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The profile of successful students at the University of the Free State

A statistical report

Dr Nadia Fouché
QUANTEMNA

Contents

Research questions

1. How does the profile of a student look who is successful in any given year?
2. How does the profile of a student look who is successful in a degree?
3. How does the profile of a student look that graduates in time (N and N + 1 years)?

Data analysis methodology

Statistical analyses were run to answer the research questions for each of the following variable combinations:

1. Extended pathway Qwaqwa Campus
2. Extended pathway Bloemfontein Campus
3. Mainstream pathway Qwaqwa Campus
4. Mainstream pathway Bloemfontein Campus

The indicators of interest were:

1. Quintiles
2. Home province
3. Sum of NQF level of all modules enrolled in
4. Academic year of registration
5. Length of degree
6. Gender
7. Race
8. Sum of modules enrolled in
9. AP score
10. NBT results
11. Faculty of qualification
12. NSFAS funding status

For each of the research questions and within each of the variable combinations, feature selection was carried out to ensure that only variables significantly contributing to the outcome variables were included in the final models.

Research Question 1: How does the profile of a student look who is successful in any given year?

For Research Question 1, the outcome variable (success rate) was indicated by the proportion of credits passed by a student. This proportion was calculated by dividing the number of credits passed by the Full-Time Equivalent credits enrolled in. All students in the dataset were included for the analysis of Research Question 1.

Extended Pathway Qwaqwa Campus

Descriptive statistics for multilevel categorical variables to determine reference categories

Frequency tables were run for all categorical variables with more than two levels to help with the selection of reference categories in the multiple regression analysis.

Table 1. Extended Pathway Qwaqwa Campus – Success Rate by Province

Province	Success rate
EC	0.821022
FS	0.760977
GP	0.825077
KN	0.800153
LP	0.835496
MP	0.811347
NW	0.866934

The Western Province and the Northern Cape were removed due to the low number of cases in these provinces. Free State was chosen as the reference category due to it having a noticeably lower success rate compared to the other provinces.

Table 2. Extended Pathway Qwaqwa Campus – Success Rate by Faculty

Faculty	Success rate
Economic and Management Sciences	0.770724
Education	0.869961
Humanities	0.753804
Natural and Agricultural Sciences	0.782834

Education was chosen as the reference category due to it having a noticeably higher success rate compared to the other faculties.

Statistical model

A standard multiple regression analysis was run to determine the unique contribution of each of the variables to the prediction of student success rate.

Standard multiple regression results

The results of the standard multiple regression can be seen in Table 3 below:

Table 3. Research Question 1 Extended Pathway Qwaqwa Multiple Regression – Full Model

Dep. Variable:	Success rate	**R-squared:**	0.184
Model:	OLS	**Adj. R-squared:**	0.160
Method:	Least Squares	**F-statistic:**	7.577
No. Observations:	658	**Prob (F-statistic):**	7.53e-19

	coef	std err	t	P>|t|	[0.025	0.975]
Intercept	0.3207	0.111	2.895	0.004	0.103	0.538
EC	0.1042	0.084	1.240	0.215	-0.061	0.269
GP	0.0560	0.040	1.415	0.158	-0.022	0.134
KN	0.0498	0.023	2.141	0.033	0.004	0.095
LP	0.0268	0.092	0.293	0.770	-0.153	0.207
MP	0.0536	0.062	0.861	0.390	-0.069	0.176
NW	0.2038	0.121	1.688	0.092	-0.033	0.441
Economic and Management Sciences	-0.1573	0.032	-4.859	0.000	-0.221	-0.094
HUMANITIES	-0.2150	0.028	-7.793	0.000	-0.269	-0.161
Natural and Agricultural Sciences	-0.3506	0.042	-8.258	0.000	-0.434	-0.267
Quintile	0.0081	0.008	1.045	0.296	-0.007	0.023
Total modules enrolled	0.0765	0.013	5.936	0.000	0.051	0.102
AL Score	0.0029	0.001	2.113	0.035	0.000	0.006
Five Year Degree	3.369e-17	5.34e-17	0.631	0.528	-7.12e-17	1.39e-16
Female	0.0851	0.020	4.345	0.000	0.047	0.124
Has NSFAS Award	0.0354	0.020	1.740	0.082	-0.005	0.075
NQF level sum	0.0018	0.001	1.365	0.173	-0.001	0.004
Academic year of registration	0.0025	0.006	0.389	0.697	-0.010	0.015
AP Score	-0.0020	0.003	-0.702	0.483	-0.008	0.004
QL Score	-0.0041	0.002	-2.402	0.017	-0.008	-0.001
ML Score	0.0009	0.001	1.292	0.197	-0.000	0.002

