter.

CHAPTER SIX

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

In this chapter a summary of the study and conclusions are presented. Recommendations based on the results of this study are made. The contribution that this study makes to the existing body of knowledge is discussed.

6.2 Summary

A total of 1298 students have attended the SFP from 2005 to 2016 (University of Namibia, 2016). During this period, 90% of the students passed the SFP and enrolled in various degree programmes of UNAM (University of Namibia, 2016). The remaining 10% did not successfully complete the SFP because they did not obtain 60% or higher marks in each of the SFP subjects thus were not admitted into the degree programmes of the university (Chirimbana, 2014). However, since its introduction, no study has been carried out to evaluate the SFP, therefore there was a need to assess the effectiveness of the SFP as a whole in preparing students for their first year of study at UNAM in science and science related degrees. It is against this background that this study assessed the effectiveness of the SFP from 2005-2016 in preparing students for degree programmes at the Oshakati campus. In addition, this study sought to determine the extent to which the SFP achieved its stated objectives of widening access, equity and equality to higher education by previously disadvantaged and/or marginalised groups by giving them an opportunity to enrol in science and science-related degree programmes at UNAM.

The study specifically solicited information on four research questions.

1. What is the performance of the SFP graduates in their 1st year of the degree programmes at UNAM from 2005 to 2016?
2. What are the perceptions and experiences of the former SFP students regarding the SFP in preparing them for science and science-related courses at UNAM?
3. What are the perceptions and experiences of the SFP lecturers regarding the SFP in preparing students for science and science-related courses at UNAM?
4. What educational teaching model can be used in the SFP to effectively prepare SFP students for further studies?

A mixed methods design was used to collect data from former SFP students and the incumbent SFP lecturers. The population of this study consisted of all former students who went through the UNAM SFP from 2005 to 2016 at the Oshakati campus, as well as all the SFP lecturers. From the population of former SFP students (n=1298) a sample of 100 was selected. Stratified random sampling and the snowball sampling method were used. Convenience sampling was used to select five SFP lecturers who were individually interviewed.

The sample of 100 former SFP students comprised of 50 who were still busy with their studies. Stratified random sampling was used according to the degree programmes the students were enrolled in. Convenience snowball sampling was used to select 30 students who had completed their studies. They were selected from each academic year level of the SFP. The same sampling method was also used to select 20 students who were not enrolled in any of the degree programmes at UNAM but had gone through the SFP.

Three research instruments were used to collect the data for this study from the sample: a questionnaire, an interview guide, and document analysis. The questionnaire consisted of open and closed-ended questions. This research tool was used to obtain information from the 100 former SFP students.

A structured interview guide was used for 30 minutes' Face-to-face interviews with each of the five incumbent SFP lecturers. The interviews were audio-recorded and transcribed later.

The researcher also analysed the University Integrated Tertiary System (ITS) database by using data mining techniques. This was done (i) to extract student data to find out how many former SFP students were registered for which first year degree programmes, and (ii) to find out the performance of these students in their courses of study at UNAM. Descriptive statistics including frequency tables, graphs and charts were used to analyse quantitative data. Qualitative data were coded into common themes that emerged from the findings.

It emerged from the study that all 100 former SFP students had met the entry requirements of the SFP which was 17 points and above. The majority (80%) had successfully completed the SFP with an average of 60% or above. In terms of further studies, 80% did proceed to study at tertiary institutions: 58% enrolled at UNAM; 62.5% (n=50) were still studying; 37.5% (n=30) had already completed their university studies and all were employed mainly as teachers or nurses. The results also indicated that 6% of the students had enrolled for a Bachelor of Education degree, and 6% for a Bachelor of Clinical Nursing degree. It also emerged from the results that in each year from 2006 to 2016 more than 90% of the students passed their first year of studies at UNAM and progressed to the second year of their studies.

Further, 25% from the 80 students who had successfully completed the SFP indicated that what helped them to successfully complete the SFP was that they were provided with lecture notes and were motivated to study further by the SFP lecturers. Further, 40% of all 100 students provided information on some of the teaching and learning strategies they thought were being used in the SFP. Eight of them are presented below.

- Learner-centred teaching strategies
- Lecturer-centred teaching strategies
- Problem based learning (PBL) strategies
- Experiential learning (learning by doing) strategies
- Simulations (enhanced context strategies) strategies,
- Inquiry guided learning strategies
- Team-based learning (TBL) strategies
- Collaborative/cooperative learning

Furthermore, 80% of all the students (n=100) indicated that the teaching and learning strategies that were used in the SFP were effective because most of them were busy doing science and science related courses at UNAM. Eighty-five percent indicated that the SFP was effective in preparing students for science and science-related courses at UNAM; 50% of them were excelling in their further studies and that they managed to pass their first year with good marks. Seventy percent indicated that the SFP should continue as is. On the other hand, 30% were of the view that the SFP should be changed so that SFP former students could be admitted to UNAM degrees programmes automatically. They would not have to apply anymore provided that they have successfully completed the SFP; former SFP students should be prioritized by the Namibian Student Financial Assistance Fund (NSFAF) in granting study scholarships in order for them to further their studies.

The majority (80%/n=100) of students liked the way in which the SFP was organised and run at the Oshakati campus. The use of continuous assessment made it possible for them to successfully complete the SFP. On the other hand, 20% of all the students (n=100) did not like the way in which the SFP was organised and run at the Oshakati campus. They indicated the entry fees were very high and not every student could afford to pay.

With regard to the question about the teaching success rates, three (60%) lecturers responded that their teaching success rates since that they commenced teaching in the SFP had been excellent with 80% student pass rate; the other two lecturers (40%) indicated that their teaching success rates had been above average with a student pass rate was over 60%. The lecturers' responses revealed that they were using some teaching strategies in teaching their specific subjects in the SFP, namely:

- Group work or group teaching or group discussions
- Problem-based learning
- Participatory or learner–centred teaching strategy
- Teacher-centred teaching strategies.

They also identified some shortcomings of the SFP in relation to teaching in the SFP at the Oshakati campus. These were: lack of workshops on subjects that were being taught in the SFP; the SFP was not accredited by the Namibian Qualifications Authority (NQA); SFP students still had to apply for degree courses as they are not automatically admitted to degree programmes; the certificate that students get when they successfully complete the SFP was only recognised by UNAM and not by international institutions and this limits the opportunities of students to study at other institutions of higher learning.

All lecturers (n=5/100%) were of the view that the SFP was meeting its mandate of preparing students to take up further studies in science and science-related courses at UNAM. There was consensus that the SFP was very effective in preparing students to take up further studies in science-related fields because more students had managed to pass the 1st year of their studies at UNAM; most students who had successfully completed the SFP had enrolled in science and science-related courses at UNAM. To the question of whether the teaching and learning in the SFP should be changed, four (80%) of the lecturers responded that the status quo should continue.

Lastly, all five lecturers indicated that there was no specific teaching model that was being used in the teaching of the SFP. Accordingly, the researcher has proposed a teaching model termed the Foundation Programme Outcome Based Approach (FPOBA) for the SFP. In this teaching model, all SFP lecturers would have to give SFP students a diagnostic test, carry out a needs assessment in all the subjects that are offered in the SFP at the beginning of each year for them to identify students with academic and social challenges. The SFP lecturers would then use the results of the diagnostic test and needs assessment to assess the students' strengths and weaknesses in a specific subject area. After the SFP lecturers have identified the academic and social challenges of the SFP students, they would give the students remedial teaching (those with academic challenges) in those areas where they were struggling, as well as send them to a UNAM student counsellor for counselling. The next step in the FPOBA teaching model is for the SFP lecturers to then decide on the teaching and learning strategies that they can use in teaching their specific subjects. The next level of the FPOBA teaching model suggests that the SFP lecturers should conduct a formative assessment during the course of the year, and carry out a summative assessment at the end of the academic year. SFP students exit the programme after its completion provided that they have successfully completed all the requirements of the

programme. They are then expected to enrol for degree programme courses of their choice at UNAM. A tracer study should then be conducted every year by the SFP lecturers to find out whether the former SFP students had enrolled for further studies and also to find out the performance of the SFP students in their first year of studies at UNAM.

6.3 Conclusion

It can be concluded from the document analysis' results that more than half of the former SFP students enrolled in UNAM degree or diploma courses for the years 2006 to 2016; the highest enrollment rate was 96% in 2015. The results also show that in each year more students had passed their first year of studies at UNAM and had progressed to the second year of their studies; the highest progression rate of students (96%) to second year studies was in 2015. Therefore, it can be concluded that the SFP has been effective in preparing students to take up further studies in science and science-related fields.

It can also be concluded from the results of this study that most of the students had successfully completed the SFP with an average of 60% or above and thus had qualified to enrol for degree programmes at UNAM. It can also be concluded that the SFP students were motivated by their lecturers to study further. They were also motivated by informative lecture notes and the variety of teaching and learning strategies used in the SFP.

The results of this study showed that most students who had gone through the SFP had also furthered their studies at tertiary institutions such as UNAM, the former colleges of education, the International University of Management, Namibia University of Science and Technology, India Bio-Medical Sciences University (India), and Mutare Teachers College in Zimbabwe.

Most of the former SFP students positively supported the effectiveness of the teaching and learning strategies used in the SFP. It can also be concluded that most of them (24 out of 50) had enrolled in the faculty of education and nursing courses. All 30 former SFP students who had completed their further studies were all employed; this might be attributed to the fact that the SFP does contribute to the wellbeing of students. It can be concluded from the students' responses that out of the 30 former SFP students who had graduated from tertiary institutions, most were employed as teachers and nurses. This implies that Namibia was to be equipped with more teachers and nurses who might contribute towards the improvement of the education and health sectors for the betterment of all Namibian citizens.

