



SAASTA

South African Agency for Science
and Technology Advancement

NURTURING TALENT IN SET

April 2021

**TRACKING STUDY REPORT OF LEARNERS
AT SELECTIVE PROVINCES IN SOUTH AFRICA**



Advancing knowledge,
transforming lives,
inspiring a nation
through the National
Science Olympiad



SAASTA

South African Agency for Science
and Technology Advancement

Tracking Study: Post-Evaluation Report Record

Project: Nurturing Talent in SET
Interaction: Projects in Science Education
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Project Location: NRF-SAASTA Education Division
Project Team: Jabu Nukeri / Moloko Matlala / James Tlhabane

Study Commissioned by the Monitoring and Evaluation Team:
Joyce Khunou / Rofhiwa Raselavhe / Lindie Muller



science & innovation

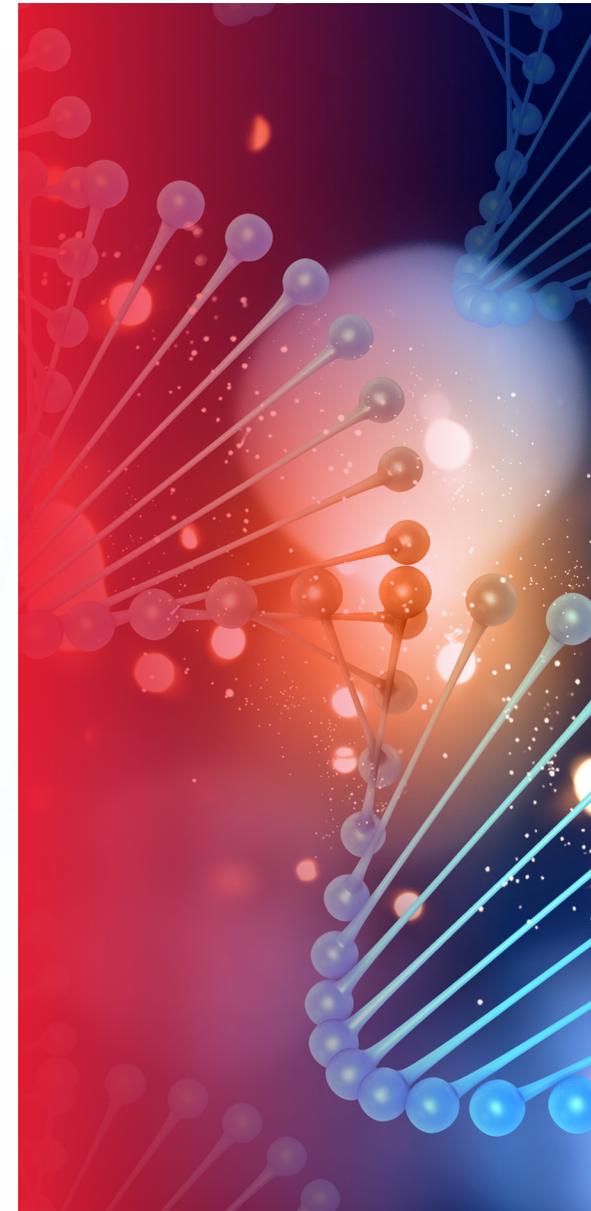
Department:
Science and Innovation
REPUBLIC OF SOUTH AFRICA



**National
Research
Foundation**

CONTENTS

Executive Summary	3
1. Introduction	4
1.1. Aims and objectives of this study	4
1.2. Participation in the programme	5
1.3. The significance of the study	7
2. Methodology	8
2.1. Population and sampling	8
2.2. Data Collection	8
2.3. Data analysis	9
2.4. Ethical considerations	9
3. Limitations of the Study	10
4. Presentation of the study results and findings	11
4.1. Tracking of past participants	11
4.2. Learner tracking per school from the participating Education Circuit	12
Figure 6 : Malamulele Education Circuit	13
Figure 7 : Nkowankowa Education Circuit	14
Figure 8: Bushbuckridge Education Circuit	15
Figure 9 : Khulangwane Education Circuit	16
4.3. Careers fields selected by NSET past participants	17
4.4. Analysis of Insights shared by NSET beneficiaries: Education, career and future aspirations	20
5. Conclusion and Recommendations	32
5.1. Conclusion	32
5.2. Recommendations	32



Executive Summary

Nurturing talent in science, engineering, and technology (SET) plays a crucial role in youth development considering the rapidly changing global landscape and ever-increasing social requirements. Through Nurturing Talent in SET (NSET), learners are provided with the opportunity, tools, and content knowledge to improve their performance in Mathematics, Physical Science and Life Sciences. This is enabled through extra-tuition, camps, provision of educational resource materials, and hands-on activities, as well as exposure to related career opportunities in the relevant sectors and guidance gaining appropriate qualifications. SAASTA acknowledge the vital role that education plays in the developing of a youth that will contribute to the skills pool required for SET advancement and economic growth.

Over the course of three years, between 2010 and 2012, SAASTA embarked on a campaign to facilitate NSET in four education circuits in two provinces in South Africa. Schools were selected and learners nurtured to stimulate evident and latent talent in SET. An initial study that SAASTA conducted in 2014 found that the project contributed to the inflow of students in SET qualifications at Higher Education Institutions. Now, in 2020, a follow-on tracking study was conducted where 143 of the same past

participants as learners in the NSET programme and the cohort that entered tertiary studies, were traced. Subsequently, it was found that at least 94 SET qualifications have been generated and at least 96 skilled individuals have entered the STEMI sector in a variety of fields. Through a qualitative investigation, it was confirmed that the NSET project had a significant influence on the professional trajectory of learners. This is not only true for the past participants that gained STEM qualifications and entered the STEM sector but also enabled some past participants whose interest were elsewhere, to achieve the required level of performance in the subjects to gain entry at reputable tertiary institutions.

What the study also confirmed is the prevalent unemployment challenges, something that is widely experienced in the South African context. However, the study also found that although the majority of the past participants have been able to secure employment, certain STEM sectors or fields within those sectors, are more susceptible to unemployment. This entail sectors such as environmental sciences and electrical engineering, while others, for an example, mechanical engineering and health and medical sciences enjoy an almost 100% employment rate. This provides valuable insight into the success

of the project, its contribution to government imperatives, the institutional objectives, and provides the basis for SAASTA to adjust its approach for possible replicate or even improve on the programme's success. As with any other initiative, there may be unintended consequences as well. What emerged is that the NSET project also inspired some of the past participants to become involved in community development and engagement. This provides the perfect opportunity to replenish the skills available for science engagement with individuals in line with the respective institution and their approach.

1. Introduction

Nurturing Talent in Science, Engineering and Technology (NSET) is a project among others that the South African Agency for Science and Technology Advancement (SAASTA) initiated and is being spearheaded by the Science Education Division with the aim to contribute towards increasing the SET workforce in the country. The project forms part of a variety of initiatives that include, the Primary Schools Science Intervention; National Youth Service; Role Modelling; Techno Youth; Undergraduate Support and; Science and Technology Youth Journalism programmes, among others. In particular, the NSET intervention programme started in 2010 in two provinces, namely Limpopo and Mpumalanga and continued for a three-year year period until 2012 targeting the same group of learners in grade 9 throughout the three year period until they reached grade 12.

The main objectives of the programme were the following:

- Support improvement of learner performance in Mathematics, Physical Science and Life Science through extra-tuition, camps, provision of educational resource materials, and hands-on activities;
- Expose learners to career opportunities in mathematics, science, engineering, and

technology;

- Create opportunities for learners to interact with appropriate role models in SET; and
- Provide educator's support in critical areas in mathematics, physical science, life science and life orientation.

Lack of SET skills may limit the youth's ability to participate in the SET workforce due to the rapid advancements in science and technology. Significant investments are made to address scarce skills in South Africa and the NSET intervention is one among others that was initiated specifically for this purpose. With the rapid advancement in science and technology on a global scale, South Africa has to remain current and competitive while industries are encouraged to play their role and contribute accordingly by providing resources in a variety of ways to ensure economic growth. Although a multitude of support and skills development initiatives in the education sector are being implemented by a variety of institutions, initiatives of this nature are rarely tracked over the long term to determine whether there is attribution that could be linked to interventions. It was under this context that SAASTA initiated this study and the purpose of this report.

1.1 Aims and objectives of this study

This study aims to investigate and determine whether SAASTA's NSET programme has contributed to the inflow of skills into the STEM workforce with a focus on the participating Education Circuits and selected schools. Mainly the study will seek to assess whether bullet three and four objectives of the NSET programme as stipulated above were achieved. Thus the study will assist to determine:

- The number of learners that have completed their studies since the first assessment;
- The proportion of learners that have entered the STEM workforce after gaining qualifications; and
- The employment rate within the predominant STEM fields.

This introductory section focuses mainly on providing an overview of the purpose of the NSET intervention programme; the following section will focus on participation and the significance of the study.

1.2 Participation in the programme

Table 1 below outlines number of learners from the participating schools according to their respective education circuits.

Circuit/	Participating School Name	School Participation	Total Number of Learners
Limpopo			
Malamulele Education Circuit	Ximun'wana	√	22
	Shingwedzi	√	23
	Mbhanyeke	√	16
	EPP Mhinga	√	26
	Khathisa	√	24
Sub-total	5	5	111
Nkowankowa Education Circuit	Zivuko	√	20
	DZJ Mtebule	√	17
	Progress	√	20
	Hudson Ntsan'wisi	√	10
	Petanege	√	5
	Charles Mathonsi	√	18
	Magoza	√	15
	Bankuna	√	20
Sub-total	8	7	125

Mpumalanga			
Bushbuckridge Education Circuit	Lekete	√	20
	Mosipa	√	19
	Maripe	√	25
	Moses Mnisi	√	15
Sub-total	4	4	79
Khulangwane Education Circuit	Camalaza	√	20
	Driekoppies	√	20
	Lovunywa	√	20
	Manzolwandle	√	14
	Mdzili	√	20
	Nhanyane	√	20
	Soshangane	√	20
	Mbambiso	√	20
Sub-total	8	7	154
Grand Total	25	12	469

Table 1. Participating schools and learner cohorts for NSET 2010 to 2012

As stipulated in table 1 above, 469 learners enrolled in the NSET programme when it commenced in 2010. The intervention continued until 2012, however, in 2014, when the first tracking study was conducted it was established that only 375 of the 469 learners continued with the programme. This was because some learners changed schools, dropped out or a change in subject selection. This included Petanegge High School from the Nkxwankowa education circuit; which changed its focus to commercial fields after the commencement of the programme. In addition, Nhanyane and Mbambiso Secondary schools from Khulungwane Education Circuit in Mpumalanga did not participate in the study due to lack of reliable learner database.