The model was refined by dropping all non-significant predictor variables and rerunning the regression analysis. The results can be seen in Table 4 below.

Table 4. Research Question 1 Extended Pathway Qwaqwa Multiple Regression – Refined model

Dep. Variable:	Success_rate	**R-squared:**	0.166
Model:	OLS	**Adj. R-squared:**	0.153
Method:	Least Squares	**F-statistic:**	12.17
No. Observations:	806	**Prob (F-statistic):**	1.89e-24

	coef	std err	t	P>|t|	[0.025	0.975]
Intercept	0.3027	0.076	3.960	0.000	0.153	0.453
EC	0.1300	0.066	1.957	0.051	-0.000	0.260
GP	0.0633	0.034	1.884	0.060	-0.003	0.129
KN	0.0501	0.019	2.670	0.008	0.013	0.087
LP	0.0971	0.070	1.396	0.163	-0.039	0.234
MP	0.0709	0.048	1.462	0.144	-0.024	0.166
NW	0.2078	0.097	2.139	0.033	0.017	0.399
.Economic and Management Sciences	-0.1556	0.029	-5.381	0.000	-0.212	-0.099
Humanities	-0.2170	0.025	-8.660	0.000	-0.266	-0.168
Natural and Agricultural Sciences	-0.3541	0.039	-9.122	0.000	-0.430	-0.278
Total modules enrolled	0.0837	0.010	8.413	0.000	0.064	0.103
AL Score	0.0036	0.001	3.115	0.002	0.001	0.006
Female	0.0824	0.018	4.699	0.000	0.048	0.117

QL Score	-0.0036	0.001	-2.412	0.016	-0.007	-0.001

From the table above can be seen that, after dropping all non-significant variables, the following variables made statistically significant unique contributions to the prediction of student success rate after all other variables were controlled for: home province, faculty, sum of modules enrolled in, AL score, gender and QL score.