It can also be concluded from the lecturers' responses that their teaching in the SFP has been a success. This is probably the reason why more students were admitted to degree programmes of their choices at UNAM and why these students had succeeded in their first year of university.

The study also found that 95% of the students, and all five SFP lecturers strongly agreed that the SFP was effective in preparing students to take up further studies in science and science-related fields; most of the students were excelling in their studies. Those who had already graduated were working. From the respective responses of the students and lectures one can conclude that the SFP was meeting its goals and mission of preparing students to take up further studies in science and science-related fields at UNAM. Further, it can be concluded from their responses that teaching and learning in the SFP was good and did not need to be changed. Most of the students and all of the lecturers seemed to be satisfied with the way in which the SFP was organised and run at the Oshakati campus.

It can be concluded from the lecturers' responses that there was no specific teaching model for teaching of the SFP. The SFP lecturers need a uniform teaching method that would help them

to teach well and gain needed insights into why some methods work well with some students while others do not. Such insights are necessary to radically modify existing methods of teaching and instructional delivery so that emerging or altered instructional techniques may better meet the needs of the SFP students. Accordingly, the researcher designed a teaching model for the SFP. The model is called the Foundation Programme Outcome Based Approach. This teaching model has eight stages: diagnostic testing; needs assessment (academic and social challenges identified); remedial teaching; student support and counselling; learning and teaching strategies; formative assessment; summative assessment; exit; and tracer study.

The SFP does meet its goals and mission of preparing students to take up further studies in science and science-related courses at UNAM; most of the students were doing science-related courses at UNAM; most of them have graduated with science degrees and are now working.

It can also be concluded from the findings of this study that there are challenges facing the SFP at the Oshakati campus as identified by the former SFP students and the five SFP lecturers. These include:

1. SFP students are not secured automatic admission to UNAM degree courses.
2. SFP students are not prioritised by NSFAF and thus not all of them receive the government loan when furthering their studies.
3. The SFP is not accredited by the NQA.
4. The certificate that students get when they successfully completed the SFP is not recognised by other institutions of higher learning internationally. It is only recognised by UNAM and this may limit the opportunities of the students.
5. SFP only offers one field of study, which is the science field, and other fields of study are not offered.

6. There is not a uniform teaching model that is used by all the lecturers in the SFP.

6.4 Recommendations

The following recommendations are based on the results of this study.

6.4.1 Recommendations for the university management

- The researcher recommends that the university management should work out a strategy of ensuring that the SFP students secure automatic admission to UNAM degrees once they have successfully completed the SFP so that they do not have to compete for admission with other students who never went through the SFP. The SFP is a UNAM programme that trains students for UNAM programmes, that is why students who successfully complete this programme should not have to struggle to be admitted into UNAM degree programmes.
- The university management should try and reach an agreement with the Namibian Student Financial Assistance Fund (NSFAF) so that all SFP students who have successfully completed the SFP can qualify for a government study loan when furthering their studies at UNAM.
- The university management should apply for accreditation with Namibia Qualifications Authority (NQA) so that the SFP can become a qualification on its own. This might help more SFP graduates to gain admission to further their studies in a variety of degree courses at UNAM.

- The university management should introduce other fields of study besides the science field in the SFP. This might allow students who have not done science subjects at secondary level to enrol in the SFP and enrol in non-science degree courses at UNAM.
- The university management should source money to create a fund that will help pay for the fees of students from marginalised groups who cannot afford to pay for the SFP.
- The university management should allow the SFP students to repeat the programme if they fail. This will increase the chance of more students successfully completing the programme and also increase their chances of enrolling in degrees courses at UNAM.

6.4.2 Recommendations for the SFP lecturers

- The SFP lecturers, together with the UNAM curriculum review committee, should regularly review the SFP curriculum to keep abreast with changes in the first year curriculum at UNAM.
- The SFP lecturers need to communicate with the first year UNAM lecturers in order for them to determine what they are offering in the SFP is what is needed in order to help the SFP students excel in their studies. The SFP lecturers and the first year lecturers should develop a strong collaboration to discuss the needs of the SFP students and smooth the process of SFP students enrolling in the first year of their further studies at UNAM.
- The Foundation Programme Outcome Based Approach (FPOBA) model should be used in teaching of SFP students to effectively prepare them for further studies at UNAM.
- The SFP lecturers should conduct a tracer study to find out the whereabouts of former SFP students in terms of whether they have been admitted in tertiary institutions of higher learning, their academic performance or employment status.

- The SFP lecturers should visit other countries where foundation programmes are offered for benchmarking purposes, networking and learning from best practices.

6.4.3 New contribution to the already existing body of knowledge

The Foundation Programme Outcome Based Approach (FPOBA) teaching strategies should be used in the SFP to effectively teach and prepare students for further studies at UNAM.

6.4.4 Recommendations for further research

- Further research should be carried out to assess the performance of SFP students at UNAM and the direct entry of Grade 12 students into university degree programmes.
- A longitudinal study should be carried out to shed light on the performance of SFP graduates throughout their studies: from first year to their final year of studies.
- Further research should be carried out to assess the quality of the lecturers who are teaching in the SFP at UNAM Oshakati Campus.
- Further research should be carried out to shed light on the availability of resources for the implementation of the SFP at UNAM Oshakati campus
- Further research should be carried out to shed light on the number of students from disadvantaged areas admitted unconditionally into the 1st year degree programme. i.e. What proportion of students admitted into the SFP meet admission cut off of 60%?
- Further research should be carried out to determine if there is any correlation of scores of the former SFP students in the 1st year of their studies at tertiary level and their entry scores from Foundation Programme.
- The Foundation Programme Outcome Based Approach (FPOBA) teaching model should be tested to establish its suitability as well as its effectiveness in enhancing teaching in the SFP.

REFERENCES

Alkin, M. C. (2018). *Evaluation Roots: A Wider Perspective of Theorists' Views and Influences*. Thousand Oaks, CA: Sage.

Amukugo, E., Likando, G. N., & Mushaandja, J. (2011). Access and quality dilemma in education: Implication for Namibia's vision 2030. *Higher Education Forum*, 7, 101-112.

Amukugo, E.M. (1993). *Education and politics in Namibia before and after independence: A comparative perspective.* Windhoek: Gamsberg MacMillan Publishers.

Amutenya, M. N. (2002). *Active learner participation: A study of the BETD INSET teachers' classroom practices in the Ondangwa East & West Regions.* An unpublished Master thesis submitted in the partial fulfilment of the award of a master's degree. University of Namibia: Windhoek.

Angula, N. (1990). *The National Integrated Education System for Emergent Namibia.* Windhoek: Namibia Printers.

Becker, G. (2003). *Human capital.* (3rd Ed). Chicago: University of Chicago Press.

Becker, G. S. (1994). *A theoretical and empirical analysis with special reference to education.* (3rd Ed). Chicago: University of Chicago Press.

Bell, C. (2004). *Qualitative and quantitative research in statistics education: on symbolizing and computer tools.* Utrecht: CD- Press.

Bell, J. (2001). *Doing your research project.* A guide to first researchers in education and social science. (3rd Ed.). Buckingham, Philadelphia: Open University Press.

Benjamin, L. M., & Greene, J. C. (2009). From program to network: The evaluator's role in today's problem solving environment. *American Journal of Evaluation, 30*, 296-309.

Bennett, J. (2010). *Doing your research project.* Buckingham: Open University Press.

Bhorat, H. (2009). Unemployment in South Africa. *Paper presented to the Commission on Growth and Development*, Washington DC: World Bank.

Bickman, L. (2012). *Using program theory in evaluation: New directions for program evaluation.* San Francisco, CA: Jossey-Bass.

Blaxter, L., Hughes, C. (2010). *How to research*. England: Open University Press.

Brown, H. (2001). *Teaching by principles, an integrative approach to language pedagogy.* White plains, NY. Longman Publications (PTY) LTD.

Chaplin, S. (2007). A model of student success: Coaching students to develop critical thinking skills in introductory biology courses. *International Journal for the Scholarship of Teaching and Learning*, 3, 23-34.

Chen, H. T. (1994). Theory driven evaluations: Need, difficulties, and options. *American Journal Evaluation*, *15*, 79-82.

Chirimbana, M. (2013). *Effect of setting academic and behavioural goals on academic performance.* Mastard: Lambert Publishing Company.

Chirimbana, M. (2014). *The effect of a problem based learning approach on the teaching and learning of composition and inverses of functions in a foundation programme.* Mastard: Lambert Publishing Company.

Clegg, A. (1989). *Science and mathematics education in Namibia.* Lusaka: Macmillan Publishers.

Creswell, J. (2012). Mixed methods resarch designs. *CAQD Workshop* (pp. 1-43). Margburg: Lincoln University of Nebraska.

Cuban, L. (2010). *The blackboard and the bottom line: why schools can't be businesses.* London: Harvard University Press.

De Beer, K. (2006). Open access and retention at the Central University of Technology. *South African Journal for Higher Education*, *4*(2), 33-47.

Depoy, E., & Gitlin, L. N (2008). Introduction to research: understanding and applying multiple strategies. Philadelphia, Mosby.

Dewey, J. (2008). *Democracy and education*. Virginia: Wilder publications.

Directorate of National Examinations and Assessment (DNEA), (2008). *An overview report on NSSC Ordinary and Higher level examinations.* Windhoek: DNEA.

Donaldson, S. I., & Lipsey, Y, M. W. (2004). *Roles for theory in evaluation practice.* Thousand Oaks, CA: Sage.

Dunn, T. (2003). *Radical pedagogy: challenging the vestigies of past subjection: influences of educational reforms in Namibia on teachers' beliefs and instructional practices.* Riverfalls: University of Wiscosin.