1.3 The significance of the study

This study is a continuation of the tracking study that was conducted in 2014. It was incumbent to investigate the progress made by the learners as beneficiaries of this intervention programme to establish the whereabouts of the learners and assess whether the programme was able to achieve its intended objectives of exposing the learners to career opportunities in the STEMI fields, and thus contributes meaningfully to the much needed SET skills in the country.

In undertaking this tracking study, it will also assist SAASTA and the relevant stakeholders to:

- Establish whether the NSET programme has contributed to stimulating interest and an inflow of skills into the STEM sector;
- Determine whether the intervention programme should be re-introduced or replicated in other areas;
- Establish lessons learned from the intervention for future implementation of similar programmes, and;
- The study will also help those learners who are not familiar with SET related careers and how SET careers could be beneficial in learners' lives.



2. Methodology

Quantitative and qualitative research approaches were used in this narrative analysis study. The quantitative part of the study focuses mainly on learner’s progress and the school’s participation in the programme. The qualitative part focused on determining the level of exposure and interest in SET careers by the learners from participating schools. Participating high schools from four education circuits were selected to participate in this tracking study. This section focuses on the overall design of the study, including sampling, data collection, data analysis, and interpretation.

2.1 Population and sampling

The study targeted all 469 learners from 24 schools in the four- education circuits located in Limpopo and Mpumalanga provinces who initially enrolled to participate in the programme from the period 2010 until 2012. This approach was more appropriate because of the small number of the participants juxtapose the available resources to instigate this study. Out of the 479 learners that participated in the programme until 2012, only 143 learners were successfully tracked as stipulated in Table 2 below.

Population:	All 469 learners that participated in the NSET programme from 2010 to 2012
Realisation:	A total of 143 learners were successfully tracked for 22 schools
Response rate (%)	31%

Table 2. Population and sampling

From the table above, it is indicative that the response rate of 31% was achieved, which is a reasonable representation of the targeted population to provide insights on whether the intervention was successful or not.

2.2 Data Collection

The data collection for this study was conducted through the collation of information such as learners contact details supplied by the participating schools. This was corroborated with data that was available from the NSET database at SAASTA. The availability of technology made

it easy to collect other data through tracking of some learners on social media platforms, such as Facebook and LinkedIn. In addition, a pre-set questionnaire was developed to collect qualitative data that will guide one on one interviews with participating learners. In summary, the data collection methods that enabled the study is reflected in Table 3 below:

Instrument:	Pre-set questionnaire to guide one on one interviews		
	Mixed-method questionnaire		
Distribution:	Telephonic calls with direct engagement		
	Electronic contact with indirect engagement		
	Desktop study of professional LinkedIn profiles		
	Data Collection Dates		
	1 June 2020	to	25 September 2020
Data Presentation:	Microsoft Excel Spreadsheet		

Table 3. Data collection

2.3 Data analysis

The data analysis method to determine the result findings is articulated below in Table 4.

Method:	Manual evaluation to generate usable statistics by quantifying instances and identifying trends through content analysis (qualitative)
Software:	Microsoft Excel
Quality Assurance:	Data reviewed by three evaluators
Total Observations:	Total number (n) of observation analysed is 143 (n=143) for past participants in the NSET programme

Table 4. Data analysis

2.4 Ethical considerations

At the inception phase when the programme begun, appropriate approval was secured from parents, the school principals, and the Department of Education, through its mathematics, science, and technology (MST) coordinators to enable participation of learners. At the time, all stakeholders were informed that the information will be used for future tracking studies for purposes of assessment of impact and so forth. It was also clearly indicated that SAASTA will not make the contact details available to any unauthorised third-party.

For this intervention, learners were tracked for participation at each event to ensure consistency. Participants in the study were informed of the reasoning, benefits, and risks associated with the study and also provided with the opportunity to withdraw at any stage of the study should they wish to do so. It is noted that incomplete data were not excluded but recorded as undisclosed. Due to the personal nature of the questions participants were also provided with the opportunity to opt for non-disclosure on certain questions.



3. Limitations of the Study

Limitations were identified in that, not all beneficiaries were successfully traced, mainly due to the changed contacts details. Other limitations are that some of the previous beneficiaries decided not to participate in the study despite

being successfully traced and some respondents did not provide all the required information that resulted in incomplete datasets. However, these limitation did not compromise the findings in this study.



4. Presentation of the study results and findings

Below are the result findings of the tracking study:

4.1 Tracking of past participants

Figure 1 is a representation of learners that were tracked according to their respective schools and education’s circuits.

Number of traced NSET Beneficiaries

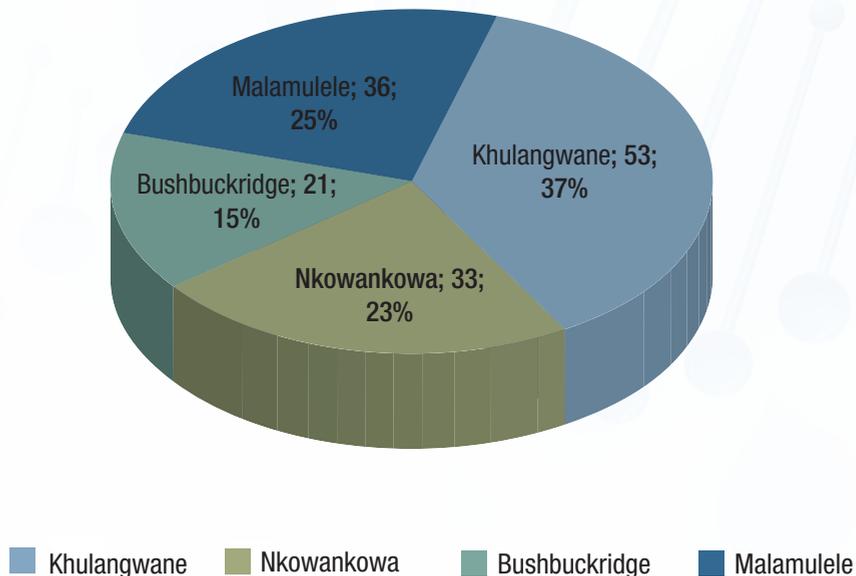


Figure 1 : Total number of past NSET participants traced

According to figure 1 the following can be concluded that:

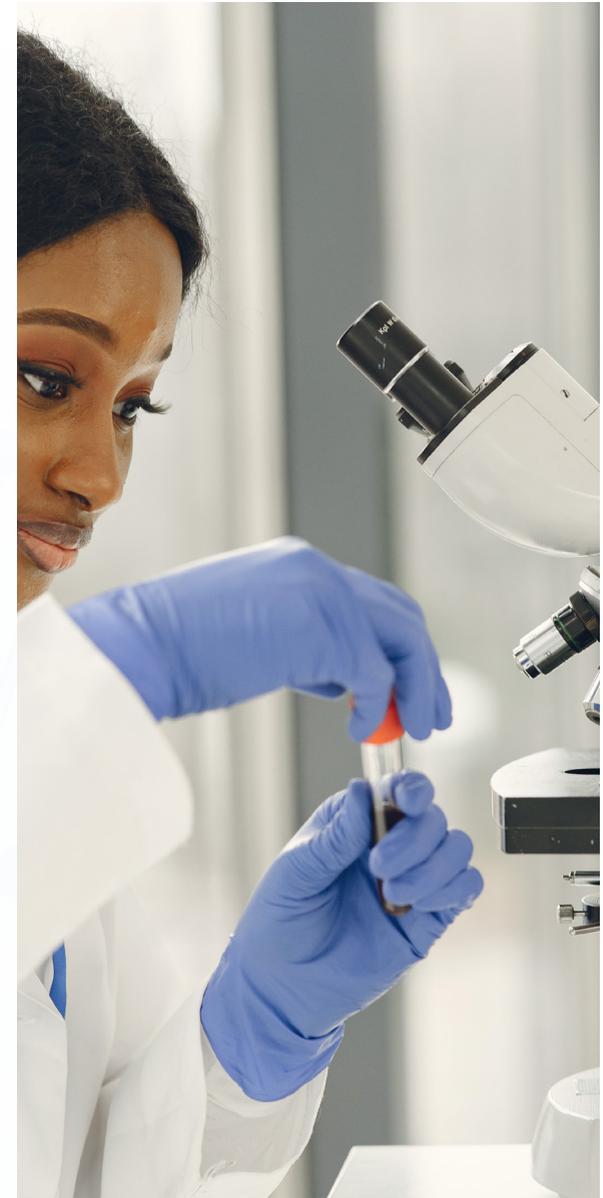
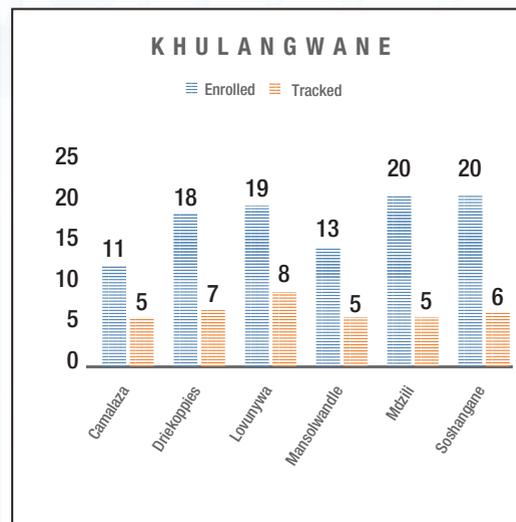
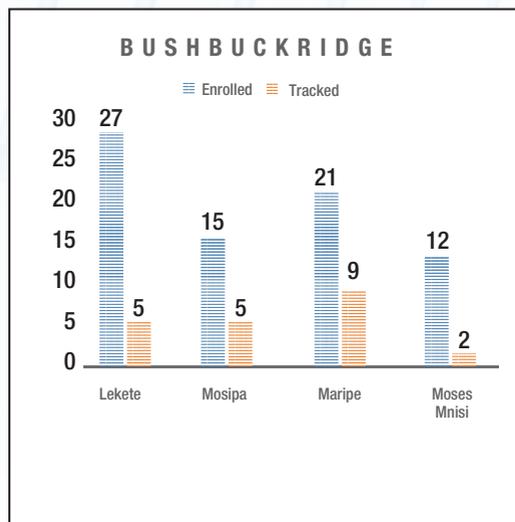
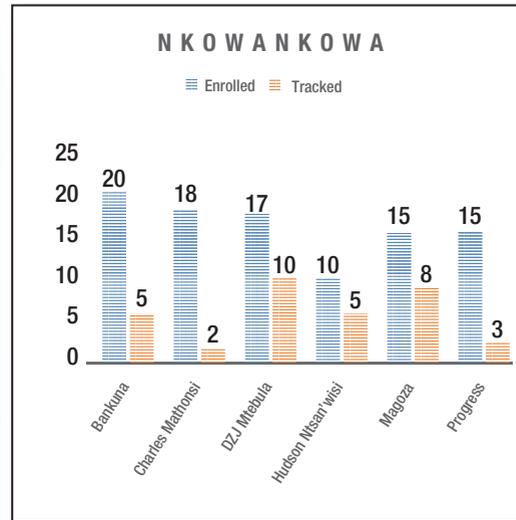
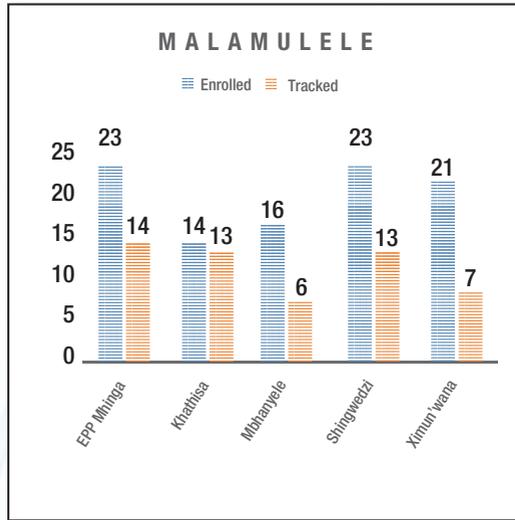
- 53 (37%) were from Malamulele;
- 33 (23%) were from Nkowankowa
- 21 (15%) were from Bushbuckridge and
- 36 (25%) were from Khulangwane.

