Science Engagement Projects: Talent Development Programme Post-School Destinations of the 2020, 2021 and 2022 Cohorts

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- The Department of Science and Innovation, for the funding and support of the Talent Development Programme (TDP) and the tracking of the post-school participants.
- The Stellenbosch University Centre for Pedagogy (SUNCEP) for the provision of learner information for the study.
- The TDP participants who took part in the post-school study.
- *Khumbula*, who were responsible for the collection of the post-school data and the provision of the data to the HSRC.

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ABBREVIATIONS AND ACRONYMS

DBE	-	Department of Basic Education
DSI	-	Department of Science and Innovation
DST	-	Department of Science and Technology
HSRC	-	Human Sciences Research Council
STEM	-	Science, Technology, Engineering and Mathematics
SUNCEP	-	Stellenbosch University Centre for Pedagogy
TDP	-	Talent Development Programme

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TRACKING THE 2020, 2021 and 2022 POST-SCHOOL COHORTS

The Talent Development Programme

The Department of Science and Innovation's (DSI) suite of Science Engagement Programmes were initiated in 2005. One of the key programmes for learners that was incorporated into this suite was the Talent Development Programme (TDP). The TDP aims to find and support senior secondary learners with talent in Science, Technology, Engineering and Mathematics (STEM) and to enhance their access to STEM futures. The programme centres on improving learners' mathematics and science achievement, encouraging them to engage in after or out of school mathematics and science activities, preparing them for higher education, and fostering their interest in pursuing STEM-based studies and careers.

The programme selects high performing beneficiaries predominantly from lower socio-economic status homes that had restricted opportunities for tertiary education in the past. Learners are chosen according to their prior performance in mathematics and science[1].

In 2022, the third phase of the TDP, which began in 2017, came to end. The Stellenbosch University Centre for Pedagogy (SUNCEP) was responsible for the co-ordination of this phase of the programme. During phase 3, the TDP targeted learners in their final two years of secondary school (Grade 11 and 12) from selected public schools across South Africa. SUNCEP introduced a decentralised model with a TDP centre located in each province, and learners were housed in school hostels for three sessions during the year. In 2020 and 2021, all TDP sessions were conducted online due to the Covid-19 pandemic, through the TDP Smart Classroom[2]. In 2022, online sessions continued, with the re-introduction of one in-person holiday school in the middle of the year.

Phase 3 of the TDP had three focus areas:

- Enhancing participants' chances to access higher education;
- Preparing participants for higher education life;
- Enhancing well-informed career decision-making by participants.

Evaluating the TDP and tracking post-school participants

The Human Sciences Research Council (HSRC) is responsible for the evaluation of the TDP implementation. This is achieved through collecting demographic and experiential data from participants during the two years that they take part in the TDP, as well as from the TDP tutors and provincial coordinators. The post-school trajectories of participants are then tracked for two years after they leave the programme.

Methodology

The key research questions for this study were:

- Where were the 2020 TDP Grade 12 cohort in 2022?

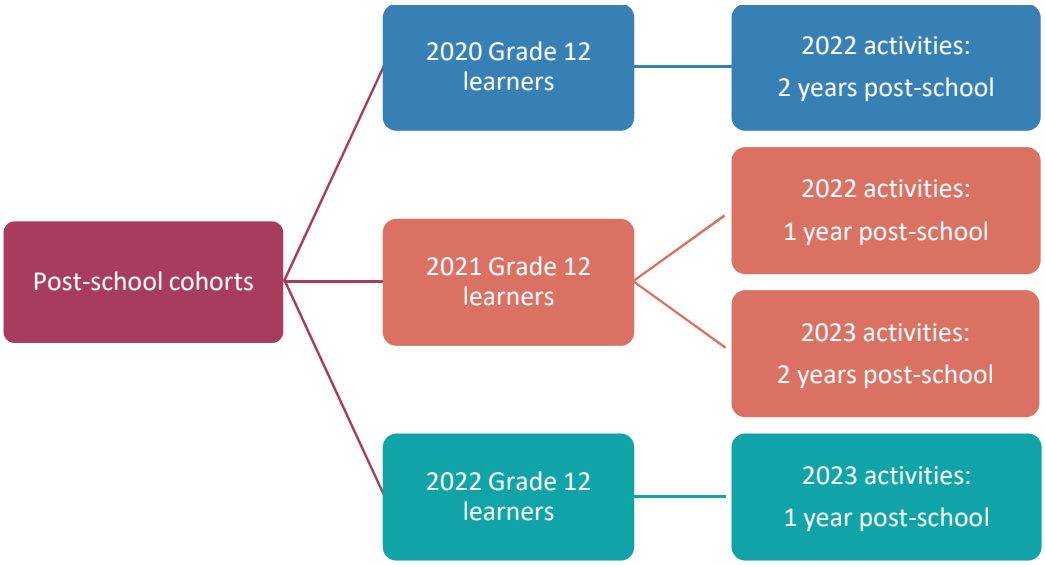
[1] More information on the criteria used for learner selection for the TDP can be found in Hannan and Arends (2021).

[2] An online platform developed for the TDP.

- Where were the 2021 TDP Grade 12 cohort in 2022 and 2023?
- Where were the 2022 TDP Grade 12 cohort in 2023?

Figure 1 summarises the tracking of each cohort in 2023.

Figure 1: Tracking of post-school TDP cohorts



In the post-school tracking, participants were asked about their post-school activities: whether they were studying at a tertiary institution (University/University of Technology or college), working, or neither working nor studying. Participants were then asked a specific set of questions according to their particular activity.

A service provider was appointed by the HSRC to collect the data from the post-school cohorts in 2023, and they were provided with the contact information for the three post-school cohorts, which was obtained from SUNCEP. Two methods of data collection were employed: 1) a survey link was sent to all participants, and 2) telephonic interviews were conducted with some participants. The data collectors attempted to contact each participant several times telephonically if they did not complete the online survey. The combination of these two methods was used to collect as much data as possible. The number of responses and response rate for each cohort are presented in Table 1.

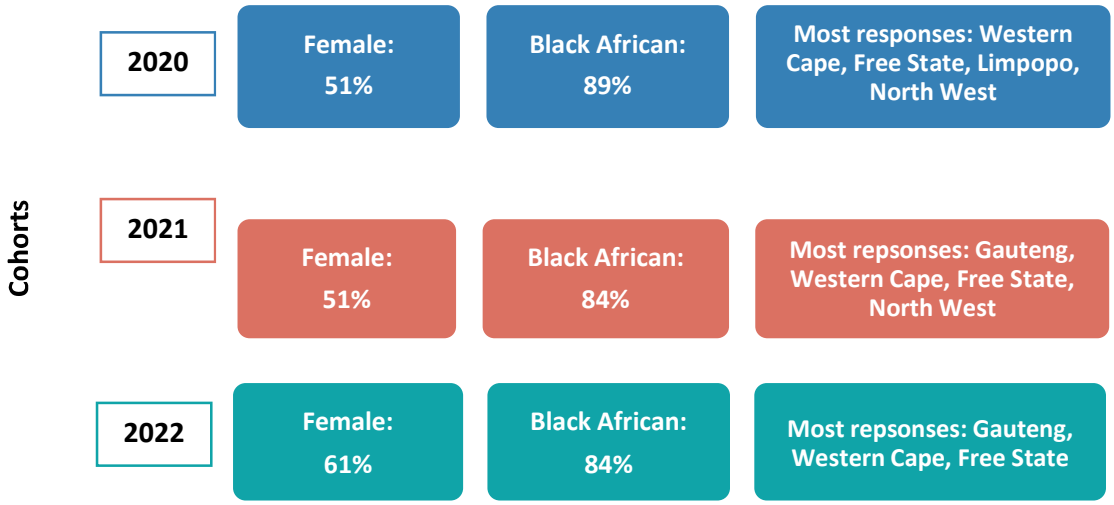
Table 1: Responses by cohort

	Records (Grade 12)	Online survey completion	Telephonic interviews	Total responses	Response rate
2020 cohort	364	153	75	**228**	**63%**
2021 cohort	363	162	85	**247**	**60%**
2022 cohort	346	149	82	**231**	**67%**

The TDP post-school respondents

Females made up at least half of the respondents from each cohort, and the majority were Black African (Figure 2).