Fey, M. E. (1995). *Preparing preschoolers for the academic and social challenges of school.* Baltimore: Paul H Brookes Publishing.

Flick, U. (2008). *Doing interviews*. Thousand Oaks, CA: Sage.

Foddy, N. (1994). *Handbook of international research in mathematics education.* Mahwah (USA): Lawrence Erlbaum.

Ford, A. (2009). *Modeling the environment.* (2nd Ed). Island Press, Washington D.C.

Funnell, S., & Rogers, P. (2011). *Purposeful program theory: Effective use of theories of change and logic models*. San Francisco, CA: John Wiley & Sons.

Gillham, K. (2008). *Literacy, numeracy and students with disabilities.* Canberra: McMillan.

Given, L. (2009). *The sage encyclopedia for qualitative research methods.* London: Sage Publications.

Grant, J. (2012). *Learning and change*. London, England: Radcliffe Publishing.

Grayson, D. J. (1997). A holistic approach to preparing disadvantaged students to succeed in tertiary science studies. *International Journal of Science Education,* 19(1), 107-123.

Grayson, D. J. (2000). *Summary and overview of the programme. Science Foundation Programme.* Pietermaritzburg: University of Natal.

Guba, E., & Lincoln, Y. S. (1991). *Effective evaluation.* San Francisco: Jossey-Bass.

Handelsman, J., Miller, S., & Pfund, C. (2007). *Scientific teaching.* New York: Freeman.

Hayes, P. (2000). *Speak for yourself.* Windhoek: Longman Namibia.

Henning, E., Van Rensburg, W., & Smith, T. (2004). *Finding your way in qualitative research.* Pretoria: Van Schalk publishers.

Holtman, L., Marshall, D., & Linder, C. (2004). Widening (epistemological) access: two undergraduate science courses. In H. Grisel (Ed), *Curriculum responsiveness:Case studies in Higher education* (pp. 1-5). Pretoria: South African Universities Vice-Chancellors Association.

Johnson, B., & Christensen, R. (2008). *Educational research, quantitative, qualitative and mixed approaches.* (3rd Ed.). London: Sage Publications, Inc.

Kamati, A. (2012). *The effect of code switching in the teaching of science and mathematics.* An Unpublished Master Thesis submitted in partial fulfilment of the award of master's degree. University of Namibia: Windhoek.

Kapenda, H. M., & Ngololo, E. N. (January, 2007). The role of foundation programme in mathematics education: Foundation programme at the University of Namibia, Northern Campus, Namibia. A paper presented at the *Annual SAARMSTE conference. Maputo.*

Kasanda, C. D. (1995). The role of educational research in the development of human resources in the teaching of science and mathematics subjects in Namibia. Paper presented at the

BOLESWANA Research Symposium conference held at the University of Botswana, Gaborone.

Kloot, B., Case, J. M., & Marshall, D. (2008). A critical review of the educational philosophies underpinning Science and Engineering Foundation Programmes. *South African Journal of Higher Education, 22*(4), 799–816.

Kyriacou, C. (2000). *Teacher stress and satisfaction*. London: Nelson Thornes.

Leung, G. (2001). Divisibility and multiplicative structure of natural numbers: Preservice teacher's understanding. *Journal for Research in Mathematics Education, 27*(5), 540–563.

Loraine, B. (2004). *How to research.* Birmingham: Open University Press.

Louw, J. (1999). *Improving practice through evaluation.* Cape Town: David Philip.

Mabila, T., Malatje, S., Addo-Beniako, A., & Kazeni, M. M. (2006). The role of bridging course for undergraduate mathematics in science education:The UNIFY programme at University of Limpopo, South Africa. *International Journal of educational Developement, 11*(3), 202-204.

MacMillan, S., & Schumacher, V. (2006). *Educational research methodology: Qualitative and quantitative approaches.* Boston: Allyn and Bacon.

Mark, M. M., Henry, G, T., & Julnes, G. (2000*). Evaluation*. San Franciso: Jossey-Bass.

Marope, M. (2003). *Working together towards teacher education in Namibia.* Windhoek: Gamsberg Macmillan.

Mazur, J. (2005). *Learning and behavior.* (6th Ed). Upper Saddle River, NJ: Prentice Hall.

McMahon, B. (2006). *Happiness: a history*. New York: Grove Press.

Mertens, D. M., & Wilson, A. T., (2012). *Program evaluation theory and practice, a comprehensive guide.* New York: Guilford Press.

Miles, M. B., & Huberman, A. M. (1994). *An expanded source book: Qualitative data analysis.* Thousand Oaks: Sage publications.

Ministry of Education and Culture [MEC]. (1993). *Towards Education for All. A Development Brief for Education, Culture, and Training.* Windhoek: Gamsberg Macmillan.

Ministry of Health and Social Services (MHSS). (2001). *Health in Namibia: Progress and challenges*. Windhoek: MHSS.

Munn, M., & Drever, I. (2004). *Thinking ahead of Numeracy. Mathematical Illiteracy and Its Consequences.* Penguin: London

Nakale, A. (2014, October 31). Amupanda rescues indebted student. The Namibian Daily News, p.2.

Nambahu, L., Shikongo, P., & David, E. (2005). *Post independence educational reform in Namibia* . Windhoek: Zebra.

National Planning Commission [NPC], (2003). *National Development plan 2.* Windhoek: National Planning Commission.

Naukushu, S. T. (May, 2012). *Mathematics papers must have gone crazy.* Paper presented at the 7th National Mathematics congress. Swakopmund Annual Mathematics Congress.

Naukushu, S. T., Kamati, A. M., Kasanda, C. D., & Kapenda, H. M. (January, 2012). The role of Foundation Programme on preparing students for tertiary education in Science related careers. Paper presented at the 10th Annual *SAARMSTE conference.* SAARMSTE.

Naukushu, S., & Chirimbana, M. (2012). The role of bridging course for undergraduate mathematics in tertiary education. *Annual Mathematics Congress* (pp. 12-14). Swakopmund: Orizon Education Services.

Naukushu, S., Kamati, A., Kasanda, C., & Kapenda, H. (2012). The role of Bridging course for undergraduate mathematics (FP) on preparing students for tertiary education in Science related careers. *SAMSTE Conference* , (pp. 1- 4). Lilongwe: Malawi.

Naukushu, S.T. (October, 2013). *Preparing students for Vision 2030: A paper presented at the annual research conference of 2013.* Oshakati.

Naukushu, S.T. (September, 2005). Foundation programme as a tool for preparing students for Vision 2030. A paper presented at the *Annual Research Conference of the University of Namibia Oshakati Campus*. Oshakati.

Naukushu, ST. (2015). *A critical theory enquiry in the development of number sense in Namibian first year pre-service secondary mathematics teachers.* An unpublished doctoral dissertation. Stellenbosch University, Cape Town.

Neuman, W. L. (2011). *Social research methods, (5th edition).* Boston: Pearson Education, Inc.

Ngololo, E., & Kapenda, H. (2012). Uiversity of Namibia Oshakati Science Bridging course for undergraduate mathematics Tracer study 2005-2010. *Edumeds Educational Journal*, 8-12.

Ngololo, E., & Nekongo, H. (2013). *UNAM Oshakati Campus tracer study of former Science Foundation Programme students:* 2005-2010.Windhoek: University of Namibia.

Nong, Y. (2003). *The handbook of data mining.* Mahwah. NJ: Lawrence Erlbaum.

Oppenheim, K. (2000). An assessment of estimation proficiency of students. *Mathematics Education, 21*(7) 60-69.

Pal. L. A. (2017). *Beyond Policy Analysis: Public Issue Management in Turbulent Times.* Toronto: Nelson.

Pandor, N. (2004). *Maths today and tomorrow. South African Government, Department of Education.* Retrieved on the 20th of December 2014, from http://education.pwv.gov.za, (pp. 1-4).

Patton, M. Q. (1999). *Qualitative evaluation and research methods.* (2nd Ed.). Newbury Park: Sage Publications.

Patton, M. Q. (2000). *Qualitative research evaluation methods.* Thousand Oaks, CA: Sage.

Payne, V., & Payne, W. (2004). *Qualitative research for education: An introduction to theory and methods.* Boston: Allyn and Bacon.

Peter, F. D. (2006). *The effective executive: The definitive guide to getting the right things done.* New York: Collins.

Platt, V. (2001). *Grounded theory methodology,* Boston: South End Press.

Polit, G., & Hungler, D. F. (2007). *Knowledge and values in social and educational research.* Philadelphia: Temple University Press.

Portgieter, M., Davidowitz, B., & Mathabatha, S. (2007). Do they know that they do not know? The relationsship between confidence and performnace of first year tertiary institutions in South Africa. A paper presented at the *38th Conference of the Australian Science education Research Association (ASERA).* Fremantle: WA.

Potter, C. (2006). *Program evaluation.* Cape Town: UCT Press.

Richard, L., & Zangwill, O. L. (1990). *The Oxford companion to the mind.* New York: Oxford University Press.

Rollnick, M. (2007). Successes in science access internationally. A survey of programmes *proceedings of the 14th annual SAARMSTE conference.* (pp. 9-12) January 2007.

Rollnick, M., & Holtman, L. (2010). *Identifying potential for equitable access to tertiary level science:digging for gold.* Dordrecht: Springer.

Rossi, P. H, Lipsey, W. M, & Freeman H. E, (2004). *Evaluation: A systematic approach* (7th Ed.). Thousand Oaks, CA: SAGE.

Samuel, D. R. (2017). *The culturally inclusive education. New York: Teachers College Press.*

Schwab, K. (2016). *The global competitiveness Report (2015 – 2016).* Geneva: World.