It means a total of 143 learners were tracked representing 38% of the whole cohort of 375 learners that were successfully traced.



4.2 Learner tracking per school from the participating Education Circuit

Figures 2 -5 below presents the breakdown of NSET beneficiary tracing as per the participating schools.



Figures 6 to 9 below, visualises the data collected and analysed for the purpose of this tracking study.

Figure 6 : Malamulele Education Circuit

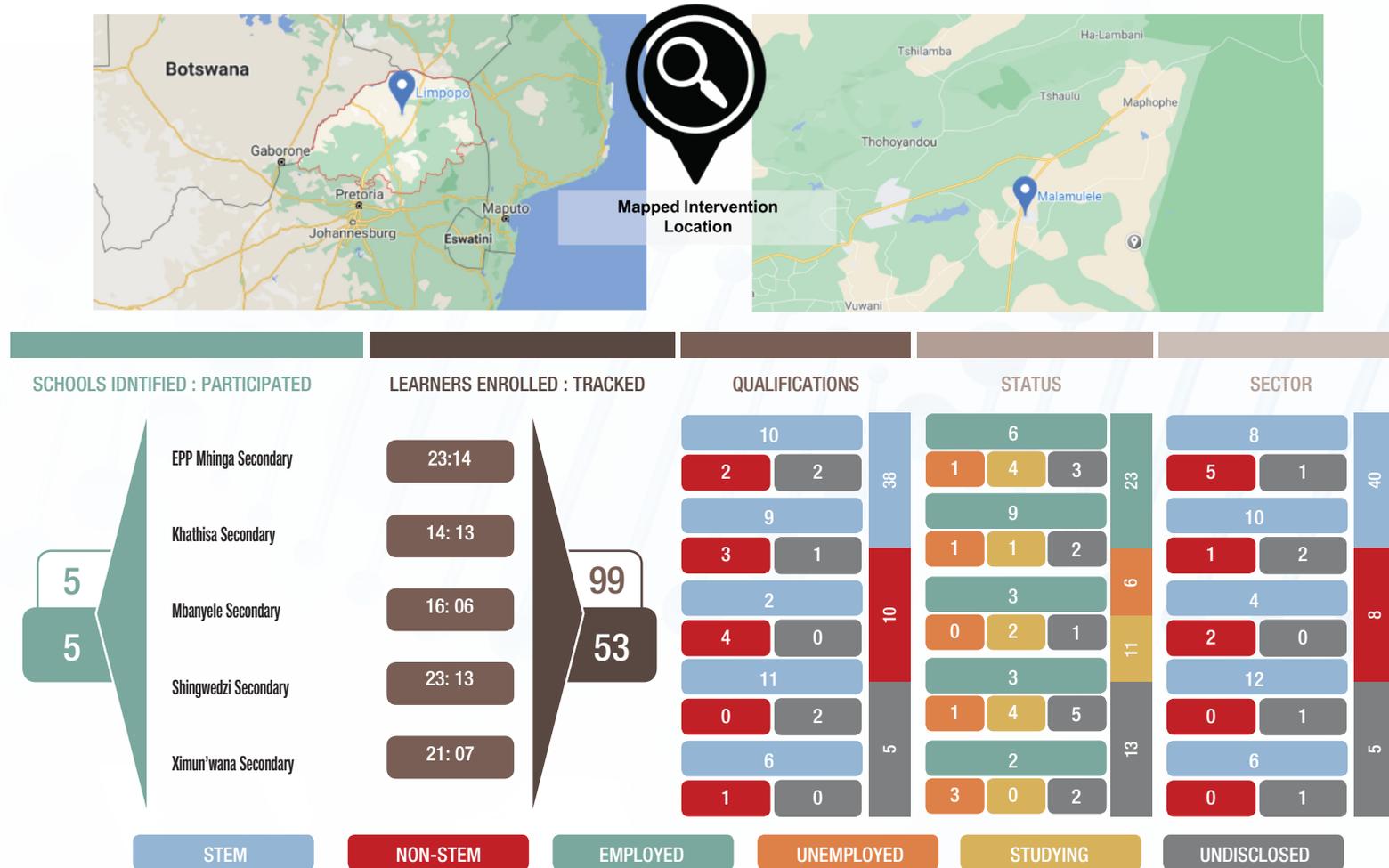


Figure 7 : Nkowankowa Education Circuit

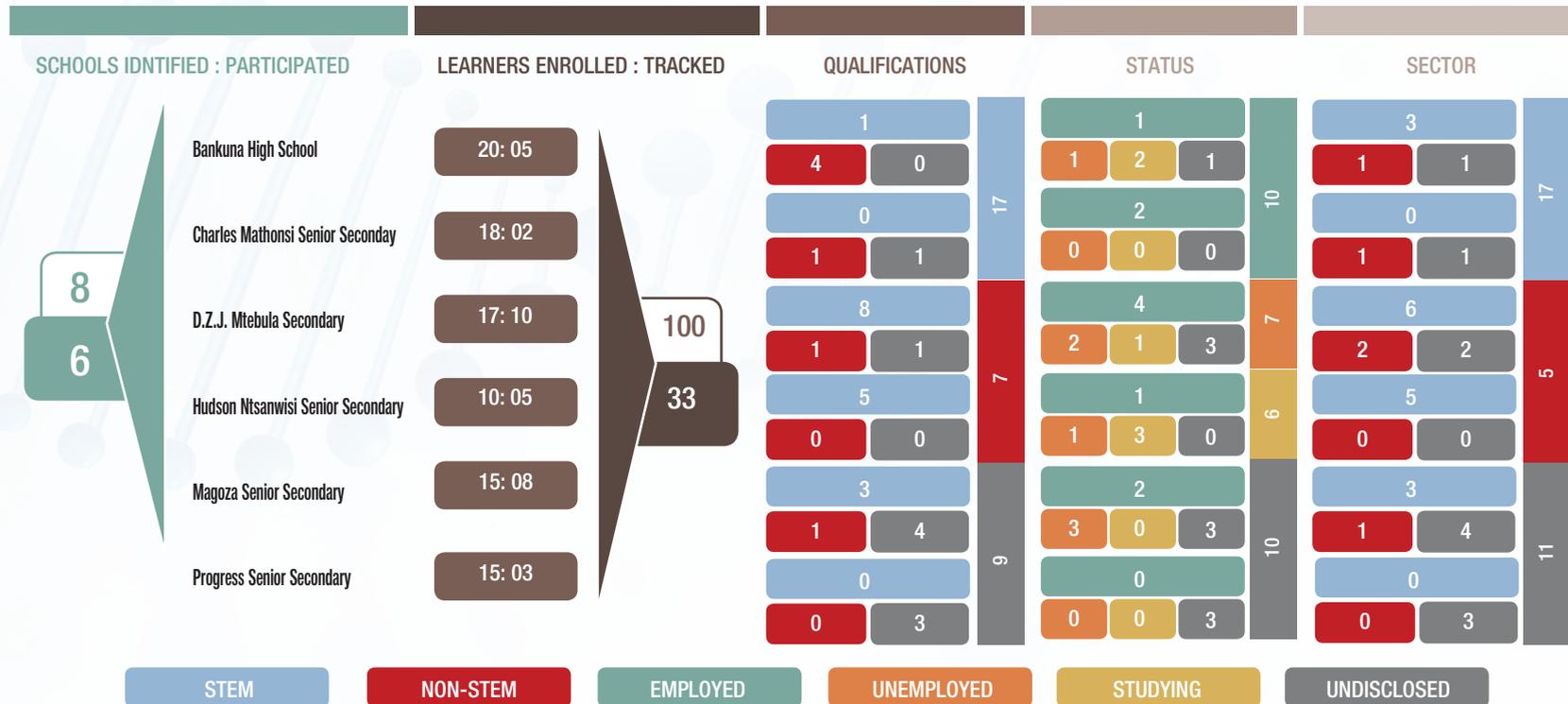


Figure 8: Bushbuckridge Education Circuit

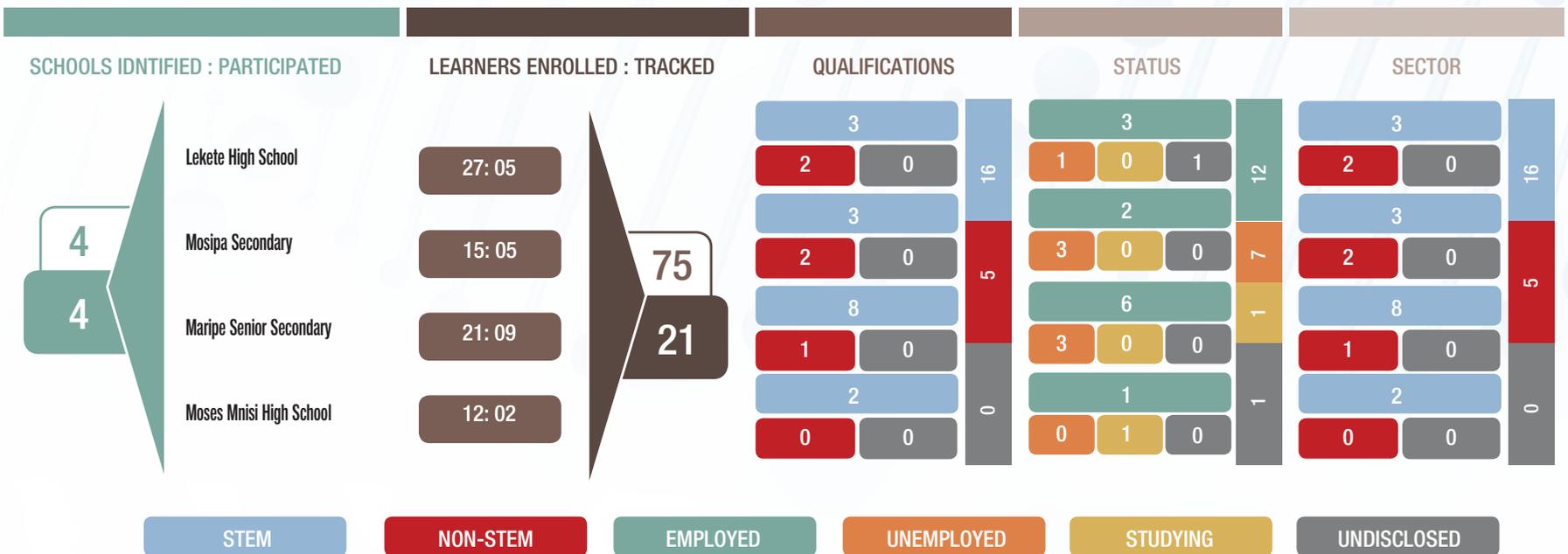
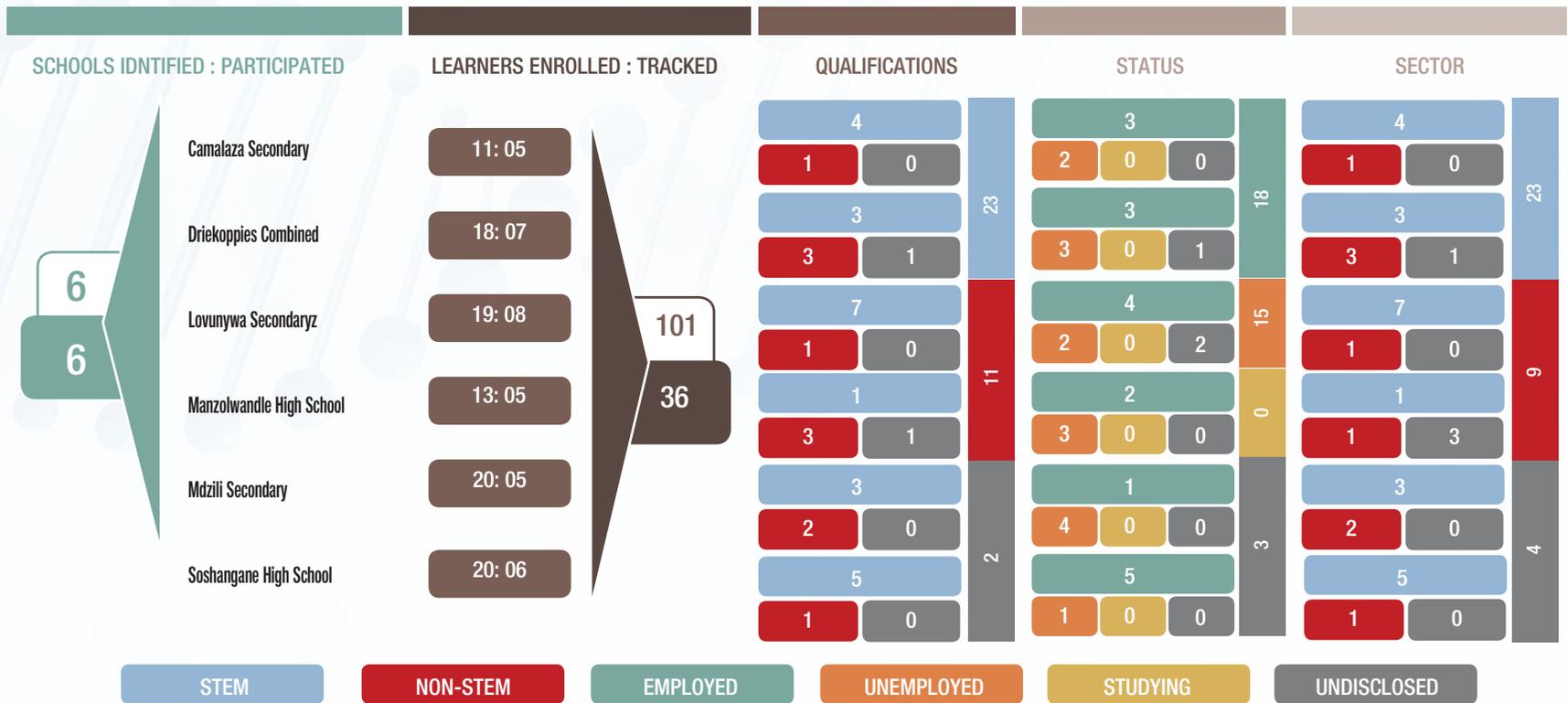
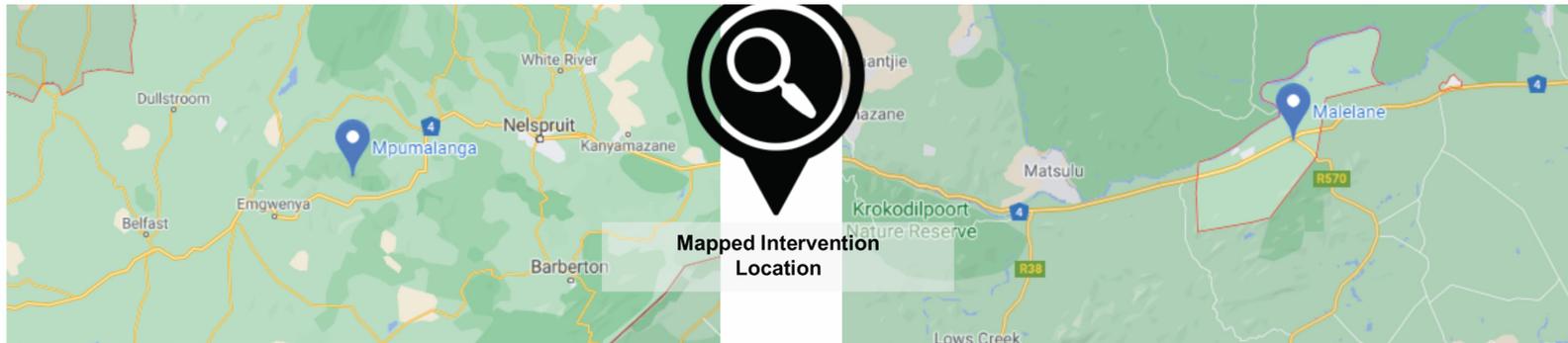


Figure 9: Khulangwane Education Circuit



4.3 Careers fields selected by NSET past participants

The NSET beneficiaries opted for different career fields after completing their high school education. Majority of former NSET beneficiaries enrolled in SET related career fields such as engineering's, technology, environmental sciences and medicine, just to mention a few.