Figure 2: Characteristics of the respondents



The report

This report presents the findings from the post-school tracking of the 2020, 2021 and 2022 Grade 12 TDP cohorts, presenting information on their destinations and activities in 2022 and 2023.

Part A focuses on the respondents from each cohort that were attending university or studying at a college in 2022. This was the post-school destination for most of the respondents in each cohort: 96% for 2020 were at a university, with the corresponding percentage being 85% for the 2021 and 2022 cohort respondents. This section outlines the respondents' tertiary institutions, their field of study and qualifications, the impact of the Covid-19 pandemic on their studies, the format of their courses, as well as the extent to which they felt the TDP prepared them for higher education. For the 2021 and 2022 cohorts (as their first-year post-school in 2022 and 2023 respectively), their Grade 12 performance in mathematics and science and their educational aspirations are presented.

In Part B, we present the post-school destinations of those respondents from the 2021 and 2022 cohorts that were working, or neither working nor studying (unemployed). The number of respondents not studying was very low and these findings, while presented, should therefore be interpreted with caution. As the percentage pf those not at a university for the 2020 cohort was only four percent and they were in their second-year post-school in 2023, the findings for this group are not presented.

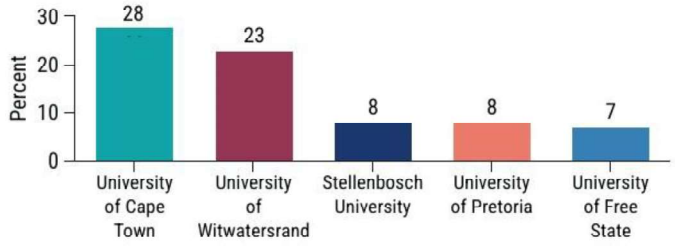
Part C provides a set of key findings from the tracking of the three cohorts.

PART A: RESPONDENTS IN EACH COHORT STUDYING

2020 Cohort: Enrolled at a University in 2022

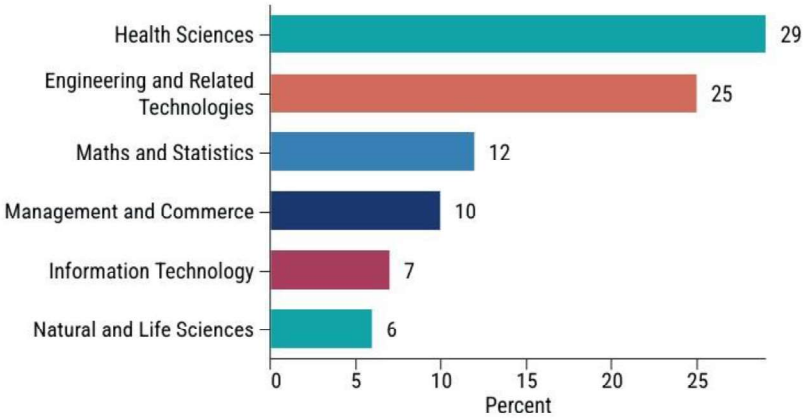
96% of the 2020 cohort were enrolled at a University or University of Technology in 2022

Institutions attended



The highest number of TDP respondents were attending the University of Cape Town and the University of the Witwatersrand, followed by Stellenbosch University and the University of Pretoria. These are 4 of the top 5 universities in the country.

Field of study



Almost 80% of respondents were studying STEM fields, with Health Sciences, Engineering and Related Technologies, and Mathematics and Statistics being the most popular fields.

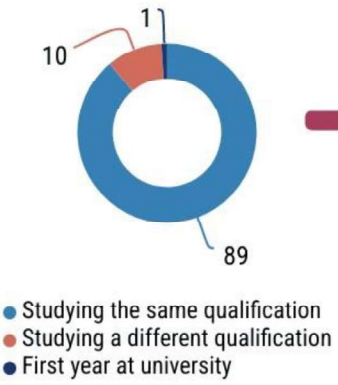
The TDP participants are pursuing tertiary studies in STEM fields, which is one of the goals of the programme.

Qualifications

A high percentage of learners were studying **medicine and surgery**, as well as different strands of **Engineering**. Other specialisations included areas such as **Chemistry; Information Technology and Computer Science; Mathematics, Accounting and Actuarial Science, and Biology**.

The TDP participants are likely to enter high profile STEM professions and occupations.

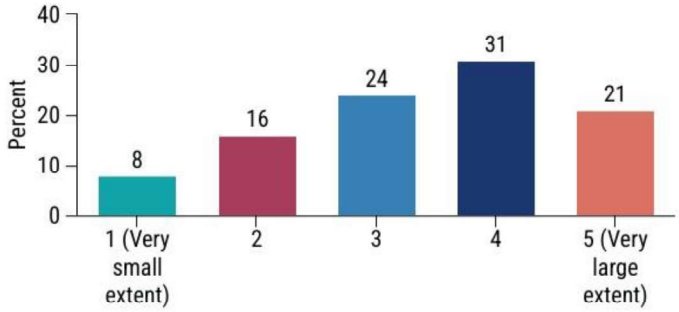
University progression



In 2022, 89% of respondents were studying the same qualification as in 2021, while 10% were studying a different qualification.

At the end of 2022, **85%** of learners met the requirements to proceed to the next year of study.

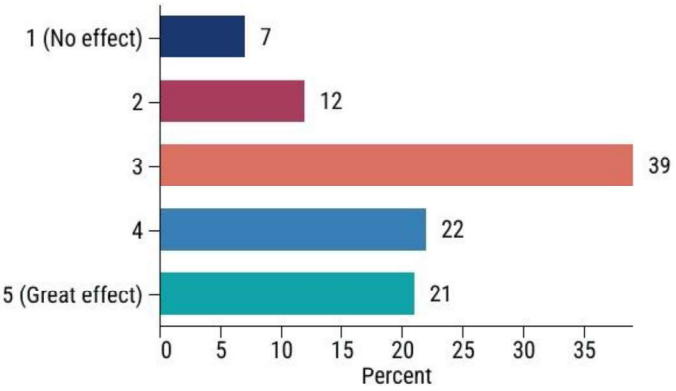
Extent to which the TDP prepared participants for university life



Just over half of the 2020 respondents felt that the TDP prepared them well for university life, giving a rating of 4 or 5.

The TDP is therefore having some success in preparing participants for higher education. However, there is room for improvement.

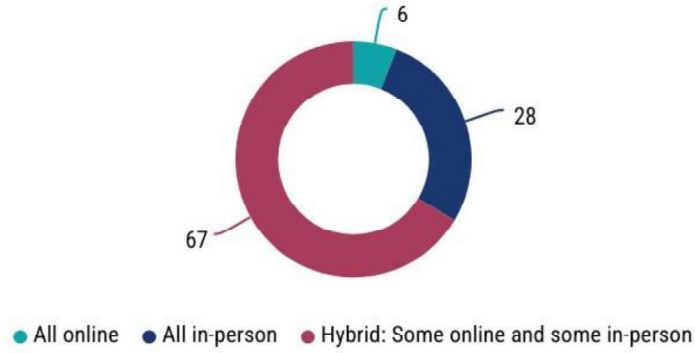
Effect of Covid-19 pandemic on studies



43% of respondents reported that the pandemic had a large effect on their studies (rated as either a 4 or 5). A further 39% felt it had a medium effect.