Scott, J. (2006). *Documentary research.* London: SAGE.

Shaw, B. (2009). *Career coaching.* New York: Brooklyn.

Smith, L. (2018). *Decolonizing Methodologies. Research and Indigenous Peoples.* Dunedin: University of Otago Press.

Stoffels, D. (2005). *Thinking ahead.* Addison Wesley Longman Inc. New York.

Strauss, A., and Corbin, J. (1998). *Basics of Qualitative research: Techniques and procedures for developing grounded theory.* London: Sage Publications.

Terenzini, P.T. (2000). Assessment with open eyes: Pitfalls in studying student outcomes. *Journal of Higher Education, 60*(6), 644-664.

Trading economics. (2016, December 10), *Population – Female (% of the total) in Namibia. Retrieved 12 December 2017 from* https://tradingeconomics.com/namibia/population-female-percent-of-total-wb-data.html.

Trigwell, K & Corrigan, A, (2009). The need for bridging and supplementary support for students at UTS. Centre for learning and teaching, Addison-Wesley: New York.

UNAM. (2005, June 12). *University of Namibia Bridging course for undergraduate mathematics: Upgrading the Access Course into the Bridging course for undergraduate mathematics.* Oshakati: University of Namibia.

University of Namibia, (2004). *Science Foundation Program database 2004.* Oshakati, University of Namibia.

University of Namibia, (2005). *Science Foundation Program database 2005.* Oshakati, University of Namibia.

University of Namibia, (2016). *UNAM database (2005-2016).* Windhoek, University of Namibia.

Uugwanga, P. (October, 2006,). The concept of "disadvantaged learners" and its position in the Science Foundation Programme. *A paper presented at the Annual Research Conference of the University of Namibia Oshakati Campus.* Oshakati: University of Namibia.

Valencia, R. R. (2017). *The Evolution of Deficit Thinking: Educational Thought and Practice.* Washington, DC: The Palmer Press.

Van der Flier, H., Thijs, G., & Zaaman, H. (2003). Selecting students for a South African Mathematics and science bridging course for undergraduate mathematics:The effectiveness and fairness of school -leaving examinations and uptitude tests. *International Journal of Educational development*, 24(4) 399-409.

Van Rensburg, C. (2015). *Discovering geography:* Grade 11 & 12: Namibian Senior Secondary School Certificate. Windhoek: Zebra Publishing.

Wallace, M. (2018). *A history of Namibia education.* New York: Columbian University Press.

Wangenge – Ouma, G., & Cloete, N. (2012). Financing higher education in South Africa: Public funding, non-government revenue and tuition fees. *South African Journal of Higher Education*, *22*(4), 906-919.

Yin, R. (2003). *Case study research: Design and methods*. Thousand Oaks, CA: Sage Publications.

APPENDIX 1: Ethical clearance certificate

UNAM
UNIVERSITY OF NAMIBIA

ETHICAL CLEARANCE CERTIFICATE

Ethical Clearance Reference Number: FOE/143/2016 **Date: 5 December, 2016**

This Ethical Clearance Certificate is issued by the University of Namibia Research Ethics Committee (UREC) in accordance with the University of Namibia's Research Ethics Policy and Guidelines. Ethical approval is given in respect of undertakings contained in the Research Project outlined below. This Certificate is issued on the recommendations of the ethical evaluation done by the Faculty/Centre/Campus Research & Publications Committee sitting with the Postgraduate Studies Committee.

Title of Project: The Effectiveness of the University of Namibia Oshakati Campus Science Foundation Programme Preparing Students for Degree Programmes

Nature/Level of Project: Doctorate

Researcher: L. L. T. Nghipandulwa

Student Number: 9969128

Faculty: Faculty of Education

Supervisors: Dr. H. Kapenda (Main) Prof. C. Kasanda (Co)

Take note of the following:

(a) Any significant changes in the conditions or undertakings outlined in the approved Proposal must be communicated to the UREC. An application to make amendments may be necessary.
(b) Any breaches of ethical undertakings or practices that have an impact on ethical conduct of the research must be reported to the UREC.
(c) The Principal Researcher must report issues of ethical compliance to the UREC (through the Chairperson of the Faculty/Centre/Campus Research & Publications Committee) at the end of the Project or as may be requested by UREC.
(d) The UREC retains the right to:

(i) Withdraw or amend this Ethical Clearance if any unethical practices (as outlined in the Research Ethics Policy) have been detected or suspected.
(ii) Request for an ethical compliance report at any point during the course of the research.

UREC wishes you the best in your research.

Prof. P. Odonkor: UREC Chairperson

Ms. P. Claassen: UREC Secretary

APPENDIX 2: The year that the students completed the SFP (N=100).

Year of completion	Frequency (%)
2005	5 (5)
2006	10 (10)
2007	5 (5)
2008	10 (10)
2009	20 (20)
2010	10 (10)
2011	15 (15)
2012	6 (6)
2013	4 (4)
2014	10 (10)
2015	5 (5)
Total	**100**

APPENDIX 3: Course of study former SFP students have enrolled in, and year of study (N=50).

Course of study	Year of study	Frequency (%)
Bachelor of Education (pre and lower primary)	4	2 (4)
Bachelor of Education (pre and lower primary)	3	3 (6)
Bachelor of Education (pre and lower primary)	1	2 (4)
Bachelor of Education (upper primary)	2	1 (2)
Bachelor of Education (upper primary)	2	1 (2)
Bachelor of Education (upper primary)	3	2 (4)
Bachelor of Education (secondary level)	3	2 (4)
Bachelor of Education (secondary level)	4	2 (4)
Bachelor of Science (Chemistry and Physics)	3	2 (4)
Bachelor of Science (Chemistry and Physics)	4	1 (2)
Bachelor of Science (Mathematics)	2	1 (2)
Natural Resource Management	4	1 (2)
Bachelor of Arts in Public Relations and Sociology	4	1 (2)
Bachelor of Clinical Nursing	1	2 (2)
Bachelor of Clinical Nursing	4	2 (2)
Bachelor of Clinical Nursing	3	3 (6)
Diploma in Agriculture	2	1 (2)
Diploma in Natural Resources management	3	1 (2)
Bachelor of Science in Agriculture	1	2 (2)
Bachelor of Science in Fisheries and Aquatic Sciences	4	2 (2)
Bachelor of Science in Fisheries and Aquatic Sciences	3	2 (4)
Bachelor of Veterinary Honors	2	2 (4)

Bachelor of Medicine and Surgery.	5	1 (4)
Bachelor of civil Engineering	3	1 (2)
Bachelor of Mechanical Engineering	4	1 (2)
Bachelor of Mining Engineering	4	1 (2)
Bachelor of Science in Applied Mathematics	3	1 (2)
Bachelor of Education in Senior Primary	1	2 (4)
Bachelor in Health and Wellness Studies Honours	1	1 (2)
Bachelor of Natural Resource Management	1	1 (2)
Bachelor of Biomedical Sciences	1	1 (2)
Total		**50(100)**

APPENDIX 4: Course of study and year in which the students completed further studies (N=30).

Course of Study	Year of completion	Frequency (%)
Basic Education Teaching Diploma	2010	2 (6)
Basic Education Teaching Diploma	2011	2 (6)
Natural Resource Management	2015	2 (6)
Bachelor of Education (pre and lower primary)	2015	2 (6)
Bachelor of Education (upper primary)	2015	3 (10)
Bachelor of Education (secondary level)	2014	2 (6)
Bachelor of Biomedical Sciences	2015	2 (6)
Mechanical engineering	2015	2 (6)
Electrical Engineering	2015	1 (3)
Bachelor of Arts in Public Relations and Sociology	2013	1 (3)
Bachelor of Science in Applied Mathematics	2015	1 (3)
Diploma in Secondary Education	2013	1 (3)
Diploma in Secondary Education	2014	1 (3)
Diploma in Agriculture	2009	1 (3)
Bachelor of Laws	2014	1 (3)
Bachelor of Clinical Nursing	2014	2 (6)
Bachelor of Clinical Nursing	2015	2 (6)
Bachelor of Science in Geology	2014	2 (6)
Total		**30(100)**

APPENDIX 5: The description of the action taken after the pilot study.

1. Comment on the teaching ways and procedures that you think were being used at UNAM.
2. How do you think you have benefited from what was being taught in the Science Foundation Programme at Oshakati Campus?
3. Comment on how effective the Science Foundation Programme was in preparing you to rake up further studies?
4. Any other general comments you would like to make about the effectiveness of the Science Foundation Programme in preparing students for Science degree Programmes at Oshakati campus?
5. For the period that you have been teaching in the SFP, what would you say was your teaching success rate?
6. To what extend is the Science Foundation Programme effective in making you and others ready for Science related courses at university?
7. Can you please justify your choice of answer in the space provided?
8. How do you think students have benefited from the Science Foundation Programme at Unam?

- Assess whether each question gave an adequate range of responses;
- Established whether student replies could be interpreted in terms of the information that was required in the study.

- Check that all questions were answered (in both questionnaires, it was found that some questions were left unanswered by the students). To address this matter, these questions were replaced with multiple choice questions instead of leaving them open ended. This

was done in order to make it easier for the students to answer these particular questions and to avoid the students leaving the questions unanswered. This was also done in order to make it easier for the researcher during the analysis of the data). Questions were replaced as follows:

1. Comment on the teaching strategies that were being used in the SFP was changed to: Which of the teaching and learning strategies do you think were being used in the SFP (Tick applicable box [es])?