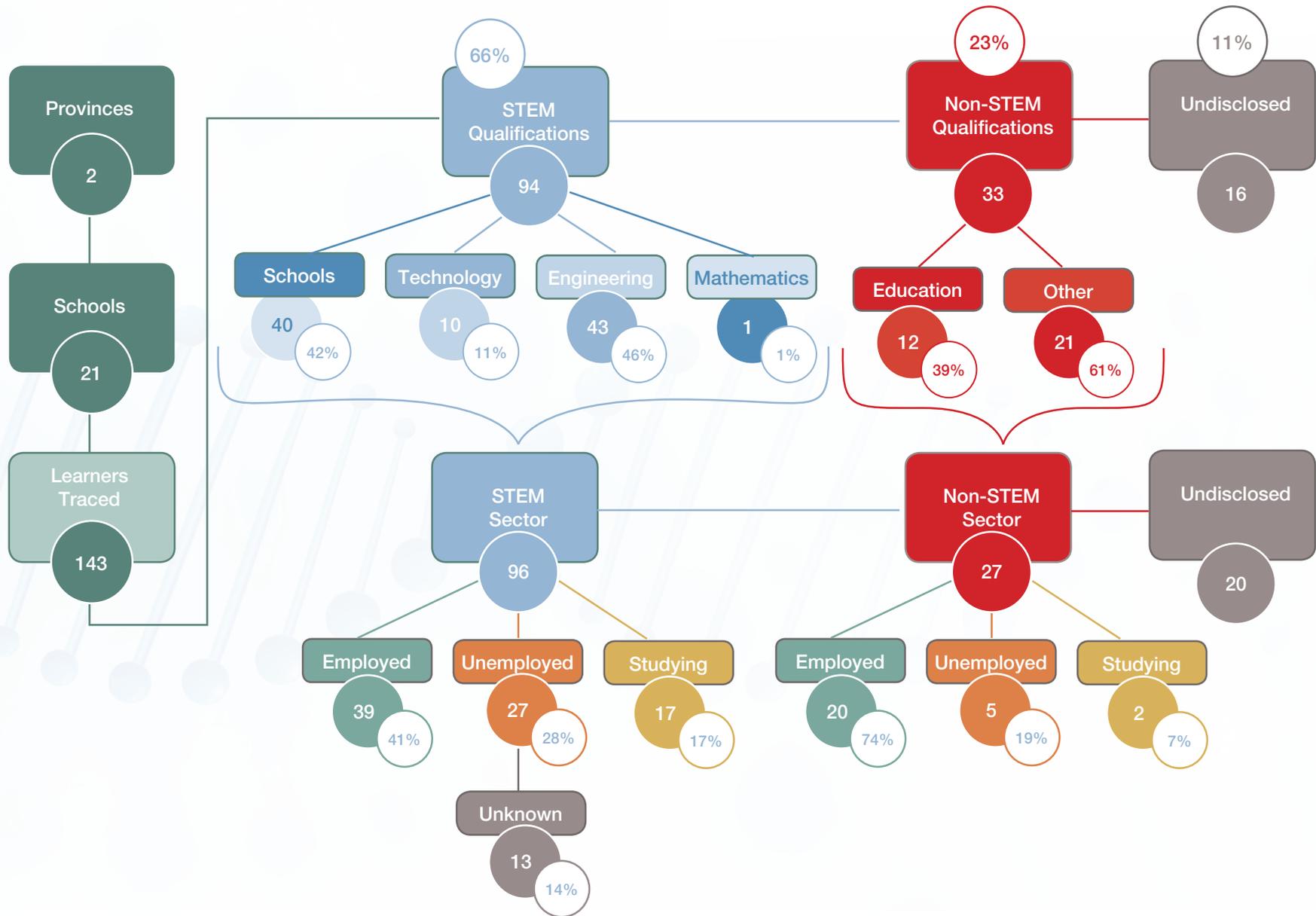
Figure 10 below refers; from the 143 respondents, 94 (66%) STEM-related qualifications were obtained, 33 (23%) non-STEM-related, and 16 (11%) qualifications were undisclosed. From the STEM-related qualifications, 42% of the qualifications are in science, 11% in technology, 46% in engineering, and 1% in mathematics. It is noted that the largest proportion of non-STEM-related qualifications is in the field of education at 39%. Notwithstanding the 94 qualifications, 96 (67%) of the respondents progressed into the STEM sector where, at the time of the study, 41% is employed, 28% is unemployed, and 17% is still studying. A total of 47 (32%) of the respondents moved into the non-STEM sector where, at the time of the study, 74% are employed, 19% are unemployed, and 7% are still studying, whereas 14% are undisclosed.