This emphaises the adverse impact that the pandemic had on university students, including the TDP graduates.

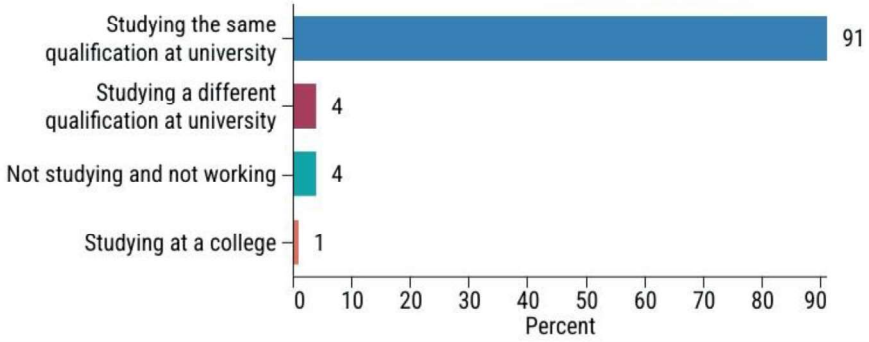
Format of courses during 2022



The majority of respondents attended some lectures/tutorials online and some in-person. Just over a quarter attended all lessons in-person and 6% attended online lessons only.

The continuation of online engagement requires learners to be familiar with online learning when entering university. This is also central within the TDP.

2023 activity

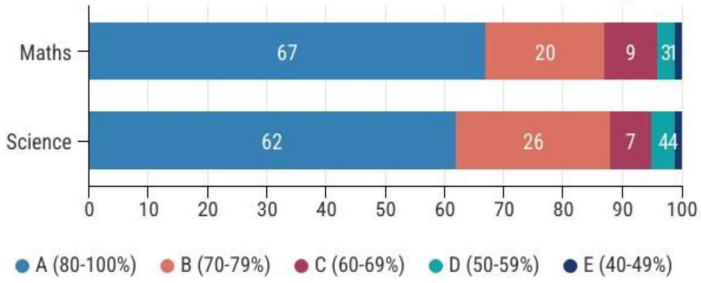


91% of the respondents were continuing with the same qualification in 2023, while 5% were studying a different qualification at a university or college.

2021 Cohort: Enrolled at a University in 2022

85% of the 2021 cohort respondents were enrolled at a University or University of Technology in 2022

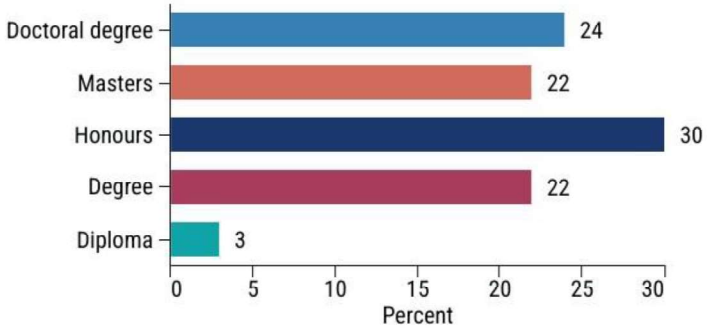
Grade 12 performance



More than 80% of TDP learners achieved an A or B in mathematics and science in Grade 12. These learners are talented and highly motivated, and these marks allowed them attend top universities and pursue STEM fields.

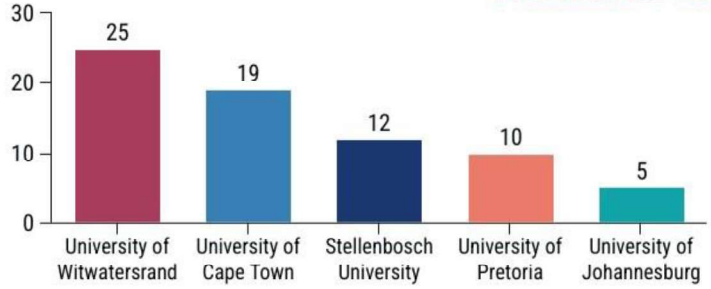
Around a quarter rated the impact of Covid on their Grade 12 year as high.

Highest qualification planned



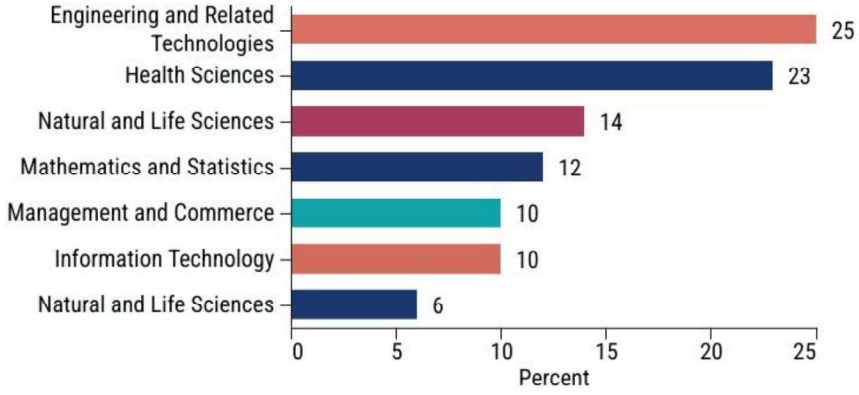
98% of the respondents planned to complete at least a degree, with 76% were aiming to obtain a post-graduate degree.

Institutions attended



The universities attended by the highest number of TDP respondents were the University of Cape Town, University of the Witwatersrand, Stellenbosch University, University of Pretoria and the University of Johannesburg.

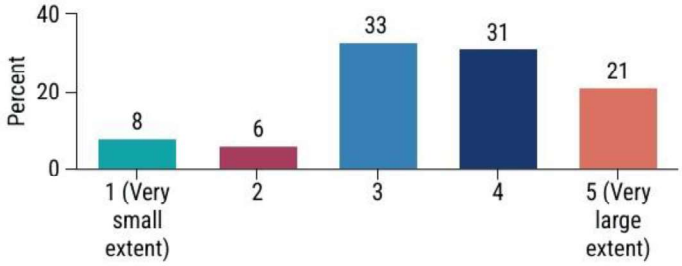
Field of study



Eighty five percent of respondents were studying STEM fields, with Engineering and elated Technologies, Health Sciences, and Natural and Life Sciences being the most popular fields of study.

TDP participants are studying STEM fields at the tertiary level, which is one of the goals of the programme.

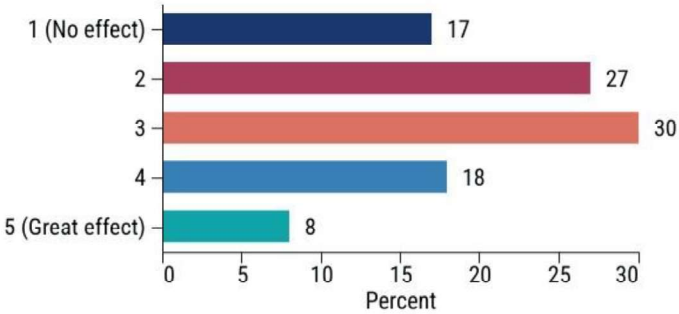
Extent to which the TDP prepared participants for university



Half of the respondents felt that the TDP prepared them well for university life (rated as a 4 or 5). , with a further third rating the level of preparation as medium.

The TDP is therefore playing an important role in supporting learners to enter higher education.