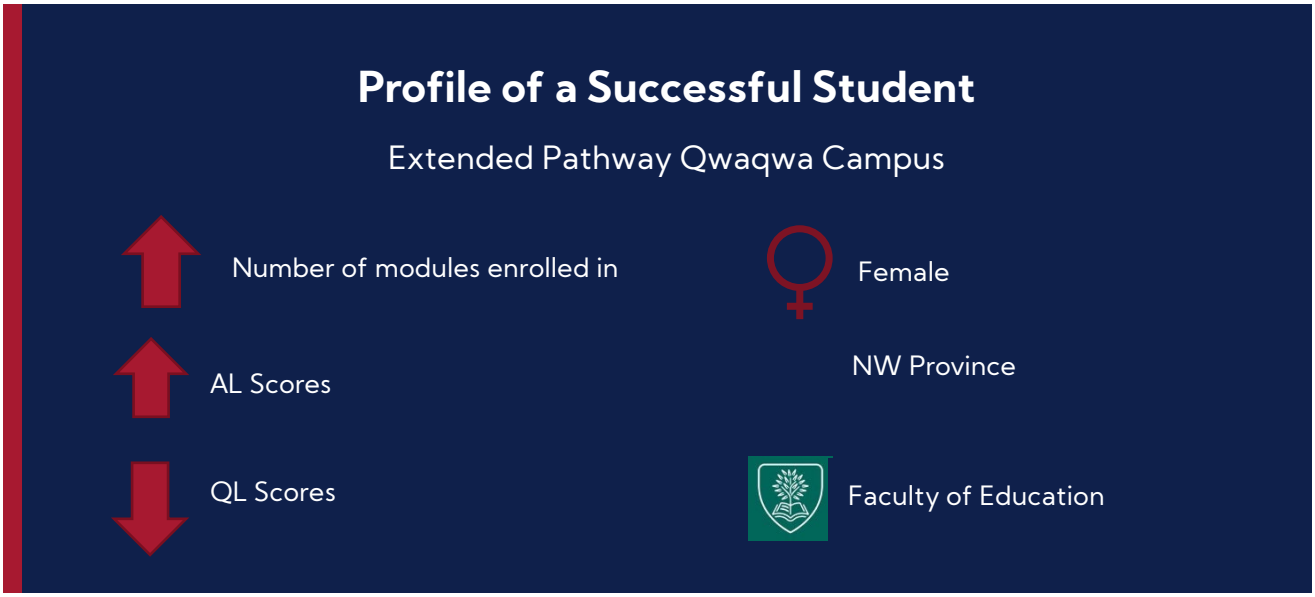
A one unit increase in the sum of modules enrolled in was associated with the proportion of credits passed (i.e., success rate) increasing by 0.08 units. Stated differently, enrolling for one additional module was associated with a 8% increase in the percentage of credits passed. In addition, a one unit increase in AL score was associated with a 0.0036 unit increase in the proportion of credits passed (0.36%), while a one unit increase in QL score was associated with a 0.0036 unit decrease in the proportion of credits passed (0.36%).

Furthermore, in comparison to males, being female was associated with the proportion of credits passed (i.e., success rate) increasing by 0.08 units. Stated differently, being female compared to male was associated with a 8% increase in the percentage of credits passed.

Moreover, in comparison to students from the Free State, being from KwaZulu-Natal was associated with the proportion of credits passed (i.e., success rate) increasing by 0.051 units, while being from North West was associated with the proportion of credits passed increasing by 0.21 units. Stated differently, being from KwaZulu-Natal compared to the Free State was associated with a 5% increase in the percentage of credits passed, while being from North West was associated with a 20% increase in credits passed. If stastistical significance is disregarded, it can be deduced that, after controlling for all other variables in the model, students from the Free State had the lowest success rates, followed by students from KwaZulu-Natal (5% higher than Free State), Mpumalanga (7% higher than Free State), Limpopo (10% higher than Free State), Eastern Cape (13% higher than Free State), and finally North West (21% higher than Free State).

Students registered in the faculties of Economic and Management Sciences, Humanities, and Natural and Agricultural Sciences had statistically significantly lower success rates when compared to students registered in the Faculty of Education. Being registered in the Faculty of Economic and Management Sciences was associated with a drop of 16% in the percentage of credits passed when compared to being registered in the Faculty of Education. Compared to the Faculty of Education, this percentage drop was even higher for students registered in the Faculty of Humanities, with a 21.7% drop in the percentage of credits passed, and for students in the Faculty of Natural and Agricultural Sciences, with a 35.4% drop in the percentage of credits passed. If statistical significance is disregarded, and after controlling for all other variables in the model, it can be deduced that students in the Faculty of Education had the highest success rate, followed by students in the Faculty of Economic and Management Sciences (16% lower than Education), the Faculty of Humanities (21.7% lower than Education), and finally, the Faculty of Natural and Agricultural Sciences (35.4% lower than Education).

In summary, students in the Extended Pathway program on Qwaqwa campus tended to have higher success rates if they were enrolled in more modules, had higher AL scores, but lower QL scores, were female, were from provinces other than the Free State, and were registered in the Faculty of Education.