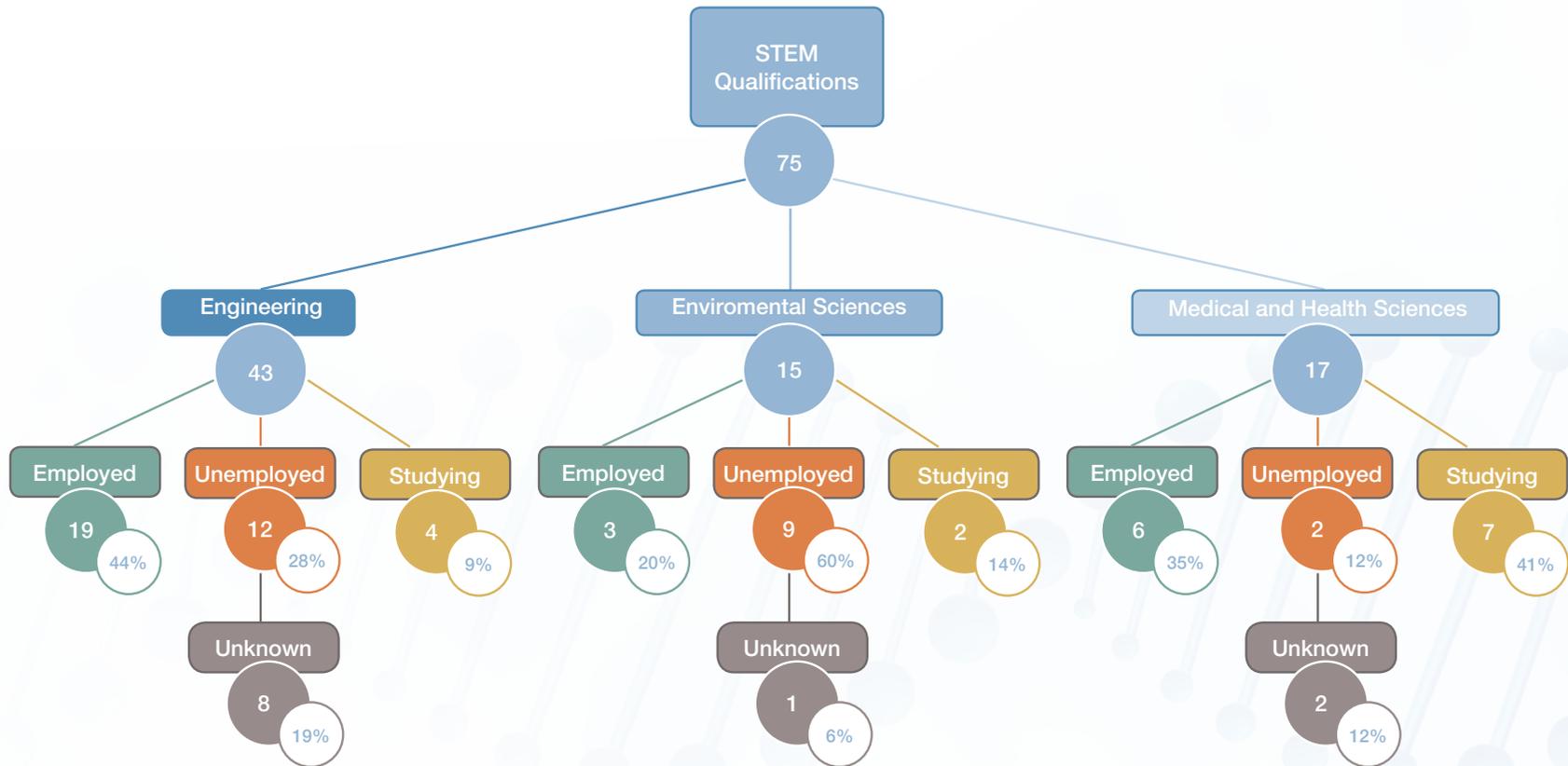
By considering the qualification field, and the employment rate, three qualifications with the highest instance rate was recorded;

engineering with 43 qualifications, medical and health sciences with 17 qualifications, and environmental sciences, which includes life sciences, at 15 qualifications. For engineering, only 44% of the respondents are employed, 28% are unemployed, and 9% is still studying, whereas 19% is undisclosed. For medical and health sciences, 35% are employed, 12% are unemployed, and 41% are still studying, whereas 12% is undisclosed. For environmental sciences, 20% are employed, 60% are unemployed, and 14% are still studying, whereas 6% are undisclosed. Based on the aforementioned, a lower unemployment rate is noted for engineering and medical and health sciences, as opposed to environmental sciences that records a significant unemployment rate.

From data observations, it is noted that the low employment at 20% for environmental sciences is mostly achieved in the field for Zoology, whereas the high unemployment is grounded in a variety of fields associated with environmental sciences. The unemployment rate for engineering at 28% can mostly be attributed to the field of electrical engineering that accounts for at least 75% of the related unemployment, whereas it appears as if the field of mechanical engineering is faring well with up to a 100% employment recorded. For the health and medical sciences field, the low unemployment at 12% is attributed to primary care and not specialist fields. Majority of the cohort in specialists fields are still engaged in tertiary studies.