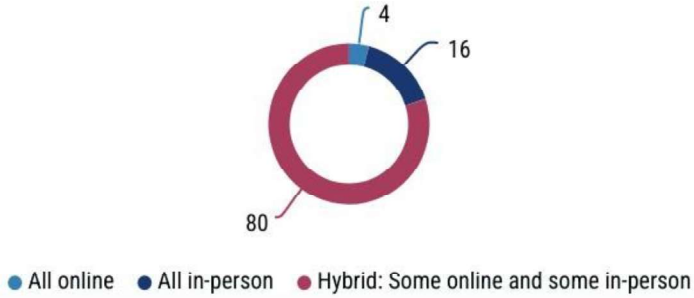
Effect of the Covid-19 pandemic on studies



A quarter of respondents (26%) felt that the pandemic had a large effect on their studies (rated as either a 4 or 5).

This was lower than the impact reported by the 2020 cohort (43%), but shows that the pandemic continued to impact students that entered university in 2022to some extent.

Format of courses during 2022



80% of respondents attended some lectures/tutorials online and some in-person in 2022.

The shift towards hybrid models of learning means that individuals require the knowledge and skills to engage with online learning. This is also central within the TDP.

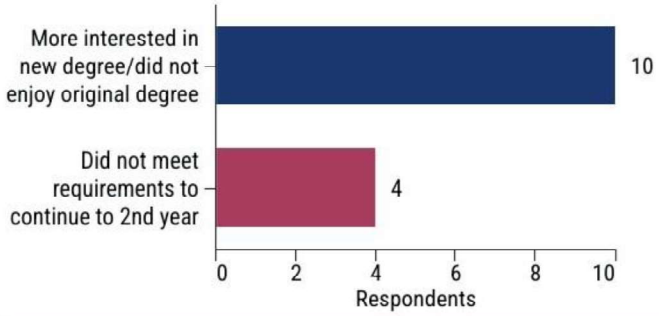
2023 activity

88%

of those in university in 2022 continued to the 2nd year of the same qualification n 2023.

7% changed their qualification, but remained at the university; 3% were not studying or working, 1% were studying at a college and 1% were working in 2023.

Changed qualification in 2023



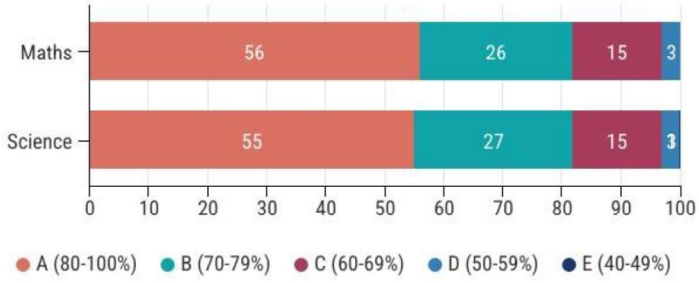
Of the 14 respondents that changed their degree, 10 found a degree they were more interested in or they did not enjoy their original degree, and 4 did not meet the necessary requirements to progress to the 2nd year of their original degree.

The majority did however still pursue STEM degrees in fields such as Nautical Science, Maths and Physics, Biological Science, Nursing, and Genetics and Pathology.

2022 Cohort: Enrolled at a University in 2023

85% of the 2022 cohort were enrolled at a University or University of Technology in 2023

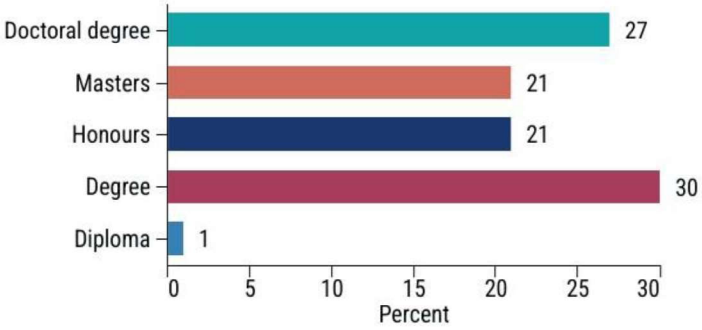
Grade 12 performance



Learners performed well in matric, with over 80% achieving an A or B in mathematics and science. This shows that these learners are talented and motivated, and these marks would have allowed them to pursue STEM fields and attend top universities.

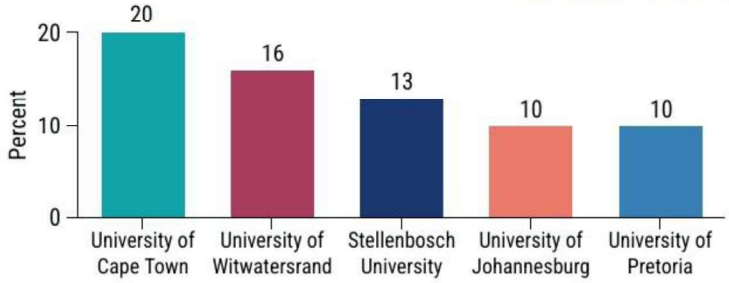
Only a quarter (24%) rated the impact of Covid on their Grade 12 year as high.

Highest qualification planned



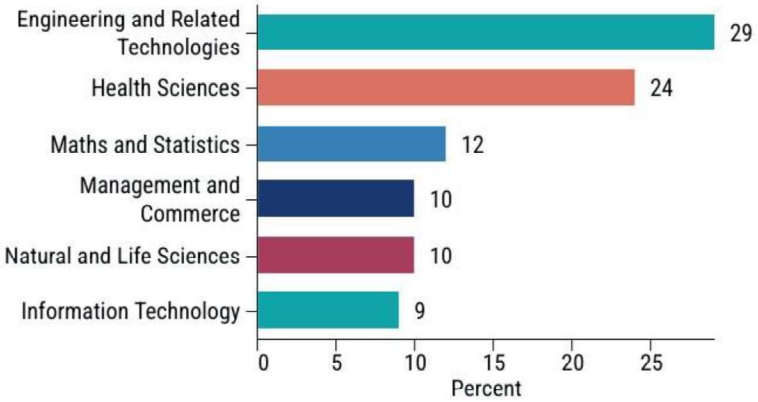
Of those respondents attending a university in 2023, around a third planned to complete a degree, with a further 69% were aiming to pursue a post-graduate degree, from Honours to a Dcotoral degree.

Institutions attended



The universities attended by the highest number of TDP respondents were the University of Cape Town, University of the Witwatersrand, Stellenbosch University University of Johannesburg and University of Pretoria. These are the top five universities in the country.

Field of study



72% of respondents were studying STEM fields, with Engineering and elated Technologies, Health Sciences and Mathematics and Statistics, being the top three fields of study.

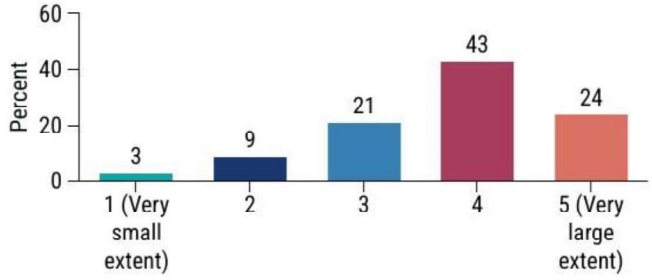
The TDP participants are pursuing tertiary studies in STEM fields, which is one of the goals of the programme.

Qualifications

A high percentage of learners were studying different strands of **Engineering** and **medicine and surgery**. Other specialisations included qualifications such as **Accounting, Actuarial Science, Mathematics, Computer Science, Chemistry and Biochemistry**.

The TDP participants are likely to enter high profile STEM professions and occupations.