Extended Pathway Bloemfontein Campus

Descriptive statistics for multilevel categorical variables to determine reference categories

Frequency tables were run for all categorical variables with more than two levels to help with the selection of reference categories in the multiple regression analysis.

Table 5. Extended Pathway Bloemfontein Campus Success Rate by Province

Province	Success rate
EC	0.771167
FS	0.731067
GP	0.845063
KN	0.784937
LP	0.842215
MP	0.833069
NC	0.740843
NW	0.805813
WP	0.745505

Free State was chosen as the reference category due to it having a noticeably lower success rate compared to the other provinces.

Table 6. Extended Pathway Bloemfontein Campus Success Rate by Race

Race	Success rate
African	0.783873
Coloured	0.753307
Other	0.800816
White	0.690245

White was chosen as the reference category due to it having a noticeably lower success rate compared to the other races.

Table 7. Extended Pathway Bloemfontein Campus Success Rate by Faculty

Registered Faculty	Success_rate
Education	0.832399
Humanities	0.744391
Law	0.792989
Theology	0.662596

The Faculties of Natural and Agricultural Sciences and Economic and Management Sciences were dropped due to low number of respondents.

The Faculty of Education was chosen as the reference category due to it having a noticeably higher success rate compared to the other faculties.

Standard multiple regression results

The results of the standard multiple regression can be seen below:

Table 8. Research Question 1 Extended Pathway Bloemfontein Multiple Regression – Full Model

Dep. Variable:	Success_rate	**R-squared:**	0.089
Model:	OLS	**Adj. R-squared:**	0.078
Method:	Least Squares	**F-statistic:**	8.157
No. Observations:	2025	**Prob (F-statistic):**	2.37e-27

	coef	std err	t	P>|t|	[0.025	0.975]
Intercept	0.2029	0.085	2.379	0.017	0.036	0.370
EC	-0.0059	0.021	-0.280	0.780	-0.047	0.035
GP	0.0307	0.021	1.479	0.139	-0.010	0.071
KN	-0.0163	0.024	-0.678	0.498	-0.064	0.031
LP	0.0034	0.030	0.112	0.911	-0.055	0.062
MP	-0.0066	0.033	-0.201	0.841	-0.072	0.058
NC	0.0114	0.024	0.478	0.633	-0.035	0.058
NW	-0.0044	0.034	-0.128	0.899	-0.072	0.063
WP	-0.0174	0.035	-0.496	0.620	-0.086	0.051
Humanities	-0.1367	0.021	-6.410	0.000	-0.178	-0.095
Law	-0.1719	0.030	-5.798	0.000	-0.230	-0.114

Theology	-0.1386	0.057	-2.412	0.016	-0.251	-0.026
African	0.0647	0.020	3.313	0.001	0.026	0.103
Coloured	0.0140	0.027	0.520	0.603	-0.039	0.067
Other	0.0586	0.053	1.116	0.264	-0.044	0.162
Quintile	0.0181	0.006	3.134	0.002	0.007	0.029
Total modules enrolled	0.0516	0.008	6.718	0.000	0.037	0.067
AL Score	0.0003	0.001	0.468	0.640	-0.001	0.002
Five Year Degree	3.165e-17	2.54e-17	1.247	0.213	-1.81e-17	8.14e-17
Female	0.0720	0.014	5.295	0.000	0.045	0.099
Has NSFAS Award	0.0219	0.017	1.289	0.198	-0.011	0.055
NQF level sum	5.231e-05	0.000	0.475	0.635	-0.000	0.000
Academic year of registration	0.0061	0.004	1.548	0.122	-0.002	0.014
AP Score	0.0045	0.002	2.141	0.032	0.000	0.009
QL Score	-0.0007	0.001	-0.785	0.432	-0.002	0.001
ML Score	0.0022	0.000	5.065	0.000	0.001	0.003

The model was refined by dropping all non-significant predictor variables and rerunning the regression analysis. The results can be seen in the tables below.