Type of science teaching and learning used in the SFP	
1. Learner centred teaching strategies	
2. Lecturer centred teaching strategies	
3. Problem based learning (PBL) strategies	
4. Discussion strategies	
5. Experiential learning (learning by doing) strategies	
6. Simulations (enhanced context strategies) strategies	
7. Inquiry guided learning strategies	
8. Team- based learning (TBL) strategies	
9. Questioning strategies	
10. Manipulation strategies	
11. Collaborative/cooperative learning	
12. All of the above	
13. Others (please specify) ……	

2. Comment on the effectiveness of the teaching and learning strategies that were used in the SFP, was changed to

(ii) Comment on the effectiveness of the teaching and learning strategies that were used in the SFP. (Tick one box).

Very effective	
Effective	
Not effective	

(ii) Justify your answer.

……

……

3. What kind of support did you receive from the Science Foundation Programme staff members if any in relation to teaching and learning? Was changed to:

What kind of support did you receive from the Science Foundation Programme staff members if any in relation to teaching and learning (Tick applicable box[es])?

Kind of support received from the SFP staff in relation to teaching and learning.	
1. Study materials for all subjects were provided	
2. 'scaffolding' support (individual instructional modifications)	
3. corrective feedback and encouragement	
4. lots of opportunities to drill and practice to strengthen ones skills	
5. Engaging students in the teaching and learning process	
6. measuring student progress on a regular basis (Progress Monitoring)	
7. Simplifying the language, repeating ambiguous words and clarifying meanings	
8. Helping students to realize that making mistakes is part of the learning process	
9. Utilizing active learning, participation and collaboration with peers.	
10. Using a wide range of teaching and learning resources/aids to support teaching and learning	
11. Ensuring that classroom environment is welcoming to all students from all cultures	
12. Provided with Carrier guidance	
13. Provided with emotional support	
14. All of the above	
15. None of the above	
16. Others (please specify)……	

4. In what ways did the Science Foundation Programme helped you to qualify or to take up career choices in the Science related degree courses at UNAM? Was changed to:

In what ways did the Science Foundation Programme helped you to qualify or to take up career choices in the Science related degree courses at UNAM?

Ways	
1. Through carrier guidance	
2. Through lecturers	
3. Through meaningful assessment activities	
4. Others (please specify……	

- Re-word or re-scale any questions that were not answered as expected such as:

1. Which year did you complete the Science Foundation Programme, was changed to: which year did you complete the SFP? (Tick one box).

Year	
2005	
2006	
2007	
2008	
2009	
2010	
2011	
2012	
2013	
2014	
2015	

2. Give the name of the tertiary institution where you completed your studies upon completion of the SFP, was changed to: Give the name of the tertiary institution where you completed your further studies upon completion of the SFP.

3. Which course of study did you enroll for at that particular tertiary institution and which year did you finish?

Course of study enrolled for	**Year of completion**

Was changed and divided into three questions as follows:

Which course of study did you enrol for at that particular tertiary institution?

Plus

Have you completed your further studies at that particular tertiary institution? (Tick one box).

1. Completed	
2. Still studying	
3. Dropped out	

And If you have completed, which year did you complete your further studies?

4. Comment on the teaching strategies that were being used in the SFP, was changed to:

   Which of the science teaching and learning strategies do you think were being used in the SFP (Tick applicable box [es])?

5. Do you think the SFP was effective in preparing you for science related courses at university? (Tick the correct box), was changed:

   To do you think the SFP was effective in preparing you for Science related courses at university? (Tick one box).

Type of science teaching and learning used in the SFP	
1. Learner centred teaching strategies	
2. Lecturer centred teaching strategies	
3. Problem based learning (PBL) strategies	
4. Discussion strategies	
5. Experiential learning (learning by doing) strategies	
6. Simulations (enhanced context strategies) strategies	
7. Inquiry guided learning strategies	
8. Team- based learning (TBL) strategies	
9. Questioning strategies	
10. Manipulation strategies	
11. Collaborative/cooperative learning	
12. All of the above	
13. Others (please specify) ……	

. Comment on the teaching strategies that were being used in the SFP, was changed to:

Comment on the effectiveness of the Science teaching and learning strategies that were used in the SFP. (Tick one box).

Very effective	
Effective	
Not effective	

What kind of support did you receive from the Science Foundation Programme staff members if any in relation to teaching and learning was changed:

To what kind of support did you receive from the Science Foundation Programme staff members if any in relation to teaching and learning (Tick applicable box[es])?

Kind of support received from the SFP staff in relation to teaching and learning.	
1. Study materials for all subjects were provided	
2. 'scaffolding' support (individual instructional modifications)	
3. corrective feedback and encouragement	
4. lots of opportunities to drill and practice to strengthen ones skills	
5. Engaging students in the teaching and learning process	
6. measuring student progress on a regular basis (Progress Monitoring)	
7. Simplifying the language, repeating ambiguous words and clarifying meanings	
8. Helping students to realize that making mistakes is part of the learning process	
9. Utilizing active learning, participation and collaboration with peers.	
10. Using a wide range of teaching and learning resources/aids to support teaching and learning	
11. Ensuring that classroom environment is welcoming to all students from all cultures	
12. Provided with Carrier guidance	
13. Provided with emotional support	
14. All of the above	
15. None of the above	
16. Others (please specify).....	

9. Do you think the science Foundation Programme should continue as it is, or do you think it should be changed? (Tick the correct box).

Yes	
No	

[i] If yes explain why.

[ii] If no explain what needs to be changed on the Science Foundation Programme,

Was changed to:

Do you think the Science Foundation Programme should continue as it is? (Tick one box).

1. SFP should Continue as it is	
2. SFP Should be changed	

[i] Explain your response

10. In what ways did the Science Foundation Programme helped you to qualify or to take up career choices in the Science related degree courses at UNAM?

Was changed to:

In what ways did the Science Foundation Programme helped you to qualify or to take up career choices in the Science related degree courses at UNAM?

Ways	
5. Through carrier guidance	
6. Through lecturers	
7. Through meaningful assessment activities	
8. Others (please specify……	

- Adding Likert type questions to make the questionnaires more interesting and easy for the students to answer. The Likert questions added were such as:

1. Have you completed your further studies at that particular tertiary institution? (Tick one box).

1. Completed	
2. Still studying	
3. Dropped out	

2. Which of the teaching and learning strategies do you think were being used in the SFP (Tick applicable box [es])?

Type of science teaching and learning used in the SFP	
14. Learner centred teaching strategies	
15. Lecturer centred teaching strategies	
16. Problem based learning (PBL) strategies	
17. Discussion strategies	
18. Experiential learning (learning by doing) strategies	
19. Simulations (enhanced context strategies) strategies	
20. Inquiry guided learning strategies	
21. Team- based learning (TBL) strategies	
22. Questioning strategies	
23. Manipulation strategies	
24. Collaborative/cooperative learning	
25. All of the above	
26. Others (please specify)	

3. Comment on the effectiveness of the teaching and learning strategies that were used in the SFP. (Tick one box).

Very effective	
Effective	
Not effective	

4. Do you think the Science Foundation Programme was effective in preparing you for Science related courses at UNAM? (Tick one box).

1. Strongly agree	
2. Agree	
3. Disagree	
4. Strongly disagree	

5. What kind of support did you receive from the Science Foundation Programme staff members if any in relation to teaching and learning (Tick applicable box[es])?

Kind of support received from the SFP staff in relation to teaching and learning.	
1. Study materials for all subjects were provided	
2. 'scaffolding' support (individual instructional modifications)	
3. corrective feedback and encouragement	
4. lots of opportunities to drill and practice to strengthen ones skills	
5. Engaging students in the teaching and learning process	
6. measuring student progress on a regular basis (Progress Monitoring)	
7. Simplifying the language, repeating ambiguous words and clarifying meanings	
8. Helping students to realize that making mistakes is part of the learning process	
9. Utilizing active learning, participation and collaboration with peers.	
10. Using a wide range of teaching and learning resources/aids to support teaching and learning	
11. Ensuring that classroom environment is welcoming to all students from all cultures	
12. Provided with Carrier guidance	
13. Provided with emotional support	
14. All of the above	
15. None of the above	
16. Others (please specify).....	

6. Do you think the Science Foundation Programme is meeting its goals and mission of preparing students to take up further studies in the science related courses at UNAM? (Tick one box).

1. Strongly agree	
2. Agree	
3. Disagree	
4. Strongly disagree	

Do you think the Science Foundation Programme should continue as it is?

1. SFP should Continue as it is	
2. SFP Should be changed	

7. In what ways did the Science Foundation Programme helped you to qualify or to take up career choices in the Science related degree courses at UNAM?

Ways	
1. Through carrier guidance	
2. Through lecturers	
3. Through meaningful assessment activities	
4. Others (please specify.....	

APPENDIX 6: Questionnaire for students admitted for further studies plus those that were not admitted for further studies.

Instructions

This questionnaire is designed with the aim of investigating the effectiveness of the university of Namibia Oshakati Campus Science Foundation Programme in preparing students for degree programmes. The information to be collected from these questions will be used to understand how effective the Science Foundation Programme at Oshakati campus is in preparing students to take up further studies in the science fields. Your honest responses will help in improving the Science Foundation Programme which in the long run will contribute to broadening access to science related degrees for all students.

Please do not write your name on any part of this questionnaire. The information collected from this questionnaire will be kept confidential. It will be used for this study only.

Thank you or your answers which will contribute towards increasing the number of qualified science and technology graduates for Namibia's growing economy.

Ms L. L. T Nghipandulwa

SECTION A: DEMOGRAPHIC INFORMATION

A1. What is your gender? (Tick the correct box).

Male	
Female	

A2. Indicate the name of the region where you completed your secondary education (Tick the correct box).