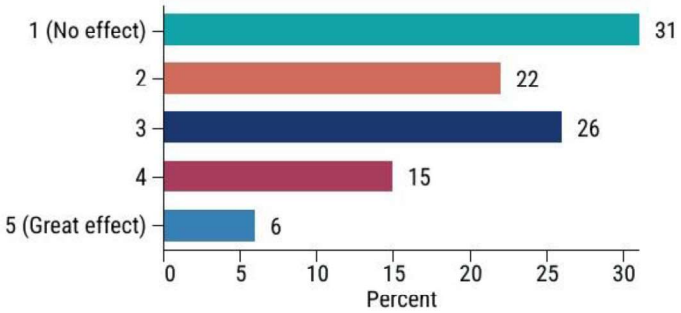
Extent to which the TDP prepared participants for university



More than two thirds of the 2022 respondents felt that the TDP prepared them well for university life, rating it as 4 or 5.

The TDP is having good success in preparing participants for higher education. However, there, is room for improvement.

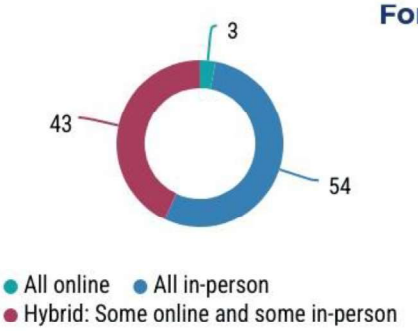
Effect of the Covid-19 pandemic on studies



21% of respondents felt that the pandemic had a large effect on their studies (rated as either a 4 or 5). A further 26% felt it had a medium effect.

These results show that the adverse impact of Covid on learning has decreased for the more recent TDP graduates.

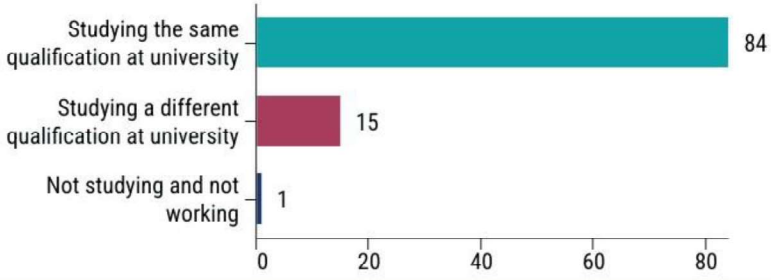
Format of 2023 courses



Just more than half of respondents attended all lectures/tutorials in-person, while 43% attended some online and some in-person.

This shows a shift towards more in-person learning since the Covid pandemic, which will enable more engagement between students, and with lecturers and tutors.

Plans for 2024



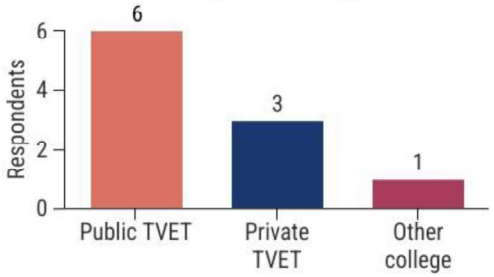
Most of the respondents were planning to continue with the same qualification in 2024, while 15% were planning to study a different qualification at university.

Studying at a college

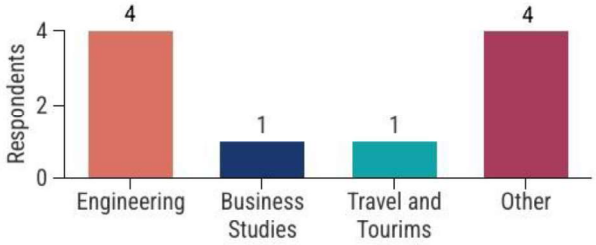
2021 cohort: Studying at a college in 2022

Of the 2021 cohort respondents, 10 were studying at a college in 2022.

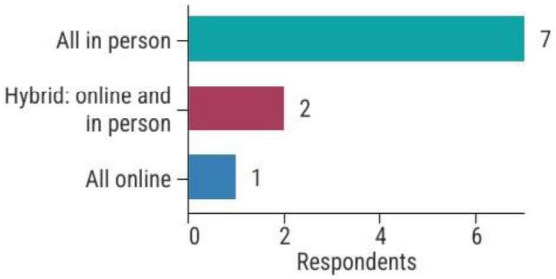
Type of college



Programme

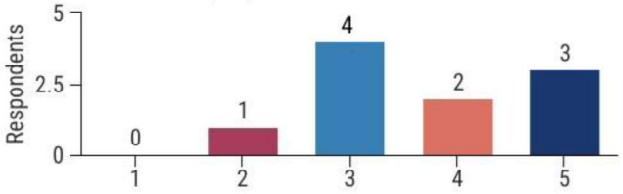


2022 course format

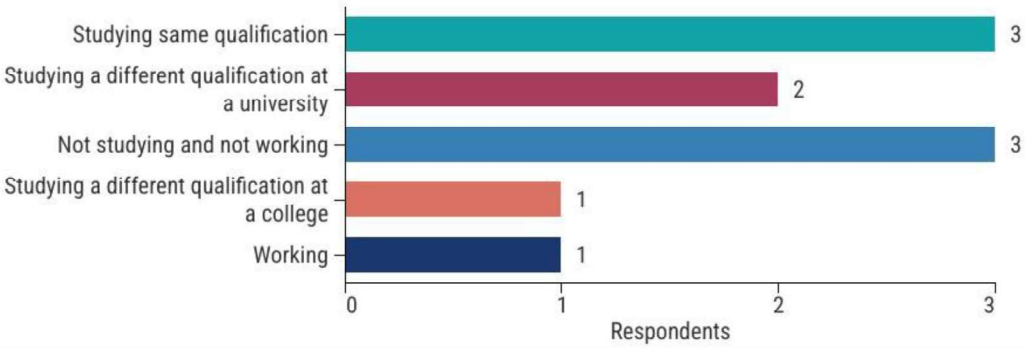


Extent to which TDP prepared them for college

Respondents reported a medium to high level of preparation from the TDP.



2023 activity



3 changed their qualifications based on their interests.

2022 cohort: Studying at a college in 2023

Of the 2022 cohort respondents, 4 were studying at a college in 2023.

Type of college

1 was studying at a public TVET college, 1 at a private TVET, 1 was at Grovos Training Center and 1 was at Focus Air Flight School.

Field of study

- Engineering
- IT/Computer Science
- Primary Agriculture
- Transport and Logistics

Impact of Covid

Most reported a limited effect of covid on their studies, with 1 reporting a high impact.

Lecture format

All 4 attended all lectures/tutorials in person in 2023.

TDP preparation

3 of the respondents rated the extent of college preparation from the TDP as very high, with 1 rating it as medium.

2024 plans

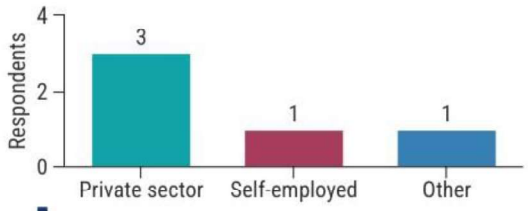
2 planned to continue with the same qualification, 1 planned to study a different qualification, and 1 intended to work in 2024.