Table 9. Research Question 1 Extended Pathway Bloemfontein Multiple Regression – Refined Model

Dep. Variable:	Success_rate	**R-squared:**	0.083
Model:	OLS	**Adj. R-squared:**	0.078
Method:	Least Squares	**F-statistic:**	17.47
No. Observations:	2133	**Prob (F-statistic):**	1.30e-33

	coef	**std err**	**t**	**P>|t|**	**[0.025**	**0.975]**
Intercept	0.2174	0.074	2.926	0.003	0.072	0.363
Humanities	-0.1309	0.020	-6.438	0.000	-0.171	-0.091
Law	-0.1660	0.028	-5.988	0.000	-0.220	-0.112
Theology	-0.1222	0.057	-2.157	0.031	-0.233	-0.011
African	0.0824	0.018	4.629	0.000	0.048	0.117
Coloured	0.0278	0.025	1.109	0.268	-0.021	0.077
Other	0.0729	0.050	1.456	0.146	-0.025	0.171

Quintile	0.0167	0.005	3.239	0.001	0.007	0.027
Total modules enrolled	0.0510	0.007	7.292	0.000	0.037	0.065
Female	0.0729	0.013	5.651	0.000	0.048	0.098
AP Score	0.0044	0.002	2.210	0.027	0.000	0.008
ML Score	0.0022	0.000	5.432	0.000	0.001	0.003

From the table above can be seen that, after dropping all non-significant variables, the following variables made statistically significant unique contributions to the prediction of student success rate after all other variables were controlled for: quintile, sum of modules enrolled in, AP score, ML score, gender, faculty, and race.

A one unit increase in quintile was associated with the proportion of credits passed (i.e., success rate) increasing by 0.017 units. Stated differently, moving up one quintile was associated with a 1.7% increase in the percentage of credits passed.

A one unit increase in the sum of modules enrolled in was associated with the proportion of credits passed (i.e., success rate) increasing by 0.05 units. Stated differently, enrolling for one additional module was associated with a 5% increase in the percentage of credits passed.

A one unit increase in the AP score was associated with the proportion of credits passed (i.e., success rate) increasing by 0.0044 units. Stated differently, AP score increasing by one unit was associated with a 0.4% increase in the percentage of credits passed.

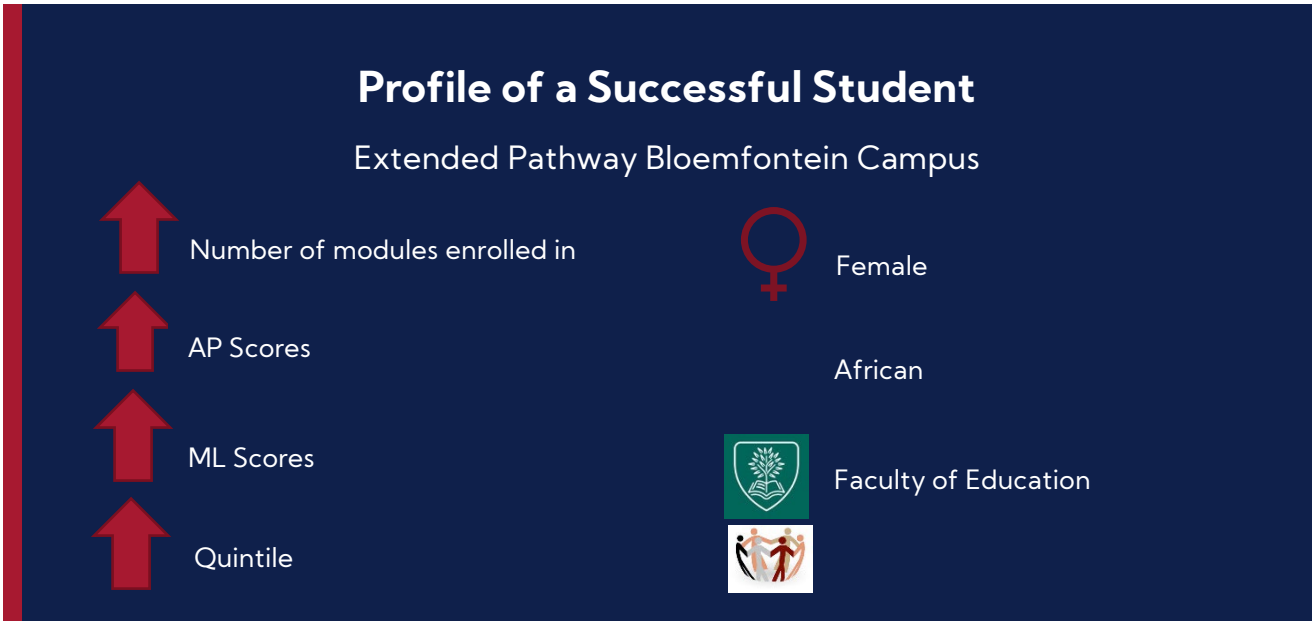
A one unit increase in the ML score was associated with the proportion of credits passed (i.e., success rate) increasing by 0.0022 units. Stated differently, ML score increasing by one unit was associated with a 0.2% increase in the percentage of credits passed.