Name of Region	
Oshana	
Oshikoto	
Omusati	
Ohangwena	
Kunene	
Omaheke	
Otjozondjupa	
Khomas	
Zambezi	
Erongo	
Kavango West	
Kavango East	

Hardap	
IIKaras Region	

A3. How many points did you obtain from Grade 12?

.....

A4. Which year did you complete the Science Foundation Programme? (Tick the correct box).

Year	
2005	
2006	
2007	
2008	
2009	
2010	
2011	

2012	
2013	
2014	
2015	

A5. Did you enrol at any tertiary institution after completing the SFP (Tick the correct box)?

Yes	
No	

[i]. [a] If your answer to **A3** is yes, give the name of the tertiary institution that you got enrolled at after completing the SFP?

.....

[b] Which course of study have you enrolled for at that tertiary institution and in which year of study are you currently in?

Course of study	**Year of study**

[ii]. [a] If your answer to **A3** is no, specify why you did not enrol at any tertiary institution?

.....

.....

[b] If you did not enrol at any tertiary institution, what are you currently doing or what did you do upon completing the SFP?

.....

SECTION B: EXPERIENCES AND PERCEPTIONS OF THE FORMER SFP STUDENTS' REGARDING THE SFP IN PREPARING STUDENTS FOR UNIVERSITY EDUCATION

B1. Did you successfully complete the SFP (with an average of 60% or above)? (Tick the correct box).

Yes	
No	

[i] If no, explain what prevented you from successfully completing the SFP with an average of 60% and above.

.....

.....

[ii] If yes, explain what helped you most to successfully complete the SFP.

.....

.....

B2. Comment on the Science teaching and learning strategies that were being used in the SFP

(i) Which of the science teaching and learning strategies do you think are being used in the SFP (Tick in the correct box or boxes)?

Type of science teaching and learning used in the SFP	
Learner centred teaching strategies	
Lecturer centred teaching strategies	
Problem based learning (PBL) strategies	
Discussion strategies	
Experiential learning (learning by doing) strategies	
Simulations (enhanced context strategies) strategies	
Inquiry guided learning strategies	
Team- based learning (TBL) strategies	

Questioning strategies	
Manipulation strategies	
Collaborative/cooperative learning	
All of the above	
Others (please specify)	

(ii) What did you like most about the science teaching and learning strategies that were being used during your time at SFP?

.....

.....

(iii) What did you least like about those science teaching and learning strategies that were being used during your time at SFP?

.....

.....

B3. Do you think the Science Foundation Programme was effective in preparing you for Science related courses at Tertiary institutions? (Tick the correct box).

Strongly agree	
Agree	
Disagree	
Strongly disagree	

[i] Justify your choice of answer above.

.....

.....

B4. What kind of support did you receive from the Science Foundation Programme staff members if any, in relation to your studies (Tick in the correct box or boxes)?

Kind of support received from the SFP staff in relation your studies.	
Study materials for all subjects were provided	
'scaffolding' support (individual instructional modifications)	

corrective feedback and encouragement	
lots of opportunities to drill and practice to strengthen ones skills	
Engaging students in the teaching and learning process	
measuring student progress on a regular basis (Progress Monitoring)	
Simplifying the language, repeating ambiguous words and clarifying meanings	
Helping students to realize that making mistakes is part of the learning process	
Utilizing active learning, participation and collaboration with peers.	
Using a wide range of teaching and learning resources/aids to support teaching and learning	
Ensuring that classroom environment is welcoming to all students from all cultures	
Provided with Carrier guidance	

Provided with emotional support	
All of the above	
None of the above	
Others (please specify).....	

B5. What did you like **most** about the Science Foundation Programme at Oshakati Campus?

.....

.....

.....

B6. What did you like least about the Science Foundation Programme at Oshakati Campus?

.....

.....

.....

.....

B7. To what extend do you think you have benefited from the Science Foundation Programme at Oshakati Campus?

.....

.....

.....

SECTION C: HOW EFFECTIVE IS THE SFP IN PREPARING STUDENTS TO TAKE UP FURTHER STUDIES IN THE SCIENCE FIELDS

C1. Do you think the Science Foundation Programme has prepared you well for further studies in the science related courses at UNAM? (Tick the correct box).

Strongly agree	
Agree	
Disagree	
Strongly disagree	

[i] Explain your response

.....

.....

C2. Do you think the Science Foundation Programme should continue as it is, or do you think it should be changed? (Tick the correct box).

SFP should Continue as it is	
SFP Should be changed	

[i] Explain your response.

.....

.....

.....

C3. In what ways did the Science Foundation Programme helped you to qualify for the Science related degree courses at UNAM?

Ways	
Through carrier guidance	
Through lecturers	
Through meaningful assessment activities	

Others (please specify.....	

C4. Any suggestions on how best the Science Foundation Programme can effectively prepare students to take up further studies in the Science related fields?

.....

.....

.....

C5. Comment on how effective the Science Foundation Programme was in preparing you to take up further studies in the science related fields?

.....

.....

.....

.....

C6. Do you like the way the Science Foundation Programme was organised or run at Oshakati Campus? (Tick the correct box).

Yes	
No	

[i] Justify your answer.

.....

.....

C7. Any other general comments you would like to make about the Science Foundation Programme at Oshakati campus?

.....

.....

.....

Thank you for your help.

APPENDIX 7: Tertiary graduates' questionnaire

Instructions

This questionnaire is designed with the aim of investigating the effectiveness of the university of Namibia Oshakati Campus Science Foundation Programme in preparing students for degree programmes. The information to be collected from these questions will be used to understand how effective the Science Foundation Programme at Oshakati campus is in preparing students to take up further studies in the science fields. Your honest responses will help in improving the Science Foundation Programme which in the long run will contribute to broadening access to science related degrees for all students.

Please do not write your name on any part of this questionnaire. The information collected from this questionnaire will be kept confidential. It will be used for this study only.

Thank you for your answers which will contribute towards increasing the number of qualified science and technology graduates for Namibia's growing economy.

Ms L. L. T Nghipandulwa

SECTION A: DEMOGRAPHIC INFORMATION

A1. What is your gender? (Tick the correct box)

Male	
Female	

A2. Indicate the name of the region where you completed your secondary education (Tick the correct box).

Name of Region	
Oshana	
Oshikoto	
Omusati	
Ohangwena	
Kunene	
Omaheke	
Otjozondjupa	

Khomas	
Zambezi	
Erongo	
Kavango West	
Kavango East	
Hardap	
IIKaras Region	

A3. How many points did you obtain from Grade 12?

.....

A4. Which year did you complete the Science Foundation Programme? (Tick the correct box).

Year	
2005	
2006	
2007	

2008	
2009	
2010	
2011	
2012	
2013	
2014	
2015	

A3. Give the name of the tertiary institution where you completed your studies upon completion of the SFP

.....
...

A4. Which course of study did you enrol for at that particular tertiary institution and which year did you finish?

Course of study enrolled for	**Year of completion**

A5. Are you currently employed (Tick the correct box)?

Yes	

No	

[i] if yes, what kind of job are you doing?

.....

[ii] If no, what are you doing?

.....

SECTION B: GENERAL QUESTIONS ON THE EXPERIENCES AND PERCEPTIONS OF THE FORMER SFP STUDENTS' REGARDING THE SFP IN PREPARING STUDENTS FOR UNIVERSITY EDUCATION.

B1. Did you successfully complete the SFP (with an average of 60% or above)? (Tick the correct box).

Yes	
No	

[i] If no, explain what prevented you from successfully completing the SFP with an average of 60% and above?

.....

.....

[ii] If yes explain what helped you most to successfully complete the SFP?

.....

.....

B2. Comment on the Science teaching and learning strategies that were being used in the SFP.

(i) Which of the science teaching and learning strategies do you think are being used in the SFP (Tick in the correct box or boxes)?

Type of science teaching and learning used in the SFP	
Learner centred teaching strategies	
Lecturer centred teaching strategies	
Problem based learning (PBL) strategies	
Discussion strategies	
Experiential learning (learning by doing) strategies	
Simulations (enhanced context strategies) strategies	
Inquiry guided learning strategies	
Team- based learning (TBL) strategies	

Questioning strategies	
Manipulation strategies	
Collaborative/cooperative learning	
All of the above	
Others (please specify)	

(ii) What did you like most about the science teaching and learning strategies that were being used during your time at SFP?

.....

.....

(iv) What did you least like about those science teaching and learning strategies that were being used during your time at SFP?

.....

.....

B3. Do you think the Science Foundation Programme was effective in preparing you for Science related courses at university? (Tick the correct box).

[i]

Strongly agree	
Agree	
Disagree	
Strongly disagree	

Justify your choice of answer above.

.....

.....

B4. What kind of support did you receive from the Science Foundation Programme staff members if any in relation to teaching and learning (Tick in the correct box or boxes)?

Kind of support received from the SFP staff in relation to teaching and learning.	
Study materials for all subjects were provided	
'scaffolding' support (individual instructional modifications)	
corrective feedback and encouragement	
lots of opportunities to drill and practice to strengthen ones skills	
Engaging students in the teaching and learning process	
measuring student progress on a regular basis (Progress Monitoring)	

Simplifying the language, repeating ambiguous words and clarifying meanings	
Helping students to realize that making mistakes is part of the learning process	
Utilizing active learning, participation and collaboration with peers.	
Using a wide range of teaching and learning resources/aids to support teaching and learning	
Ensuring that classroom environment is welcoming to all students from all cultures	
Provided with Carrier guidance	
Provided with emotional support	
All of the above	
None of the above	
Others (please specify).....	

B5. What did you like **most** about the Science Foundation Programme at Oshakati Campus?

.....

.....

.....

B6. What did you like **least** about the Science Foundation Programme at Oshakati Campus?