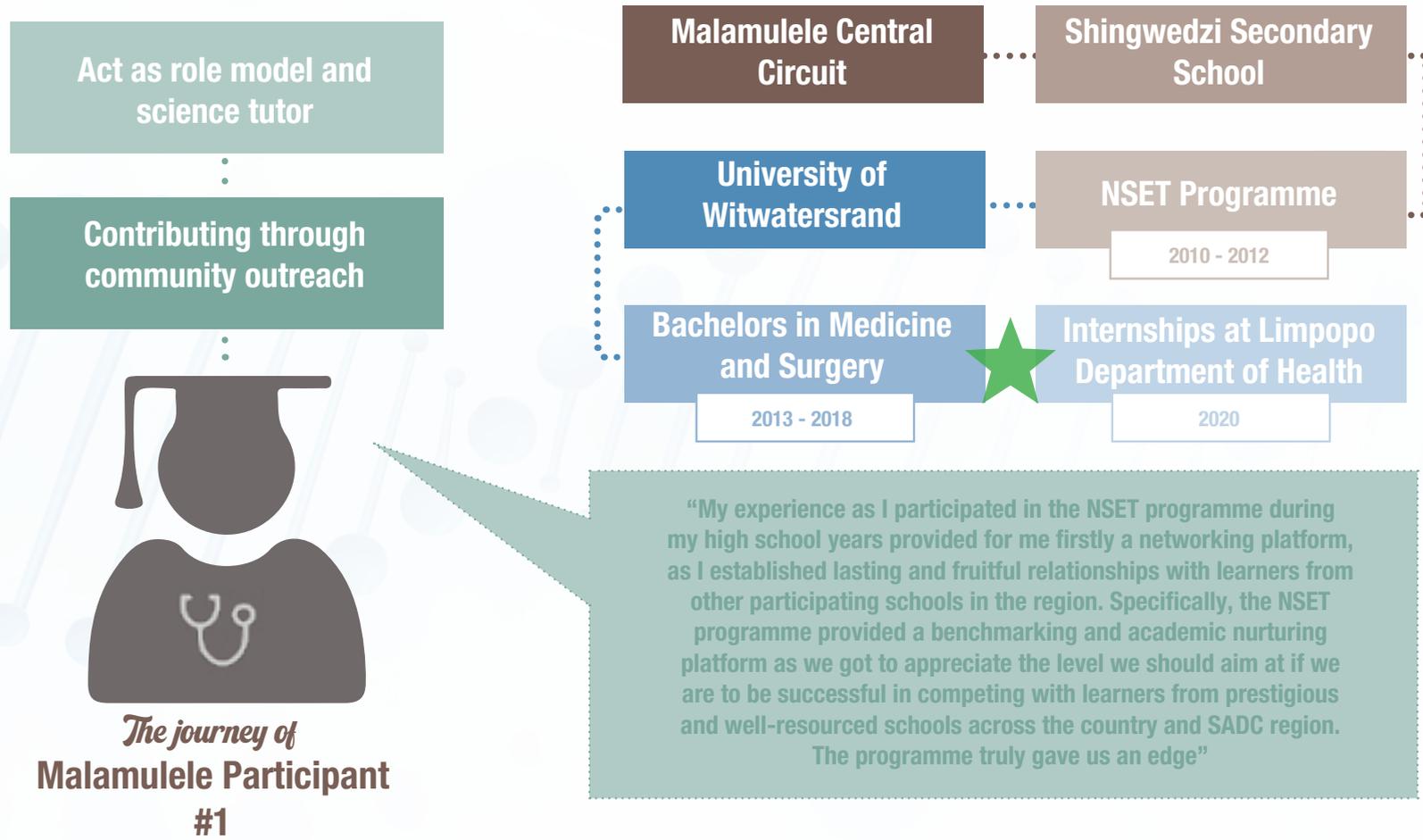




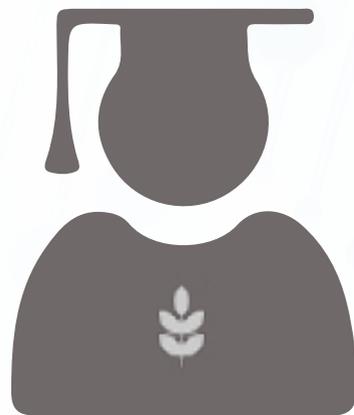


4.4. Analysis of Insights shared by NSET beneficiaries: Education, career and future aspirations

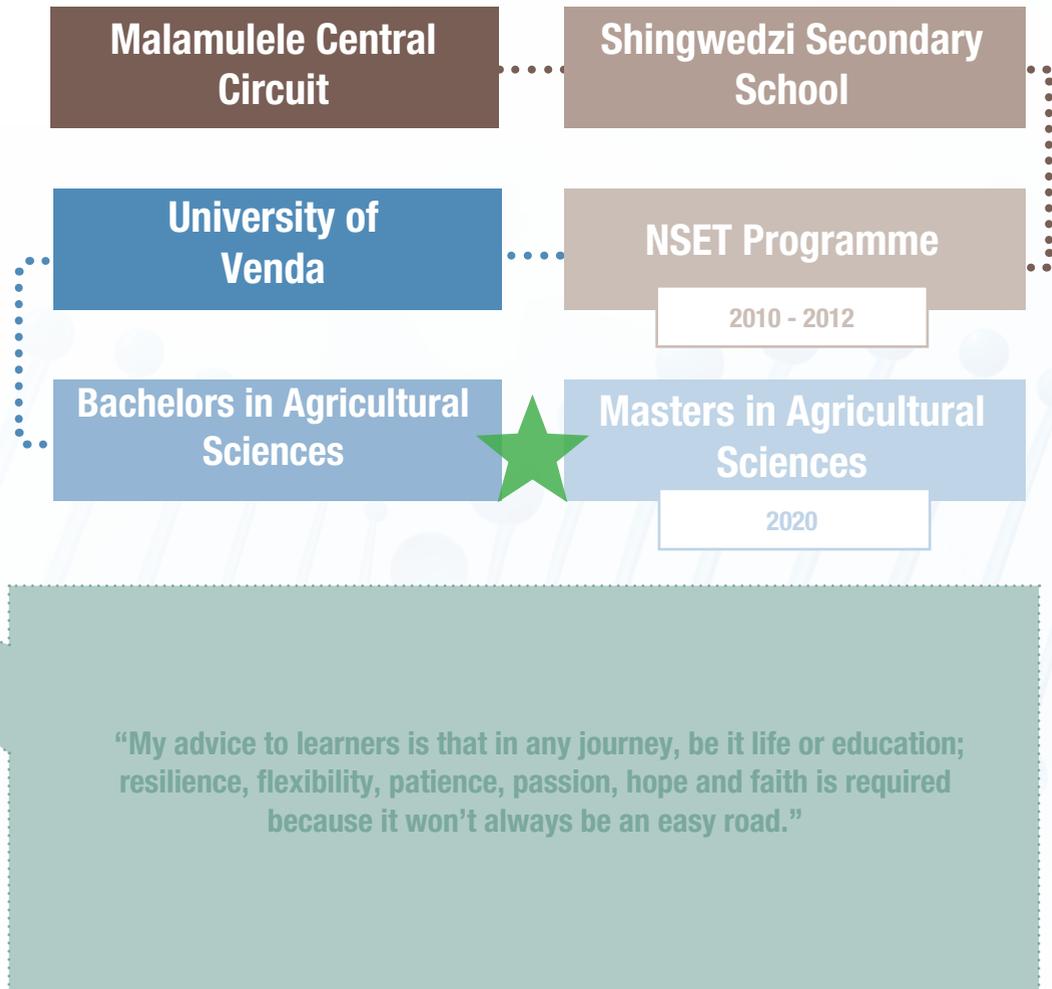
The following respondents provided insight into their experience with NSET and their journey since exiting the programme in 2012.

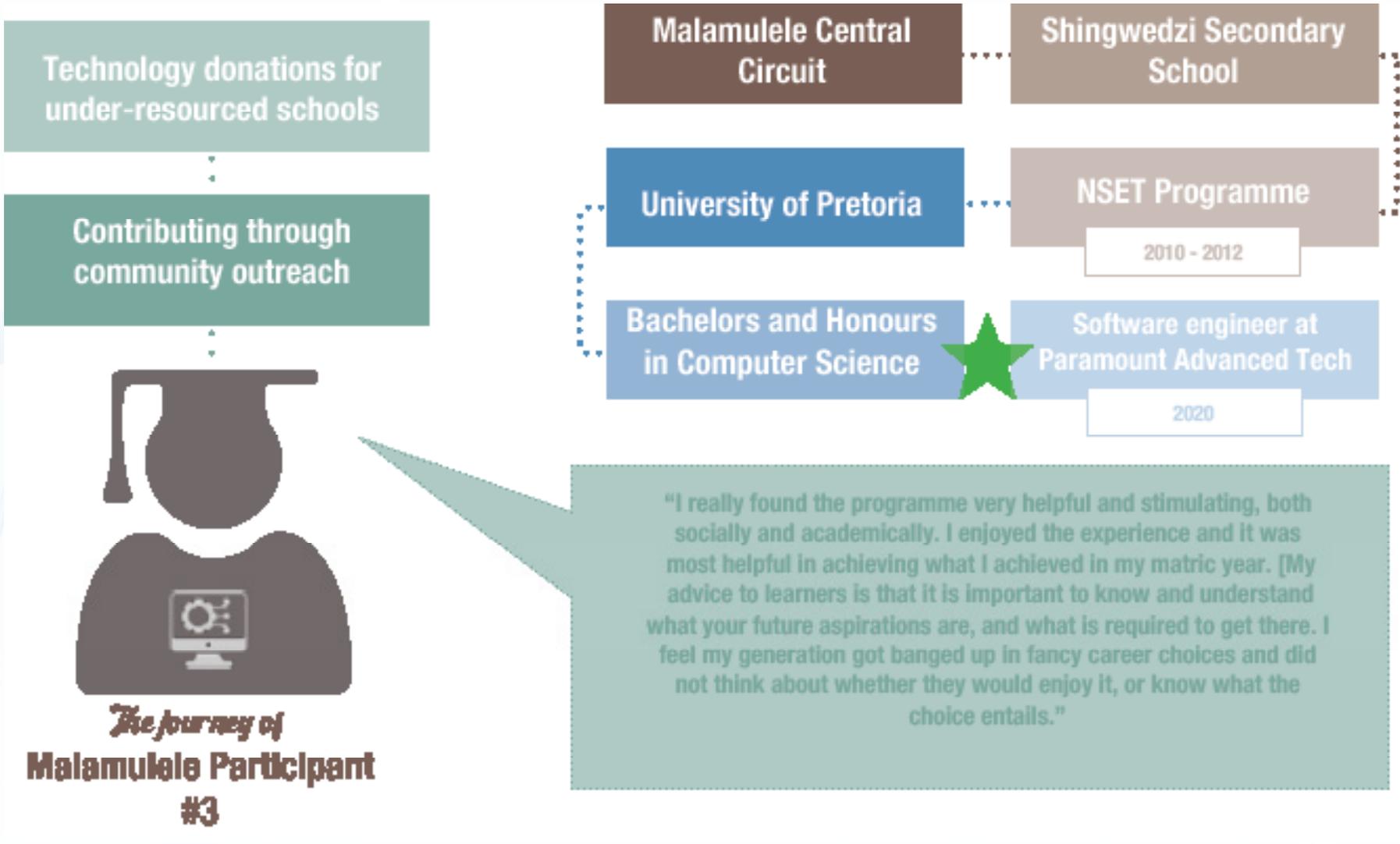


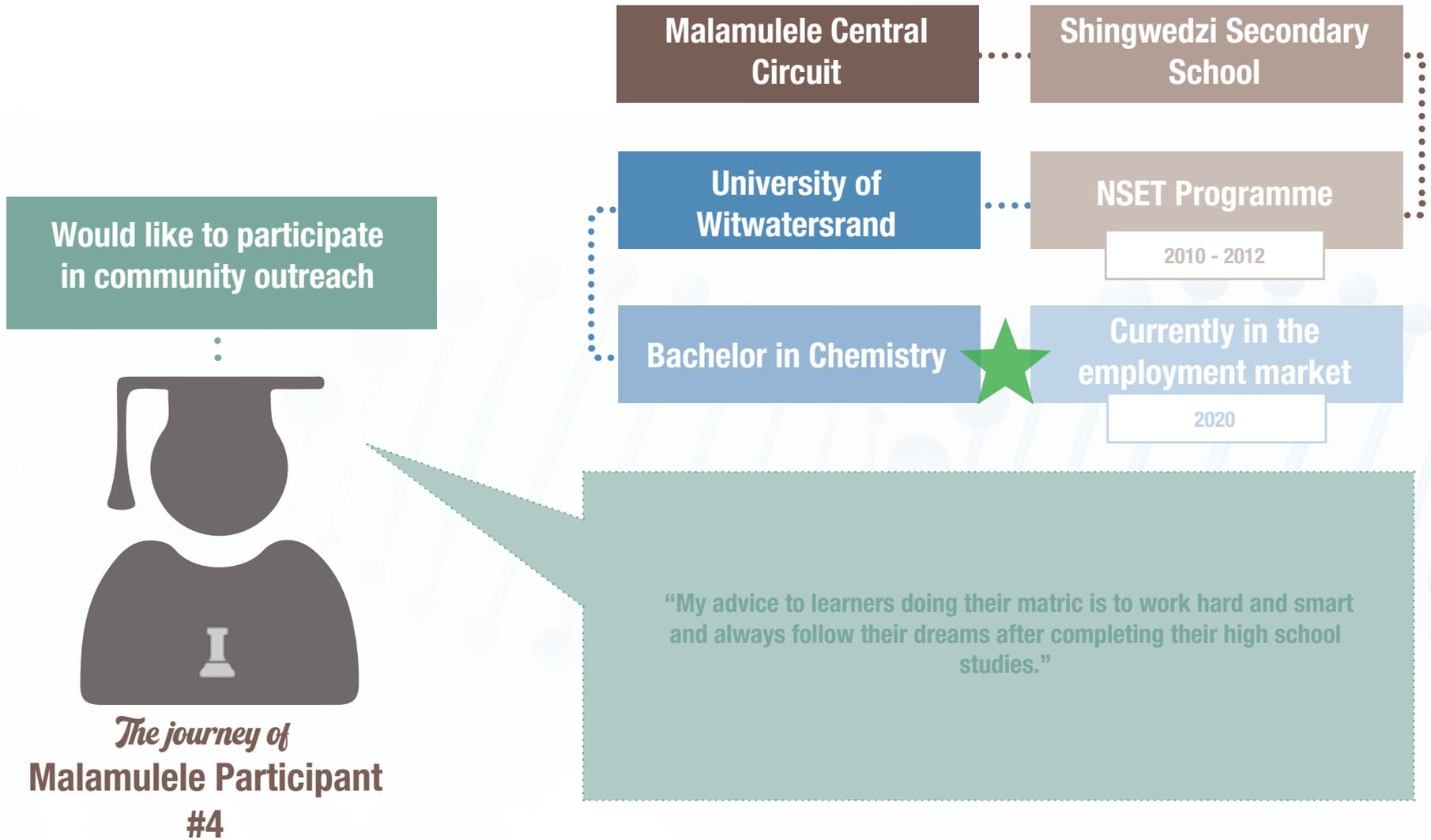
The journey of
Malamulele Participant #1



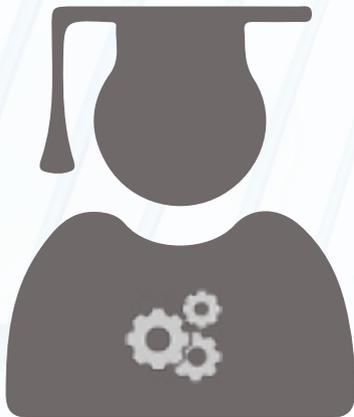
The journey of
Malamulele Participant #2