In addition, in comparison to males, being female was associated with the proportion of credits passed (i.e., success rate) increasing by 0.0729 units. Stated differently, being female compared to male was associated with a 7% increase in the percentage of credits passed.

In addition, students registered in the Faculties of Theology, Humanities, and Law had significantly lower success rates when compared to students registered in the Faculty of Education. Being registered in the Faculty of Theology was associated with a drop of 12% in the percentage of credits passed when compared to being registered in the Faculty of Education. Compared to the Faculty of Education, this percentage drop was even higher for students registered in the Faculty of Humanities, with a 13% drop in the percentage of credits passed, and for students in the Faculty of Law, with a 17% drop in the percentage of credits passed. Disregarding statistical significance, it can be deduced that, after controlling for all other variables in the model, students in the Faculty of Education had the highest success rates, followed by the Faculty of Theology (12% lower than the Faculty of Education), the Faculty of Humanities (13% lower than the Faculty of Education) and the Faculty of Law (17% lower than the Faculty of Education).

Finally, in comparison to White students, being African was associated with the proportion of credits passed (i.e., success rate) increasing by 0.0824 units. Stated differently, being African compared to White was associated with a 8% increase in the percentage of credits passed. By disregarding statistical significance and only looking at the coefficients, it can be deduced that, after controlling for all other variables in the model, African students had the highest success rate (8% higher than White students), followed by students from other racial categories (7% higher than White students), Coloured students (3% higher than White students), and finally, White students had the lowest success rate.

In summary, students in the extended pathway program on the Bloemfontein Campus tended to have higher success rates if they fell in a higher quintile, were enrolled in more modules, if they had higher AP and ML scores, were female, were from the Faculty of Education and were African.



Mainstream Pathway Qwaqwa Campus

Descriptive statistics for multilevel categorical variables to determine reference categories

Frequency tables were run for all categorical variables with more than two levels to help with the selection of reference categories in the multiple regression analysis.

Table 10. Mainstream Pathway Qwaqwa Campus Success Rate by Province

Province	Success rate
EC	0.830483
FS	0.742043
GP	0.807658
KN	0.793375
LP	0.721525
MP	0.820054
NW	0.772211

The Eastern Cape was chosen as the reference category due to it having a noticeably higher success rate compared to the other provinces.

Table 11. Mainstream Pathway Qwaqwa Campus Success Rate by Faculty

Registered Faculty	Success rate
Economic and Management Sciences	0.688970
Education	0.826477
Humanities	0.703135
Natural and Agricultural Sciences	0.619705

The Facuty of Natural and Agricultural Sciences was chosen as the reference category due to it having a noticeably lower success rate compared to the other faculties.