.....

.....

.....

B7. How do you think you have benefited from the Science Foundation Programme at Oshakati Campus?

.....

.....

SECTION C: GENERAL QUESTIONS TO DETERMINE HOW EFFECTIVE THE SFP IS IN PREPARING STUDENTS TO TAKE UP FURTHER STUDIES IN THE SCIENCE FIELDS

C1. Do you think the Science Foundation Programme is meeting its goals and mission of preparing students to take up further studies in the science related courses UNAM? (Tick the correct box).

Strongly agree	
Agree	
Disagree	
Strongly disagree	

[i] Justify your choice of answer above.

.....

.....

C2. Do you think the Science Foundation Programme should continue as it is, or do you think it should be changed? (Tick the correct box).

SFP should Continue as it is	
SFP Should be changed	

[i] Explain your response

.....

.....

C3. In what ways did the Science Foundation Programme helped you to qualify or to take up career choices in the Science related degree courses at UNAM?

Ways	
Through carrier guidance	
Through lecturers	
Through meaningful assessment activities	
Others (please specify.....	

C4. Any suggestions on how best the Science Foundation Programme can effectively prepare students to take up further studies in the Science related Fields?

.....

.....

C5. Comment on the effectiveness of the Science Foundation programme in preparing students to take up further studies in the science related fields?

.....

.....

.....

C6. Do you like the way the Science Foundation Programme was being organised or run at Oshakati Campus? (Tick the correct box).

Yes	
No	

[i] Justify your answer.

.....

.....

C7. Any other general comments you would like to make about the effectiveness of the Science Foundation Programme in preparing students for degree programmes?

.....

Thank you for your help.

APPENDIX 8: Interview guide for the Science Foundation lecturers

Date of interview_____

Venue_____

Introductory statement

Thank you for allowing me time to carry out this interview with you. The purpose of this study is to investigate the effectiveness of the University of Namibia Oshakati Campus Science Foundation Programme in preparing students for degree programmes. The information to be collected from this interview will be used to understand whether the Science Foundation Programme at Oshakati campus is meeting its goals and mission of preparing students to take up further studies in the science fields. Your honest responses will not only inform the study but will also help in improving the Science Foundation Programme which in the long run will contribute to broadening access to science related degrees for all students.

The information that is going to be collected will be treated with utmost confidentiality and anonymity. The information will only be used for the purpose of this study and your identity will not be revealed in this study. I should be most grateful if you could kindly grant me permission to audio record the interview proceedings, so that I can concentrate on our discussions now. Please answer the questions as honestly as you can to facilitate accurate findings for this study.

Thank you for your answers which will contribute towards increasing the number of qualified science and technology graduates for Namibia.

SECTION A: DEMOGRAPHIC INFORMATION

1. Are you male or female? .....

2. Which subject/s do you teach in the Science Foundation programme?

   Notes.....

3. How long have you been teaching in the Science Foundation Programme?

   Notes.....

4. How many students do you usually have in your SFP classroom each and every year for the period you have taught in the SFP?

   Notes.....

SECTION B: THE LECTURERS' EXPERIENCES AND PERCEPTIONS OF THE SFP IN PREPARING THE STUDENTS FOR UNIVERSITY EDUCATION

1. What average percentage does the student need to obtain in order to successfully complete SFP?

   Notes.....

   .....

2. **[i]** For the time (duration) that you have been teaching in the SFP what can you say about your teaching success rate?

Excellent	
Above average	

Average	
Below average	

[ii] Can you justify your choice of the answer to 2 [i].

Notes.....

.....

3. **[i]** What kind of teaching strategies do you use in the teaching of your specific subject in the SFP?

Notes.....

.....

[ii] Justify your choice of the teaching strategies specified above?

Notes.....

.....

4. What kind of support do you usually give to your students (if any) in relation to teaching and learning in the SFP?

Notes.....

.....

5. What do you like **most** about teaching in the Science Foundation Programme at Oshakati Campus?

Notes.....

.....

6. In your view, what are the shortcomings of the SFP in relation to teaching in the Science Foundation Programme at Oshakati Campus?

Notes.....

.....

7. In your view how have students benefited from the Science Foundation Programme at Oshakati Campus for the period that you have been teaching in the SFP?

Notes.....

.....

SECTION C: EFFECTIVENESS OF THE SFP IS IN PREPARING STUDENTS TO TAKE UP FURTHER STUDIES IN THE SCIENCE FIELDS

1. To what extent do you think the Science Foundation Programme is meeting its mandate of preparing students to take up further studies in the science related courses at UNAM?

Notes.....

.....

2. **[i]** To what extent do you believe the Science Foundation Programme effectively prepares students for Science related courses at university?

Notes.....

.....

[ii] Please justify your answer?

Notes.....

.....

3. In your opinion, in what ways do you think the Science Foundation Programme helps in preparing students for Science related degree courses at UNAM?

Notes.....

.....

.....

4. In your opinion, do you think the teaching and learning in the Science Foundation Programme should continue as it is? Yes/No

5. What aspects should be changed?

Notes.....

.....

6. How effective is the Science Foundation programme in preparing students to take up further studies in the science related fields?

Notes.....

.....

.....

7. What suggestions do you have on how the Science Foundation Programme can be improved to effectively prepare students for further studies in Science related fields?

Notes.....

.....

.....

8. What are your comments regarding the way the Science Foundation Programme is being organised and run at Oshakati Campus?

Notes.....

.....

9. Any other comments that you would like to make about the effectiveness of the Science Foundation Programme in preparing students for Science related degree programmes?

Notes.....

.....

.....

SECTION D: THE TEACHING MODEL BEING USED IN THE SFP

1. What specific teaching model(s) do you follow in the teaching of the SFP students?

Notes.....

.....

1. Briefly describe the teaching model(s) that you are using in the teaching of the SFP students.

   .....

   .....

2. In your view, how effective is that teaching model(s) in the teaching of the SFP students?

   Notes.....

   .....

2. Is there anything else that you would like to add for this interview?

   Notes.....

   .....

Thank you for your answers which will contribute towards increasing the number of qualified science and technology graduates for Namibia.

APPENDIX 9: Consent letter for the SFP students

INFORMATION SHEET AND AN INFORMED CONSENT FORM TO PARTICIPATE IN RESEARCH FOR THEFORMER SFP STUDENTS

THE EFFECTIVENESS OF THE UNIVERSITY OF NAMIBIA OSHAKATI CAMPUS SCIENCE FOUNDATION PROGRAMME IN PREPARING STUDENTS FOR DEGREE PROGRAMMES

1. INTRODUCTION

You are being invited to participate in a research study conducted by Ms Leena Lahja T Nghipandulwa from the department of Mathematics and Science Education at the University of Namibia. The results of this study will be used to compile a thesis for my Doctoral studies. You were selected as a possible participant in this study because the study targets to use the former Science Foundation students and you are part of them. In order to ensure that you are informed about the study, I am asking you to read this information sheet carefully. The content of this sheet will also be explained to you verbally. If you agree to take part in the study, you will be asked to sign the attached consent and return it to the researcher.

2. PURPOSE OF THE STUDY

APPENDIX 9: Consent letter for the SFP students

UNAM
Inspiring minds & shaping the future

INFORMATION SHEET AND AN INFORMED CONSENT FORM TO PARTICIPATE IN RESEARCH FOR THEFORMER SFP STUDENTS

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1. INTRODUCTION

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2. PURPOSE OF THE STUDY

The study purports to assess the effectiveness of the Science Foundation Programme in preparing students for degree programmes, at Oshakati campus from 2005 to 2015. In addition, this study will seek to determine the extent to which the Programme is achieving its stated objectives of widening access, equity and equality to higher education especially by previously disadvantaged and/or marginalized groups by giving them an opportunity to enroll in science-related degree programmes at UNAM.

3. PROCEDURES

If you agree and volunteer to participate in this study, i would ask you to complete an individual questionnaire with both open ended and closed ended questions. The questionnaire will be hand delivered and/or sent via e-mail to you.

4. BENEFITS

There is no financial compensation or any other personal benefits by participating in this research study. However, your responses may assist in informing the University management about the shortcomings of the SFP which might need to be overcome by the university in order to improve the SFP, i.e. deciding whether to re-design the SFP or to keep it as it is.

5. POTENTIAL RISKS AND DISCOMFORTS

There are no envisaged physical or psychological potential risks in this study.

6. CONFIDENTIALITY

All information gathered from the study will remain confidential. Your identity as a participant will not be disclosed to any person. Only the researcher will have access to the research materials, which will be kept in a locked cabinet as well as in a password-locked personal computer. In order to protect your identity, the documents of raw data which may contain your personal information, will be disposed of 5 years after the completion of the study. This will

be done by deleting soft copies from the computer and by shredding all hard copies, upon completion of the study. In addition, your name will not be used in the dissertation or any other documents in the public domain, arising from this study. The information collected in this study might only be made available to the University of Namibia in its capacity as the institution of study by the researcher. The information collected in this study might also be used to publish articles in journals as well as be presented as papers at conferences. This will be done should it be deemed necessary by the University of Namibia.

7. PARTICIPATION AND WITHDRAWAL

Participation in this study is voluntary; refusal to participate will involve no penalty. If you volunteer to be in this study, you may withdraw at any time without prejudice and consequences of any kind. You may also refuse to answer certain questions should you not feel comfortable answering but still want to remain in the study.

8. COSTS AND /OR PAYMENTS TO SUBJECTS FOR PARTICIPATION IN RESEARCH.

There will be no costs for participating in the research. Participants will not be paid to participate in this research project.