2021 Cohort: Not studying in 2022

2021 cohort: Working in 2022

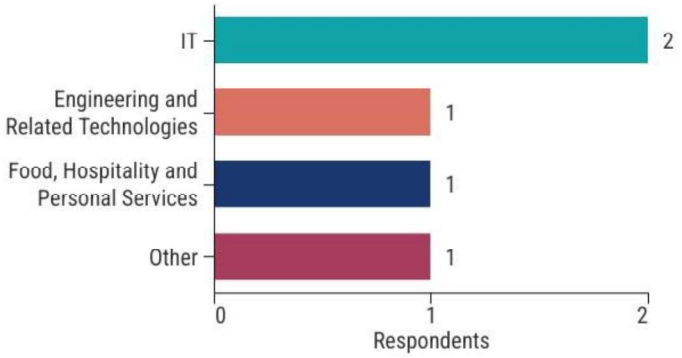
Of the 2021 cohort respondents, 5 were working in 2022.

Sector



4 were on contract and 1 was working on a casual (daily) basis.

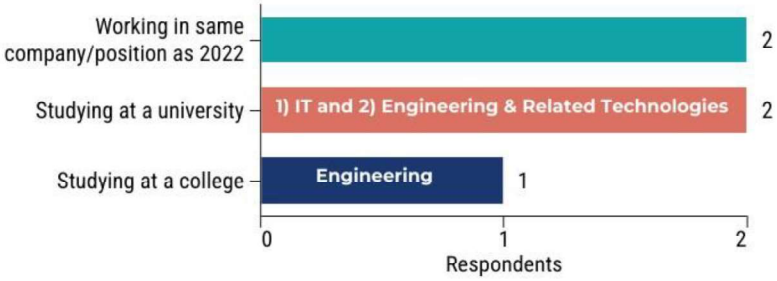
Field



Impact of Covid on employment

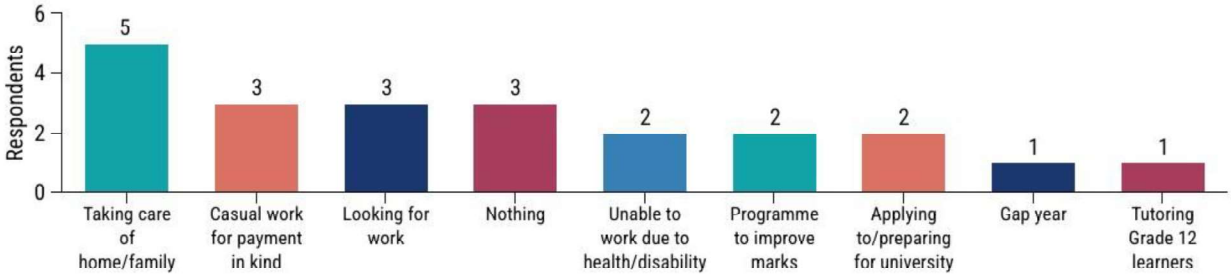
The views on the impact of covid on their employment were mixed: 2 rated the impact as high, while 3 reported a low to medium impact.

2023 activities

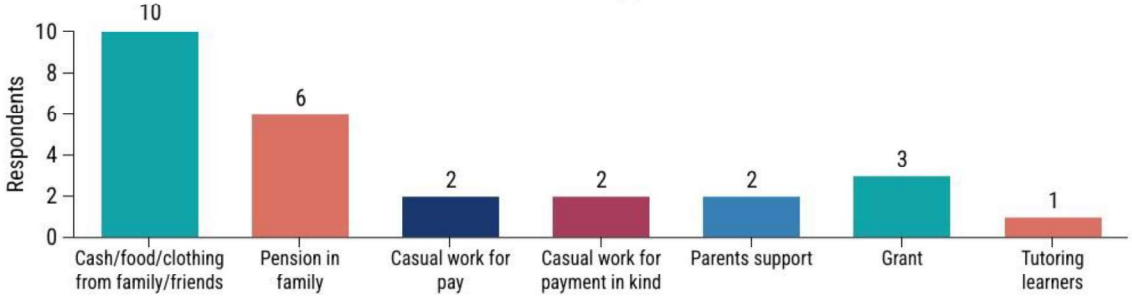


2021 cohort: Neither working nor studying in 2022

2022 activities

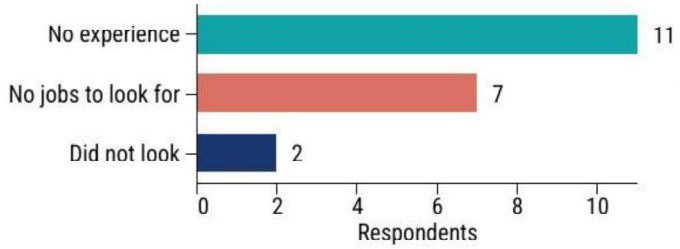


Sources of support



Job search

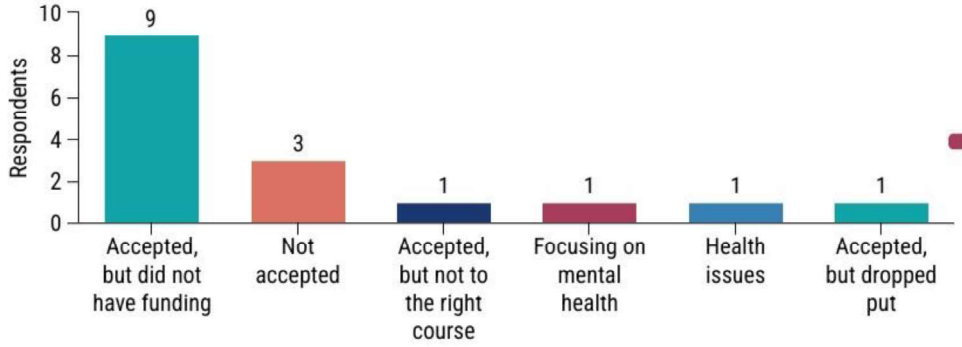
Of the 21 unemployed, 14 reported looking for a job in 2022.



The most common reason reported for not being able to find employment was not having experience, followed by the idea that there were no jobs available.

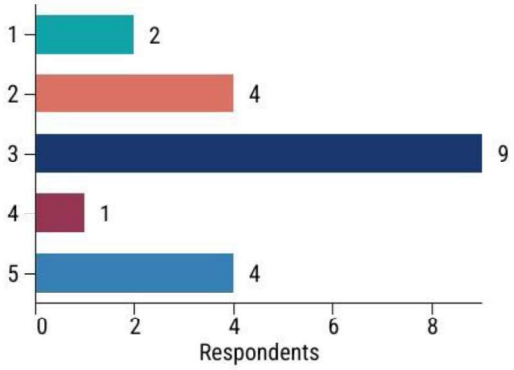
Applied to study

Of the 21 unemployed, 17 had applied to study in 2022.

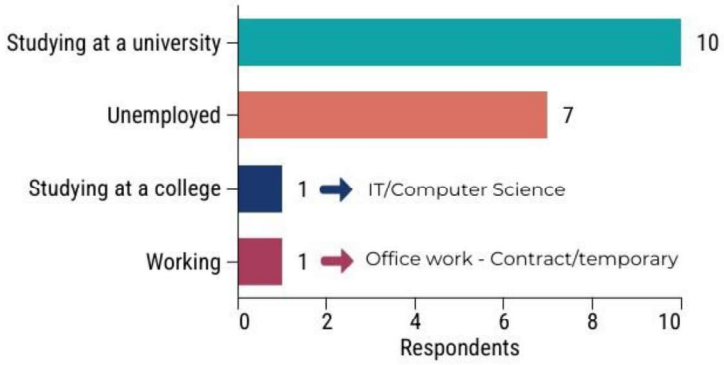


Respondents provided several reasons for being unable to study in 2022, with the most common being a lack of funding.