Standard multiple regression results

The results of the standard multiple regression can be seen below:

Table 12. Research Question 1 Mainstream Pathway Qwaqwa Multiple Regression – Full Model

Dep. Variable:	Success_rate	**R-squared:**	0.174
Model:	OLS	**Adj. R-squared:**	0.153
Method:	Least Squares	**F-statistic:**	8.229
No. Observations:	761	**Prob (F-statistic):**	3.96e-21

	coef	std err	t	P>|t|	[0.025	0.975]
Intercept	0.3136	0.188	1.672	0.095	-0.055	0.682
EC	-0.1403	0.174	-0.807	0.420	-0.482	0.201
FS	-0.0727	0.146	-0.499	0.618	-0.359	0.213
GP	-0.0513	0.149	-0.344	0.731	-0.344	0.241
KN	-0.0632	0.146	-0.434	0.664	-0.349	0.223
MP	-0.0238	0.156	-0.152	0.879	-0.330	0.282
NW	0.0926	0.205	0.452	0.651	-0.309	0.495
Economic and Management Sciences	0.1030	0.044	2.363	0.018	0.017	0.189
Education	0.2710	0.032	8.457	0.000	0.208	0.334
Humanities	0.1792	0.040	4.492	0.000	0.101	0.257
Quintile	0.0228	0.008	2.701	0.007	0.006	0.039
Total modules enrolled	0.0456	0.008	5.820	0.000	0.030	0.061
AL Score	-7.141e-05	0.001	-0.054	0.957	-0.003	0.003
Four Year Degree	4.982e-17	1.29e-16	0.387	0.699	-2.03e-16	3.03e-16
Female	0.0424	0.019	2.212	0.027	0.005	0.080
Has NSFAS Award	0.0196	0.019	1.024	0.306	-0.018	0.057
NQF Level Sum	-0.0008	0.001	-1.155	0.249	-0.002	0.001
Academic year of registration	0.0012	0.007	0.177	0.860	-0.012	0.014
AP Score	-0.0032	0.002	-1.342	0.180	-0.008	0.001
QL Score	-0.0025	0.002	-1.614	0.107	-0.005	0.001
ML Score	0.0009	0.001	1.272	0.204	-0.000	0.002

The model was refined by dropping all non-significant predictor variables, and rerunning the regression analysis. The results can be seen in the tables below.

Table 13. Research Question 1 Mainstream Pathway Qwaqwa Multiple Regression – Refined Model

Dep. Variable:	Success_rate	**R-squared:**	0.092
Model:	OLS	**Adj. R-squared:**	0.091
Method:	Least Squares	**F-statistic:**	75.05
No. Observations:	4463	**Prob (F-statistic):**	1.50e-89

	coef	**std err**	**t**	**P>|t|**	**[0.025**	**0.975]**
Intercept	0.3609	0.034	10.684	0.000	0.295	0.427
.Economic and Management Sciences	0.0721	0.020	3.584	0.000	0.033	0.112
Education	0.2119	0.016	13.259	0.000	0.181	0.243
Humanities	0.0934	0.018	5.112	0.000	0.058	0.129
Quintile	0.0142	0.004	4.005	0.000	0.007	0.021
Total modules enrolled	0.0162	0.002	6.606	0.000	0.011	0.021
Female	0.0772	0.009	9.051	0.000	0.060	0.094

From the table above can be seen that, after dropping all non-significant variables, the following variables made statistically significant unique contributions to the prediction of student success rate after all other variables were controlled for: faculty, sum of modules enrolled in and gender.