9. CONTACT PERSON FOR QUESTIONS.

If you have any questions about the study in general, your rights as a participant in this study or any problems with the study, you may contact **Ms Leena LT Nghipandulwa** at the following telephone number: **(065) 2232287 or 0812786099** or email to lnghipandulwa@unam.na.

If you agree to take part in the study, please sign the written consent form below and return it to the researcher.

CONSENT TO PARTICIPATE IN THE STUDY

I, the undersigned confirm that I have read and understood the research study statement as explained to me in both writing and verbally and have had the opportunity to ask questions.

I agree that I understand the nature, purpose and all benefits of this research study. I agree that I understand that my participation is voluntary and that I am free to withdraw from the research study at any time with no penalty and without giving reasons especially if I do not feel comfortable continuing to participate. I understand that any information I provide is confidential.

I understand that anonymity will be ensured in the write-up by disguising my identity. I therefore agree to participate as a volunteer in this study and also give permission to quotation/publication of extracts from my responses.

_____ _____

Date Signature of the participant

_____ _____

Date Signature of researcher

APPENDIX 10: Consent letter for the SFP lecturers

INFORMATION SHEET AND AN INFORMED CONSENT FORM TO PARTICIPATE IN RESEARCH FOR SFP LECTURERS

THE EFFECTIVENESS OF THE UNIVERSITY OF NAMIBIA OSHAKATI CAMPUS SCIENCE FOUNDATION PROGRAMME IN PREPARING STUDENTS FOR DEGREE PROGRAMMES

INFORMATION SHEET

1. INTRODUCTION

You are being invited to participate in a research study conducted by Ms Leena Lahja T Nghipandulwa from the department of Mathematics and Science Education at the University of Namibia. The results of this study will be used to compile a thesis for my Doctoral studies. You were selected as a possible participant in this study because the study targets to use all the Science Foundation Program (SFP) lecturers as well as the former Science Foundation students and you are part of them. In order to ensure that you are informed about the study, I am asking you to read this information sheet carefully. The content of this sheet will also be explained to

you verbally. If you agree to take part in the study, you will be asked to sign the attached consent and return it to the researcher.

2. PURPOSE OF THE STUDY

The study purports to assess the effectiveness of the Science Foundation Programme in preparing students for degree programmes, at Oshakati campus from 2005 to 2015. In addition, this study will seek to determine the extent to which the Programme is achieving its stated objectives of widening access, equity and equality to higher education especially by previously disadvantaged and/or marginalized groups by giving them an opportunity to enroll in science-related degree programmes at UNAM.

3. PROCEDURES

If you agree and volunteer to participate in this study you will be interviewed individually. I will request permission from you to tape record the interview proceedings, so that I can concentrate on our discussion at that moment and come to write it out later. The interview will last for about 30 minutes in length.

4. BENEFITS

There is no financial compensation or any other personal benefits by participating in this research study. However, your responses may assist in informing the University management about the shortcomings of the SFP which might need to be overcome by the university in order to improve the SFP, i.e. deciding whether to re-design the SFP or to keep it as it is.

5. POTENTIAL RISKS AND DISCOMFORTS

There are no envisaged physical or psychological potential risks in this study.

6. CONFIDENTIALITY

All information gathered from the study will remain confidential. Your identity as a participant will not be disclosed to any person. Only the researcher and the immediate supervisors of the study will have access to the research materials, which will be kept in a locked cabinet as well as in a password-locked personal computer. In order to protect your identity, the documents of raw data which may contain your personal information, will be disposed of 5 years after the completion of the study. This will be done by deleting soft copies from the computer and by shredding all hard copies, upon completion of the study. Audiotapes will be erased at the completion of the study and only transcribed interviews will be kept. In addition, your name will not be used in the dissertation or any other documents in the public domain, arising from this study.

The information collected in this study might only be made available to the University of Namibia in its capacity as the institution of study by the researcher. The information collected in this study might also be used to publish articles in journals as well as be presented as papers at conferences. This will be done should it be deemed necessary by the University of Namibia.

7. PARTICIPATION AND WITHDRAWAL

Participation in this study is voluntary; refusal to participate will involve no penalty. If you volunteer to be in this study, you may withdraw at any time without prejudice and consequences of any kind. You may also refuse to answer certain questions should you not feel comfortable answering but still want to remain in the study.

8. COSTS AND /OR PAYMENTS TO SUBJECTS FOR PARTICIPATION IN RESEARCH

There will be no costs for participating in the research. Participants will not be paid to participate in this research project.

9. CONTACT PERSON FOR ADDITIONAL INFORMATION

If you have any questions about the study in general, your rights as a participant in this study or any problems with the study, you may contact **Ms Leena LT Nghipandulwa** at the following telephone number: **(065) 2232287 or 0812786099** or email to lnghipandulwa@unam.na.

If you agree to take part in the study, please sign the written consent form below and return it to the researcher.

CONSENT TO PARTICIPATE IN THE STUDY

I, the undersigned confirm that I have read and understood the research study statement as explained to me in both writing and verbally and have had the opportunity to ask questions.

I agree that I understand the nature, purpose and all benefits of this research study. I agree that I understand that my participation is voluntary and that I am free to withdraw from the research study at any time with no penalty and without giving reasons especially if I do not feel comfortable continuing to participate. I understand that any information I provide is confidential.

I therefore give permission for my interview to be Audio-recorded. I understand that anonymity will be ensured in the write-up by disguising my identity. I agree to participate as a volunteer in this study and also give permission to quotation/publication of extracts from my interview.

_____ _____

Date Signature of the participant

_____ _____

Date Signature of researcher

APPENDIX 11: Permission request letter for UNAM PVC

PERMISSION REQUEST LETTER TO THE UNAM PVC

University of Namibia Oshakati campus

P. O Box 15346

Oshakati

lnghipandulwa@unam.na.

12 December 2016

The Pro-Vice Chancellor (Academic Affairs and Research)

University of Namibia

Windhoek

Dear Sir/madam

Ref: Request for permission to do a research study

I am Leena Lahja T Nghipandulwa, a member of the lecturing staff based at Oshakati Campus lecturing in the Science Foundation Programme. I am registered as a PHD candidate at the University of Namibia undertaking a PHD in Science Education. My student number is **9969128**. I am requesting permission to conduct a research study on the Science Foundation Programme which is located at UNAM Oshakati Campus.

The study is in partial fulfillment of the requirement for the degree.

The topic of my study is:

The effectiveness of the University of Namibia Oshakati Campus Science Foundation Programme in preparing students for degree programmes.

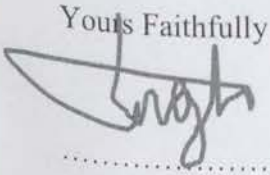
This study will seek to assess the effectiveness of the Science Foundation Programme in preparing students for degree programmes, at Oshakati campus from 2005 to 2015. In addition, this study will seek to determine the extent to which the Programme is achieving its stated objectives of widening access, equity and equality to higher education especially by previously disadvantaged and/or marginalized groups by giving them an opportunity to enroll in science-related degree programmes at UNAM. The study which will utilize a mixed method approach, i.e. qualitative and quantitative paradigms, will focus on the students who have done the Science Foundation Programme at Oshakati campus from 2005 to 2015 and on all the current SFP lecturers at Oshakati campus.

The findings of this study might inform the University of Namibia in determining whether the SFP is achieving what it was intended to achieve or not. The findings might further inform the University management about the shortcomings of the current programme which might need to be overcome by the university in order to improve the programme, i.e. to re-design the SFP or to keep it as it is. The findings of this study might also enable the University management to arrive at decisions that will help the SFP to be more effective and efficient. The overall goal is to come up with the educational teaching model that can be used in the SFP to effectively prepare students for further studies.

There will be no interruptions during the lessons. The preferable date for the study is on the 1st February 2017 to the 30th of May 2017.

Thank you in advance

Yours Faithfully



.....

Leena LT Nghipandulwa

APPENDIX 12: Permission request letter for UNAM Registrar

PERMISSION REQUEST LETTER TO THE UNAM REGISTRAR TO ACCESS INFORMATION ON STUDENT RECORDS

University of Namibia Oshakati campus

P. O Box 15346

Oshakati

lnghipandulwa@unam.na.

12 December 2016

The Registrar

University of Namibia

Windhoek

Dear Sir/madam

Ref: Request for permission to access information on student records.

I am Leena Lahja T Nghipandulwa, a member of the lecturing staff based at Oshakati Campus lecturing in the Science Foundation Programme. I am registered as a PHD candidate at the University of Namibia undertaking a PHD in Science Education. My student number is **9969128**. The topic of my study is:

The effectiveness of the University of Namibia Oshakati Campus Science Foundation Programme in preparing students for degree programmes

I am therefore requesting permission to access information on the SFP student records. The students, whose records are required, are the former SFP students who went through the UNAM SFP from 2005 up to 2015 at Oshakati campus.

I would like to analyze the University Integrated Tertiary System (ITS) Database to extract student data in order to find out how many former SFP students have registered for which degree courses and also to find out the performance of these students in their courses of study at UNAM.

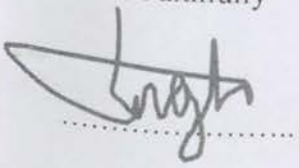
Data mining techniques will be used to extract data from the University ITS Database using Oracle 9i software. From the database, the student marks for all subjects, contact details and information about graduation will be extracted in order to find out about the performance of

the SFP graduates in the 1st year, 2nd year, 3rd year and 4th year of the degree programmes at UNAM.

The preferable date for the study is on the 1st February 2017 to the 30th of May 2017. Attached please find the instrument (University Integrated Tertiary system (ITS) Database checklist) to be used for collecting data from the database.

Thank you in advance

Yours Faithfully



Leena LT Nghipandulwa