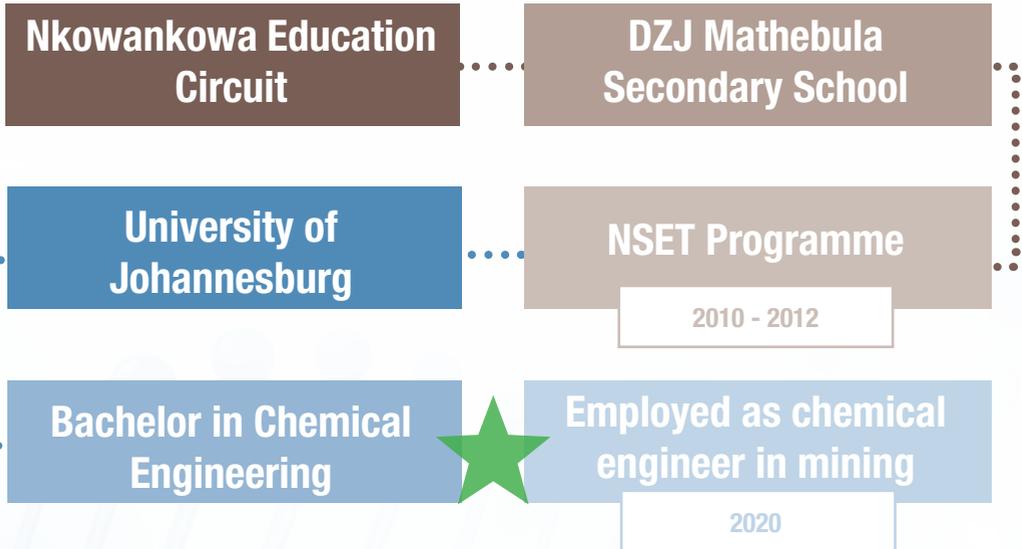




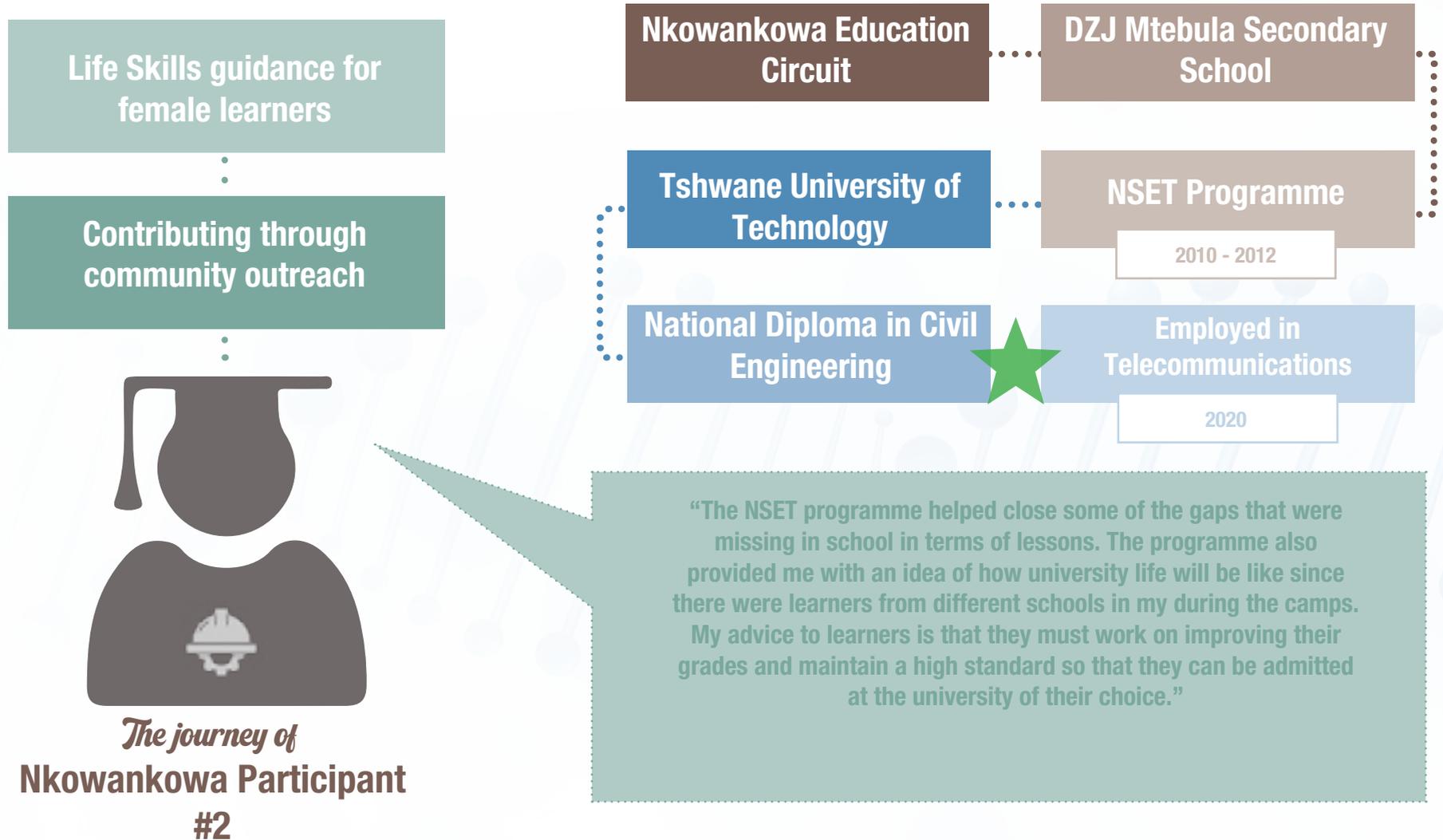
Would like to participate in community outreach



The journey of
Nkwankowa Participant #1



“The NSET programme was necessary at the time and has helped me and other learners to gain a lot of knowledge in terms of the work that we did back in high school, including in grade 12. The NSET activities were a good experience, which afforded me a good opportunity to meet learners from other schools, which helped us to share knowledge, learning and studying techniques. My advice to learners is that they should work on their studies and follow what they love. In terms of choosing a career path, they should choose what is most comfortable for them.”

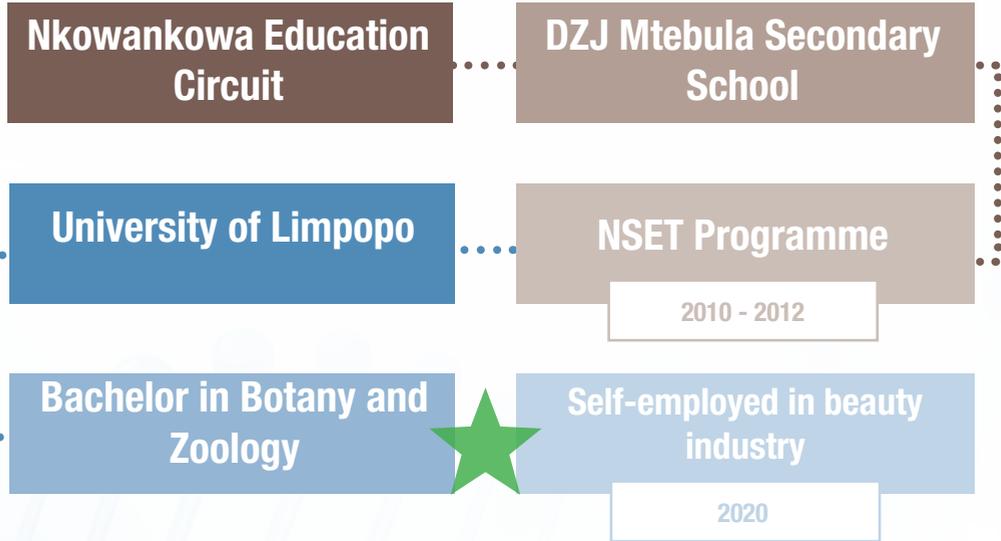


Life Skills guidance for female learners

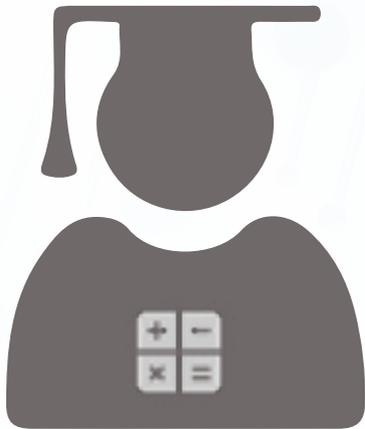
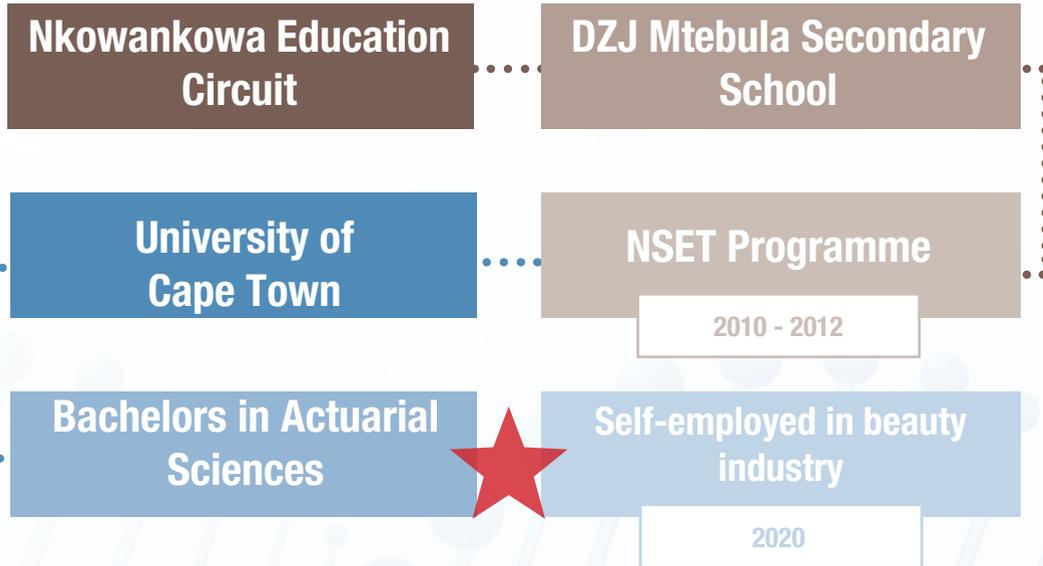
Contributing through community outreach



The journey of
Nkowankowa Participant #3



“The NSET programme was informative and eye-opening. Both the teachers and fellow classmates challenged my thinking, approach to learning and overall attitude towards the SET field. My advice to learners is as vital as education is, a person has to self-introspect before they choose a career path. As we were swiftly moving into the digital era, many education programmes are becoming obsolete so choose wisely. Failure doesn’t de ine who you are so don’t be scared of it instead it builds your character.”



