

# Investigating the Performance of the SFP Graduates in Their 1<sup>st</sup> Year of the Degree Programmes at UNAM from 2005 to 2016

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## Abstract

This descriptive quantitative study investigated the performance of the Science Foundation Programme (SFP) graduates in their 1<sup>st</sup> year of the degree programmes at the University of Namibia (UNAM) from 2005 to 2016. The population of the study consisted of 1298 all the former students who went through the SFP from 2005 to 2016 at the Oshakati campus and a sample of 100 ( $n = 100$ ) students was randomly selected from the population ( $N = 1298$ ). The researchers analysed the University Integrated Tertiary System (ITS) database to extract students' records 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. The findings of the study showed that since the establishment of the SFP in 2005 at the Oshakati campus in 2005, the SFP has been growing and attracting more students within Namibia. The findings also indicated that the SFP was meeting its mandate and achieving its goal and objectives of preparing students for the first year of their studies at tertiary institutions because each year, more students have passed their 1<sup>st</sup> year and have progressed into their second year of studies at UNAM. The study recommended that 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.

## Keywords

Science Foundation Programme, Science Related Courses, Tertiary Institutions, University of Namibia, Performance

## 1. Introduction

As in most African countries, formal education in Namibia prior to indepen-

dence was limited and segregated in the sense that it was based on ethnic, racial and tribal lines (Ministry of Education and Culture [MEC], 1993). Hence, after independence the University of Namibia (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 previously disadvantaged communities, especially in the science-related fields that used to be only for the elite (Chirimbana, 2014). In 2005, UNAM's Senate approved the implementation of the Science Foundation Programme (SFP) at its Oshakati campus. 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, in which students enrol for five compulsory examinable subjects: English, Mathematics, Biology, Chemistry, and Physics (Chirimbana, 2014, p. 20). 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 main aim of the SFP is to prepare students for the first year of their studies at tertiary institutions and the admission criteria are a minimum of 22 points in the best five NSSC subjects or an equivalent Grade 12 qualification. On completion of the foundation programme, students can then enrol in mathematics and science-related fields at UNAM. The minimum pass for a SFP student to be admitted to a UNAM degree programme is a 60% (C) average score (University of Namibia, 2016). Since the introduction of the SFP at UNAM Oshakati campus in 2005, no study has been carried out to evaluate how the former SFP students perform in their first year of studies at UNAM; hence the need to carry out this study. The main rationale of this study was to evaluate the effectiveness of the foundation programme by assessing students' performance especially the progress in the first year of study in the main programmes. Hence, the following research objective was addressed: To investigate the performance of the SFP graduates in their 1<sup>st</sup> year of the degree programmes at UNAM from 2005 to 2016.

## 2. Theoretical Framework

This study was 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 also 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. The theory 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). According to Funnel and Rogers (2011), a programme evaluation generates information about programme effectiveness and how to improve programmes; programme evaluation supports evidence-informed decision-making. Hence, for the scope of this study, the programme evaluation theory was used to gain information that may inform the stakeholders responsible for the establishment of the SFP at the UNAM Oshakati campus. The interest was in learning how these students were performing in their first year of studies at UNAM. In this study, the programme evaluation theory was also used to determine the extent to which the SFP was achieving its stated objectives of widening access, equity and equality to higher education; especially for the previously disadvantaged and/or marginalised groups by preparing them for the first year of their studies in science-related degree programmes at UNAM.

### 3. Literature Review

#### 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 (Briggs, Clark, & Hall, 2012). The foundation programmes 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. These courses are useful to increase school learners’ knowledge, confidence and study skills. The SFP at the Oshakati campus of UNAM was therefore 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). Foundation programmes are defined by Kloot, Case and Marshall (2008) as academic developmental programmes meant to assist disadvantaged students and underprepared students to enrol in tertiary institutions. The term foundation emerged to describe a set of courses that attempt to lay the necessary academic foundation for tertiary education (Valencia, 2017). De Beer (2011) points out that these programmes lay a sound basis for future study thereby bridging educational gaps between teaching at high school and a university. 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 for degree courses in science at the University of Namibia.

#### 3.2. Origins of Foundation Programmes

For decades there has been a worldwide trend of broadening access to university

education. Identifying the potential for students from academically disadvantaged back-grounds to succeed in the sciences has been a crucial factor for southern African tertiary institutions (Valencia, 2017). 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 (Pal, 2017). 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. Mertens and Wilson (2012: p. 152) emphasized that “during the last decade a variety of efforts were made to address the needs of school-leavers who were not ready to enrol for higher education. A route often chosen to address the needs of this group is by way of bridging courses”. Therefore, the SFP at UNAM 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).