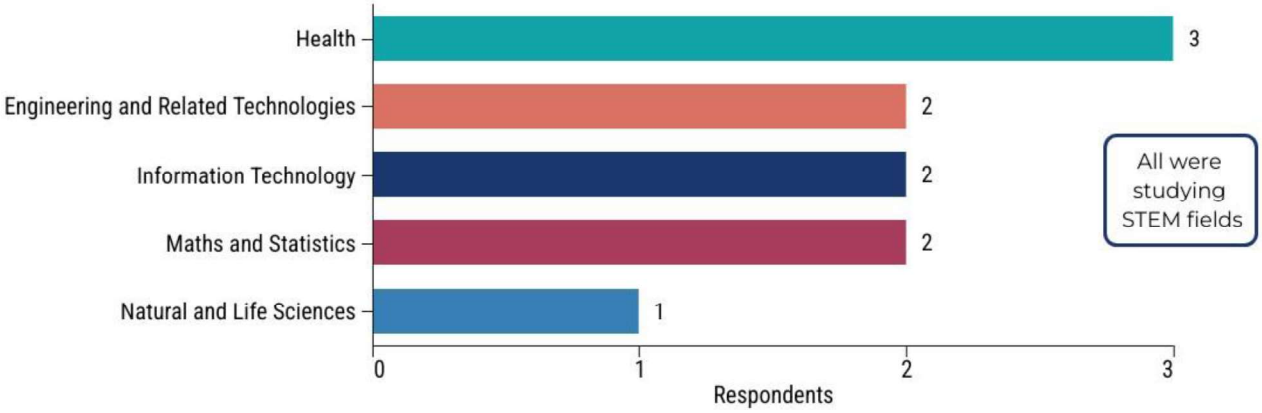
Impact of Covid on situation in 2022



2023 activity

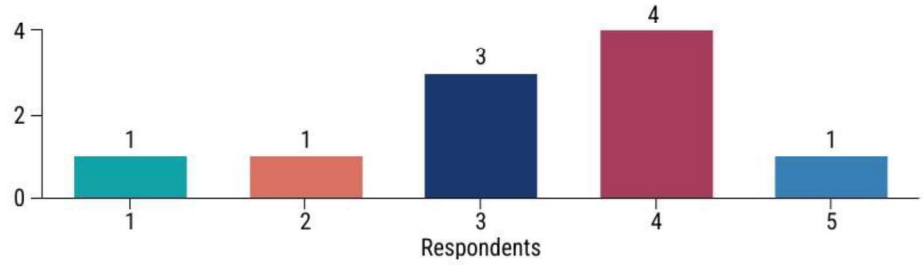


Fields of study for those in university in 2023



All were studying STEM fields

Impact of covid on university studies in 2023



Most reported a medium to high impact on their studies

2022 cohort: Working in 2023

Of the 2022 cohort respondents, only 2 were working in 2023.

1 was self-employed, working in Sales and Marketing → Planned to work in a different company / position in 2024.

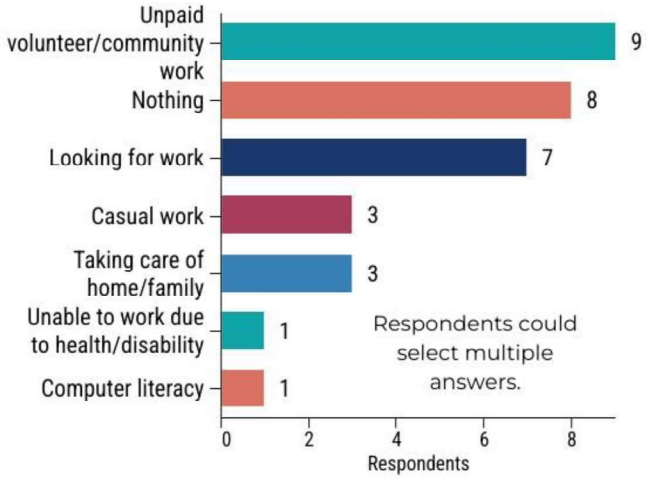
1 was working in the private sector as a cleaner → Planned to study at a university in 2024

Both were employed on a casual (daily) basis.

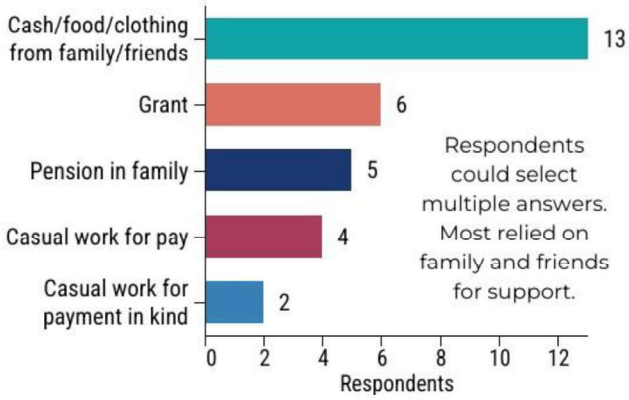
2022 cohort: Neither studying nor working in 2023

Of the 2022 cohort respondents, 26 were neither working nor studying in 2023.

2023 activities

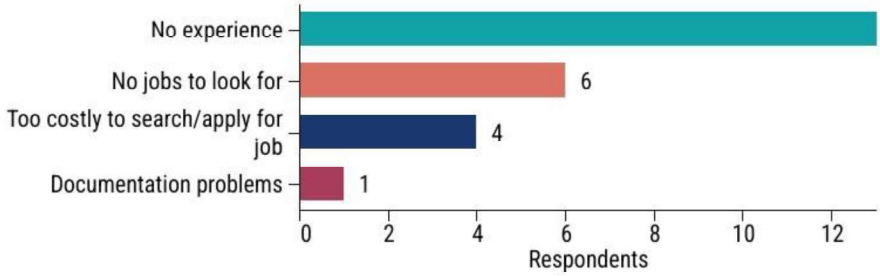


Sources of support



Job search

8 applied for jobs in 2023

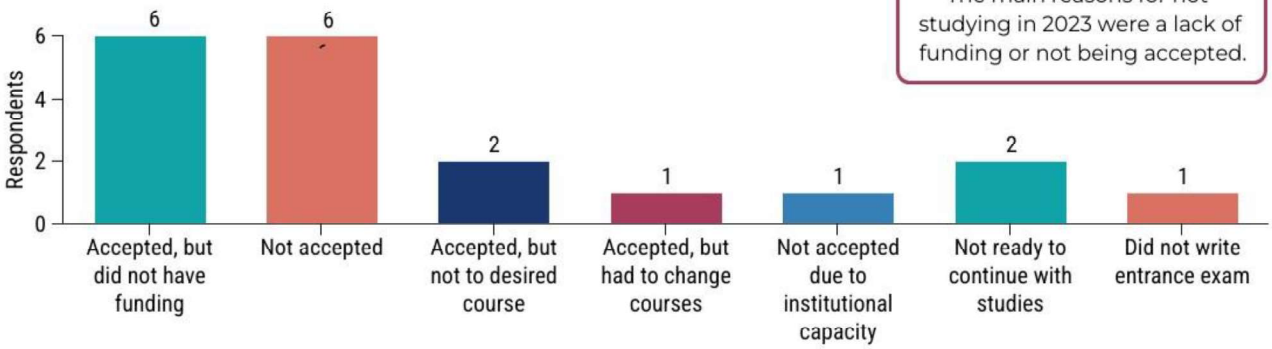


The main reason cited for being unable to find employment was no experience, followed by no available jobs. Several also felt it was too costly to search or apply for jobs.