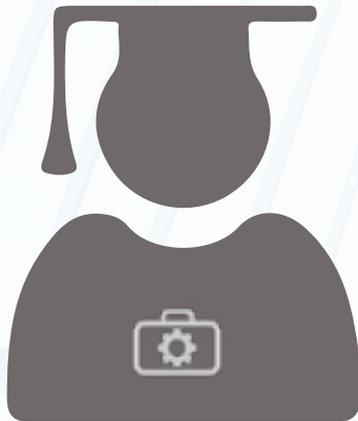
The journey of
Nkowankowa Participant
#4

I have no advice right now, but my journey inspires others.

Life skills development for teen football teams



Contributing through community outreach



The journey of
Nkowankowa Participant #5

Nkowankowa Education Circuit

Bankuna Secondary School

Letaba TVET College

NSET Programme

2010 - 2012

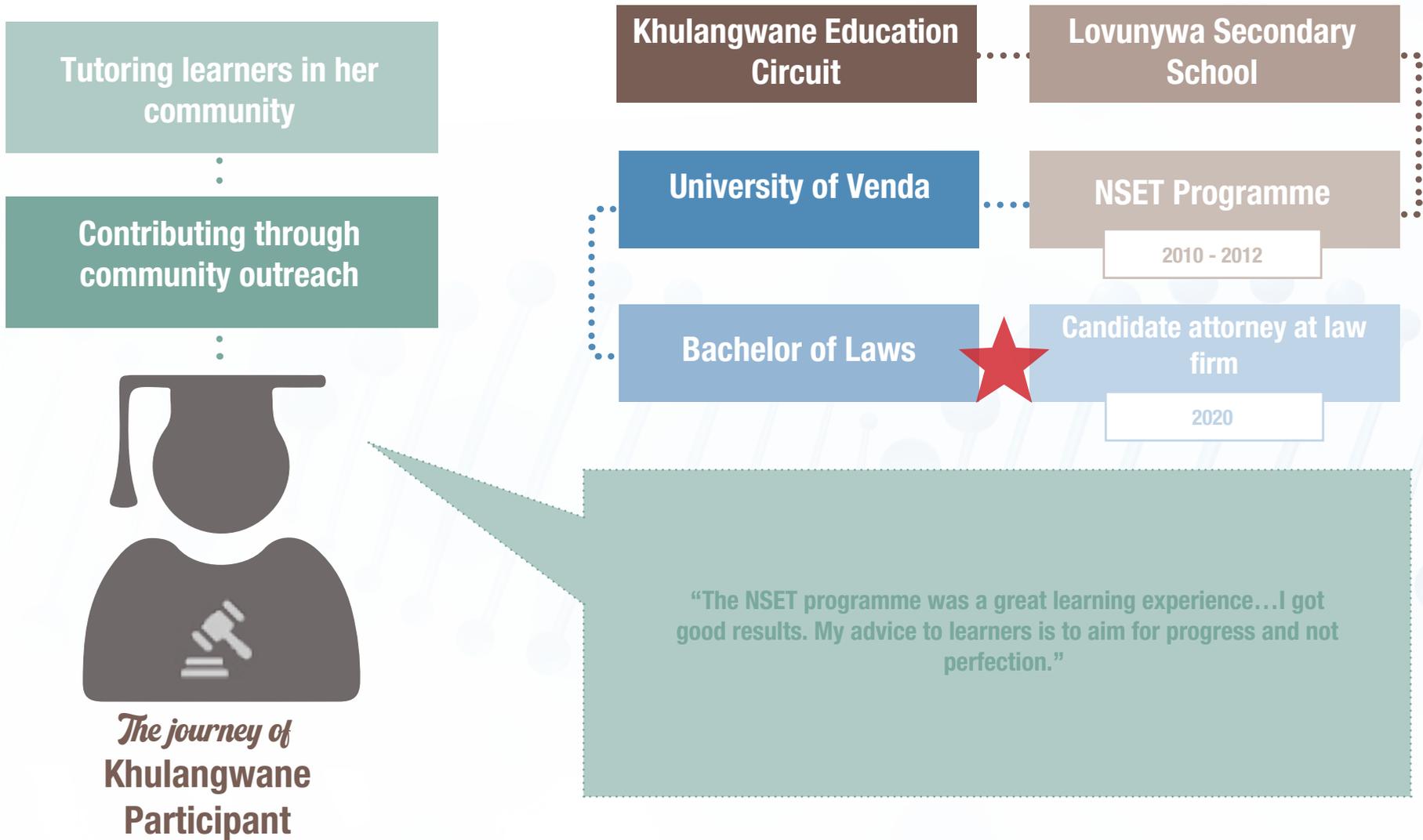
Qualification in Business Management

Intern at Department of Environmental Affairs

2020

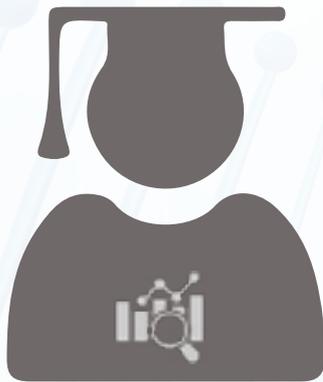


“My advice to learners is that anything is possible.”

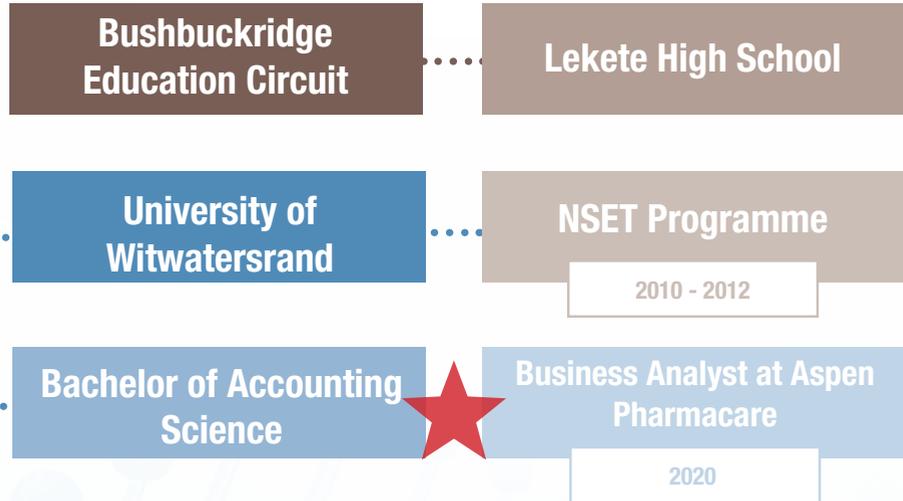


Role modelling at former school

Contributing through community outreach



The journey of
Khulangwane Participant



“The NSET programme played a pivotal role in my career journey and I achieved good marks for maths and science that helped me get admitted into one of the prestigious universities. My advice to learners is to focus on their academics by studying and giving their studies all their best. Learners must take every grade as a foundation for the next grade.”

As is systemic to all intervention programmes, not all experiences can be positive since individuals are unique and have different interpretations of the objectives and, likewise, have different expectations. Some comments, as listed below mostly relate to whether the past participants want to participate in the study. It is again noted that all learners were informed during the intervention that tracking studies will be conducted.



“I’m not interested - why would you want to check on us. That thing happened ages ago”

“Can you explain to me why SAASTA now needs the information? Thank you for the clarity. I would like not to participate”

“The experience was bad. SAASTA never helped me with anything!”

5. Conclusion and Recommendations

5.1 Conclusion

Based on the views from the 143 tracked participants or the NSET beneficiaries, 94 have enrolled in STEM-related qualifications and 96 entered the STEM sector. Majority of the successfully tracked NSET beneficiaries have indicated that they benefited from participating in the programmes and based on the majority of the expressions received, the NSET intervention achieved its objectives with a specific focus on contributing to an increased the SET/STEM workforce in the country. Furthermore, the

experiences with some participations also contributed to a drive for community engagement in life skills development, role modelling, and STEM tutoring. That being said, a relatively high unemployment rate has been recorded in relation to some SET/STEM fields.

The findings in this study provided insights that can also help other learners who are not familiar with SET related careers and how SET careers could be beneficial in learners' lives. This will be achieved by the publication of this report on the SAASTA website to allow public access at

different levels. Furthermore, the presentation of this report to the schools that enrolled their learners to participate in the NSET programme will serve as a management tool to guide and direct learners towards the different career pathways in STEM. In addition, the outcomes of this study will be shared publicly with other identified schools or learners who might participate in phase 2 of the NSET programme or other related interventions supported by SAASTA such as role modelling campaigns.

5.2 Recommendations

Based on the findings of the study, several recommendations are made that can contribute to the continued success of projects that follow a similar intervention methodology.

Identifier	Recommendation
Information sharing and integration	
NSET-20-0101	SAASTA should consider some of the past STEM graduates through the National Youth Services programme to nurture continued development and exposure to the job market.
NSET-20-0102	Some of the past participants are involved in community engagement, whereas others have shown an interest. It should be considered using these individuals, with a background in SAASTA programmes as role models and tutors through SAASTA's Mentoring and Coaching initiative. A call should be distributed to determine interest.
Information management	
NSET-20-0103	Information on databases needs to be updated consistently for the purpose of continued tracking studies and dissemination of information that might interest the part participants and facilitate continued inflow of skills into science engagement specifically.
Review of project content	
NSET-20-0104	The study highlighted some STEM careers that are not in demand to fill in the gaps of the much needed skills in other STEM fields. Exposure to these may have to be limited during interventions. Instead, space should be created to put more focus in fields that positively contribute to high employment opportunities.

Project continuation	
NSET-20-0105	The NSET intervention programme should be reintroduced in the areas that previously participated, such as Malamulele, Nkowankowa, Khulangwane and Bushbuckridge where SAASTA has already established a network. A programme proposal should be developed for consideration.
NSET-20-0106	The NSET intervention programme should be introduced in other provinces and education circuits that have a lower pass rate in STEM-related subjects. Revision for most recent matric results should be conducted to identify such education circuits and stakeholder consultations should be prioritised with the relevant MST coordinators.
NSET-20-0107	A project brief should be developed that is aligned to the emerging role of SAASTA as science engagement coordinator, where the implementation and monitoring of like NSET programmes can be implemented by third-parties.

NURTURING TALENT IN SET

April 2021

TRACKING STUDY REPORT OF LEARNERS AT SELECTIVE PROVINCES IN SOUTH AFRICA



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SAASTA

South African Agency for Science
and Technology Advancement

Physical Address | Didacta Building | 211 Nana Sita Street | Pretoria | South Africa

Postal Address | Box 1758 | Pretoria | South Africa | 0001

For Copies Contact

Tel: +27 (0)12 392-9300

Fax +27 (0)12 320-7803

info@saasta.ac.za