### 3.3. Foundation Programmes: The Namibian Perspective

The University of Namibia (UNAM) faced significant challenges including responding to the needs and demands of the disadvantaged communities, often those living in rural areas and far outlying regions (Ugwanga, 2006). The SFP was established in 2005 by the UNAM Senate after the realization that there were few graduates in science-related professions in Namibia (Ugwanga, 2006). The establishment of the SFP at UNAM aligns with social accountability and equity imperatives of tertiary institutions. It 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 Kapenda and Ngololo (2008) 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 can be 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). 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 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 (University of Namibia, 2005). The SFP was planned in such a way that students would secure admission to the first year of science degrees of their choice upon successful completion of the SFP (Chirimbana, 2014).

### 3.4. Importance of Foundation Programmes

Tertiary education institutions are often challenged with the need to widen participation, increase student diversity and improve student outcomes, including undergraduate retention and completion rates. Addressing these issues for indigenous and ethnic minority students is particularly important, given the persisting inequities in tertiary access and academic outcomes observed for these students worldwide (Grant, 2012). Ugwanga (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 excel in their selected degree programmes; this is not always done at Grade 12 level (Grant, 2012). This was one of the main objectives of this study whereby the researchers wanted to find out whether former SFP graduates were able to complete their studies on time. Often operating as alternative admission pathways, bridging/foundation programmes are increasingly being used within the context of health professional training to support the growth of an indigenous, ethnic minority health workforce (Valencia, 2017). This approach 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 (Briggs et al., 2012). Therefore, the importance of the foundation programmes cannot be undermined.

## 4. Methodology

This study adopted a quantitative research design in order to investigate the performance of the former Science Foundation Programme (SFP) students in their 1<sup>st</sup> year of the degree programmes at UNAM from 2005 to 2016. The population of this study consisted of (N = 1298) all former SFP students at the Oshakati campus. A sample of 100 was randomly extracted from the University's Integrated Tertiary System (ITS) database to provide students' data about how many former SFP students had registered for degree courses; and also to find out their performance in the courses of study at UNAM. That means, the researchers used data mining technique to extract data from ITS database using Oracle 9i software. Data mining techniques are "the practice of automatically searching large stores of data to discover patterns and trends" (Cooley, 2013: p. 21). The students' marks for all the subjects were extracted in order to find out the performance of the SFP graduates in their 1<sup>st</sup> year, of their study at UNAM. Docu-

ment analysis method was then used to analyse the data from the database. According to Platt (2010), document analysis is a process whereby documents are interpreted by a researcher to give voice and meaning around an assessment topic. Payne and Payne (2012) describe document analysis as a technique used to categorize, investigate, interpret, and identify the attributes of a certain variable. They also assert that a key advantage in conducting document analysis is that a researcher can eliminate the effect that a he or she might have on a person or situation where the research is being conducted; in other words, “the researcher’s effect”.

In this study the researchers analysed and interpreted the data using descriptive statistics. Frequency tables were used to present the results on the performance of the SFP graduates in the 1<sup>st</sup> year degree programmes at UNAM and to indicate the total number of former SFP students who were enrolled in degree programmes at UNAM. This information enabled the researchers to determine the performance of the SFP graduates in their 1<sup>st</sup> year of the degree programmes. An ethical clearance certificate was sought from, and granted by the UNAM Research Ethics Committee (UREC). This allowed the researchers to access data from UNAM’s ITS. Participants were informed about the purpose of the study and they were also given the opportunity sign to consent to accessibility of their information from the UNAM database. They were assured that the information would be treated with the utmost confidentiality by using codes on the data collection instruments.

## 5. Results

**Table 1** below shows the intake of students into the SFP from 2005 to 2016 (University of Namibia, 2016).

**Table 1.** Students 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
<b>Total</b>	<b>1298</b>

**Table 1** above shows that a total number of 1298 students went through the Science Foundation Programme at Oshakati Campus. From the table, it is also clear that the enrolment number of students has been gradually increasing on a yearly basis.

Data mining techniques, as described by [Payne and Payne \(2012\)](#), were used to extract data from the University ITS database using Oracle 9i software. **Table 2** 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 total number of students that passed 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 2** shows that in 2015 the highest number (96%) of the SFP students was enrolled in UNAM degree or diploma courses. As shown during the period 2006 to 2016 more than half of SFP students enrolled in UNAM degree or diploma courses.

**Table 3** 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 3** shows that in 2015 the highest number of 135 (96%) of the SFP students were enrolled in UNAM degree or diploma courses; followed by 92% in 2007. As shown during the period 2006 to 2016 more than half of SFP students enrolled in UNAM degree or diploma courses.

Comparative data in **Table 4** show the total enrolments 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 2016.