Applied to study

20 applied to study in 2023

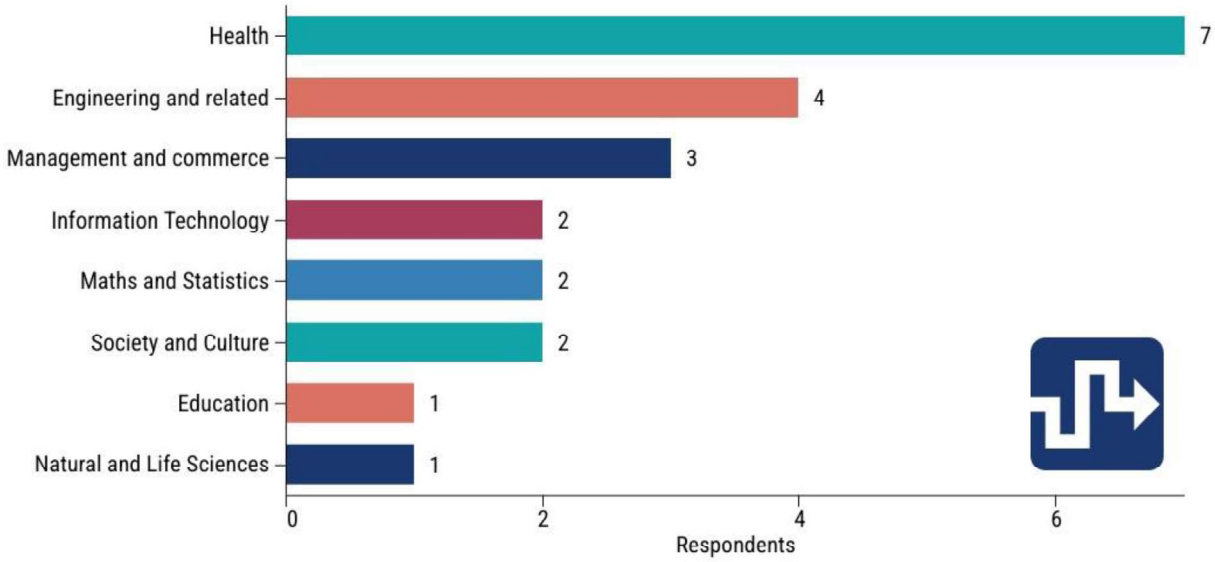
The main reasons for not studying in 2023 were a lack of funding or not being accepted.



Plans for 2024

20 planned to study at a university in 2024, 1 wanted to attend a college, 1 intended to work, and 1 planned to neither study nor work.

Planned future field of work



PART C: KEY FINDINGS

Based on the findings from the post-school cohort tracking, this section presents key findings from the three cohorts[3].

Grade 12 performance

- More than 80% of respondents in the 2021 and 2022 cohorts achieved at least a B in mathematics and science in Grade 12, with more than half achieving an A in each subject. The 2020 cohort respondents also performed well in these subjects (Hannan, 2022).

Educational aspirations

- Around 70% of the 2021 and 2022 cohort respondents wanted to complete a post-graduate degree, while almost all wanted to obtain at least a degree.

Post-school trajectories

Respondents studying at a university

- Most respondents went on to study at a university, with the highest attendance for each cohort being at four of the top five universities in the country. For the 2021 and 2022 cohorts, the University of Johannesburg, the remaining university in the top five, was also in the top five for respondent enrolment.
- The majority from each cohort had continued with, or planned to continue, their studies. A few changed their degrees.

Respondents studying at a college

- Of those studying at a college, most were studying at a public TVET college, with a few at private TVET colleges and other colleges.

Respondents working

- Of those working, some planned to go to university in the following year.

Respondents neither working nor studying

- Of those unemployed, many had applied to study. Most had been accepted, but did not have the funding to attend university, while some had not been accepted.
- Of the 2021 cohort respondents unemployed in 2022, half were studying at a university in 2022.
- For the 2022 cohort respondents, 20 out of the 23 unemployed in 2023 planned to study at a university in 2024.

STEM fields

Respondents studying at a university

- At least 85% of respondents in each cohort were studying at a university, with the highest numbers enrolled in Engineering (and related technologies), Health Sciences, and

[3] TDP participants who were employed or not in education, employment or training may have been less inclined to participate in the survey.

Mathematics and Statistics. There were also respondents studying Information Technology and Natural and Life Sciences, and a smaller proportion studying degrees in areas such as Management and Commerce.

- Although a few respondents changed their degrees, many remained in STEM fields.

Respondents studying at a college

- Of those studying at a college, some were studying towards STEM qualifications.
- Half of the respondents in college (2021 cohort: 4 out of 10, and 2022 cohort: 3 out of 4) were also pursuing qualifications in STEM fields.

Respondents working

- Three of the five 2021 cohort respondents working in 2022 went on to study STEM fields in 2023.

Respondents neither working nor studying

- The 2021 cohort respondents that were unemployed in 2022 and went on to attend university in 2022 (10 out of 19) were all studying STEM fields.
- Those unemployed in 2022 cohort unemployed in 2023 - majority wanted to work in STEM fields (16/22)
- For the 2022 cohort respondents, 16 out of 22 aimed to work in STEM fields.

TDP preparation

- At least half of the respondents attending a university or college in each cohort felt that the TDP had prepared them well higher education, giving a rating of 4 or 5, on a scale from 1 (small extent) to 5 (large extent).
- This aspect of the programme requires some refinement to ensure that participants are better prepared for higher education.

Impact of Covid

- The majority of the 2020 (67%) and 2021 (80%) cohort respondents attended university lectures/tutorials both in person and online, using a hybrid model, in 2021 and 2022 respectively. The corresponding percentage for the 2022 cohort was somewhat lower, with 43% attending sessions in person and online in 2023.
- Less than half of each cohorts' respondents reported a large impact (rated as 4 or 5) of the Covid-19 pandemic on their studies, with the percentage decreasing for each cohort: 43% for the 2020 cohort, 26% for the 2021 cohort and 21% for the 2022 cohort. A further 39% (2020 cohort), 33% (2021 cohort) and 26% (2022 cohort) reported a medium impact on their studies.
- Those studying at college, working, or unemployed reported an overall moderate impact on their studies, work or unemployment.

CONCLUSION

In South Africa, sustained efforts have been made to improve STEM (Kahn, 2014) and various initiatives focus on the promotion of mathematics and science (Tikly et al., 2018). Nevertheless, proficiency in these subjects continues to be subpar, as evidenced by research such as the Trends in

International Mathematics and Science Study (TIMSS) (Reddy et al., 2022), and the outcomes of the National Senior Certificate examinations (DBE, 2024). Moreover, even with a rise in student enrolment and completion of SET programmes (DHET, 2021), the pool of students that can access tertiary science-oriented programmes remains limited in comparison to the nation's demand for skilled professionals (DSI, 2019).

The South African departments of Basic Education, and Science and Innovation, have made a commitment to increase participation and performance in STEM subjects, and to promote a scientifically literate and engaged society (DBE, 2016; DBE, 2020; DSI, 2019), which is vital for the development of a public that can actively engage in the science and technology discourse.

This report has provided the post-school trajectories of learners that participated in the TDP, a programme that supports learners who possess the potential to excel in STEM fields, thereby playing an important role in promoting STEM knowledge and skills in the country. The TDP 2020, 2021 and 2022 participants performed well in mathematics and science at Grade 12, and therefore the majority chose to attend university. Most of the respondents have high educational aspirations and pursue degrees in STEM fields, which will lead them to contributing to the South African knowledge economy, labour market and the development of STEM human capital.

Many of the TDP participants are from homes of a lower socio-economic status and attend no-fee schools (Hannan and Arends, 2021). Consequently, it is therefore important for these learners to be supported in accessing tertiary education at top universities and pursuing STEM careers. Programmes such as the TDP must continue to contribute to the enhancement of STEM performance and the interest in STEM studies and careers in South Africa, particularly for learners from disadvantaged backgrounds.

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