**Table 4** 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%.

## 6. Discussion

In this study we investigated the performance of SFP graduates in their 1<sup>st</sup> year of the degree programmes at UNAM. Based on the study findings above, one could see that the student numbers have increased dramatically over the years. For example, in 2015 the highest number (96%) of former SFP students was enrolled in UNAM degree or diploma courses. As evident in **Table 1** the SFP has been growing and attracting more students within Namibia as students see its relevance in their lives. According to [Grayson \(1997: p.107\)](#), “a goal of the SFP is to help students develop attitudes to learning and learning behaviors that will help them undergo a process of enculturation to university life”. That means, students enrol in the SFP because they see the relevance and importance of the

**Table 2.** Performance of the SFP graduates in their 1st year of a degree programme study at UNAM from 2005 to 2016 (n = 979).

Faculty School		Performance of the Former SFP students on their 1st year at UNAM																																											
		2006		2007		2008		2009		2010		2011		2012		2013		2014		2015		2016																							
Name		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	1	1	1	1	10	5	3	3	2	1														
EDU		10	7	2	1	13	10	2	1	13	12	1	9	6	2	1	10	8	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																
SON		10	8	2	7	5	1	1	18	16	1	1	8	7	1	21	20	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	7	17	10	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
Progression rate		84%		85%		88%		90%		88%		89%		90%		86%		90%		89%		88%		90%		89%		88%		88%		88%		88%		88%									

\*Table 2: 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	Enroled
Progression rate	Pass/enroled × 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 3.** SFP student intake vs student enrolment in UNAM first year of study from 2005 to 2016.

Year	Student intake into the SFP (A)	SFP 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.** Total enrolment number passes and failures and student progression rates into the second year of studies from 2006 up to 2016.

Years (1 <sup>st</sup> year)	Enrolment rate	Number Passing	Progression rate (%) 1 <sup>st</sup> to 2 <sup>nd</sup> 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

programme. As evident in **Table 2**, more than half of former SFP students were enrolled into UNAM degree or diploma courses from 2006 to 2016. According to **Kapenda and Ngololo (2008)** the SFP aims at increasing access to UNAM science-related faculties because 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). The information in **Table 3** can be viewed to indicate 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. We argue that since the SFP students are excelling in their studies and also passing their first year of tertiary education, this could be due to adequate educational support provided by SFP lecturers. A study done by Zaaïman, van der Flier and Thijs (2000) on *Selection as contract to teach at the student's level: experiences from a South African Mathematics and Science Foundation year* indicated that disadvantaged students in SFP who have been adequately supported to succeed by teaching them at their level are able to achieve well in science and mathematics higher education programmes. However, we took cognizance of the fact that "it is becoming increasingly difficult to ascertain which students come from educationally disadvantaged background, as it is unclear how many years students may have spent at historically advantaged school" (Grussendorff, Liebenberg, & Houston, 2004: p. 271). Grussendorff et al. (2004) therefore caution that this situation poses a difficult position to those who would like to assess foundation programmes, which were originally designed for disadvantaged students. In this study, that the fact that students are excelling in their studies and also passing their first year of tertiary education at UNAM could be due to a strong educational background provided by the SFP lecturers in the SFP. However, we also agree with Donaldson, McCallum and Lafferty (2010) who state that one should also look at all the variables contributing to students' success because this type of information could be useful in providing the right support to individual students' necessities which could be highlighted during the election process of the students in foundation programmes.

## 7. Conclusion and Recommendations

It can be concluded from the document analysis' results that the SFP has been growing and attracting more students within Namibia. It can also be concluded from the document analysis' results that more than half of the former SFP students were enrolled in UNAM degree or diploma courses as from 2006 to 2016. The results further show that 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 of their studies was in 2015. Therefore, it can be further concluded that the SFP has been effective in preparing students to take up further studies in science and science-related fields since students are performing well in their studies and also passing their first year of tertiary education at UNAM. Based on the study results, the researchers recommend that further research should be carried out to assess and compare

the performance (and other related variables, such as completion rate, progression rate, course success rate, and graduation rate) of SFP students at UNAM. There is also a need for further research 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 the Foundation Programme.

### Social and Practical Implications

This study is of great importance to Namibia and its people in that the students are offered a second chance to continue with tertiary education which they could not have if the Science Foundation Programme (SFP) did not exist. They are being empowered to take their rightful place in society by being employed in the science and/or science related fields. These are areas in which Namibia lacks the necessary human resources. Further, the students completing the SFP programme and graduating from university tend to gain social mobility and acceptance in their communities. The community looks up to them for guidance and leadership. In this way they contribute to the well-being of their communities. Furthermore, they contribute to the economic development of Namibia by being employed in various positions of responsibility where their skills and expertise are required for the betterment of the country. It is therefore important to ensure the continuation of the SFP programme in order to produce the required human resources for Namibia.

### Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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