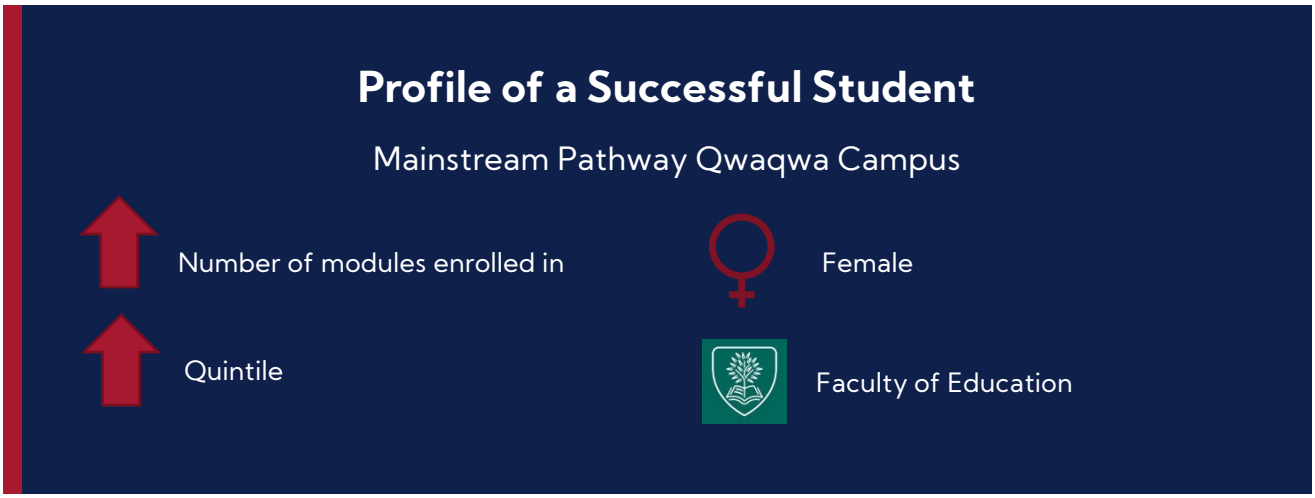
A one unit increase in the sum of modules enrolled in was associated with the proportion of credits passed (i.e., success rate) increasing by 0.016 units. Stated differently, enrolling for one additional module was associated with a 1.6% increase in the percentage of credits passed. In addition, a one unit increase in quintile was associated with a 0.0142 unit increase in the proportion of credits passed. Thus, falling in a higher quintile was associated with the percentage of credits passed increasing by 1.4%.

In addition, in comparison to males, being female was associated with the proportion of credits passed (i.e., success rate) increasing by 0.08 units. Stated differently, being female compared to male was associated with a 8% increase in the percentage of credits passed.

Finally, students registered in the Faculties of Economic and Management Sciences, Education, and Humanities had significantly higher success rates when compared to students registered in the Faculty of Natural and Agricultural Sciences. Being registered in the Faculty of Economic and Management Sciences was associated with a 7.2% increase in the proportion of credits passed when compared to being registered in the Faculty of Natural and Agricultural Sciences. The increase was even higher for students registered in the Faculties of Humanities and Education, with a 9.3% increase in the percentage of credits passed for the Faculty of Humanities and a 21.1% increase in the percentage of credits passed for the Faculty of Education compared to the Faculty of Natural and Agricultural Sciences. Disregarding statistical

significance and only looking at the coefficients shows that, after controlling for all other variables, students in the Faculty of Natural and Agricultural Sciences tended to have the lowest success rates, followed by students in the Faculty of Economic and Management Sciences (7.2% higher than Faculty of Natural and Agricultural Sciences), the Faculty of Humanities (9.3% higher than Natural and Agricultural Sciences), and finally, the Faculty of Education (21.1% higher than Natural and Agricultural Sciences).

In summary, students tended to have higher success rates if they were female, were enrolled in more modules, fell in a higher quintile, and were registered in faculties other than the Faculty of Natural and Agricultural Sciences, and especially in the Faculty of Education.



Mainstream Pathway Bloemfontein Campus

Descriptive statistics for multilevel categorical variables to determine reference categories

Frequency tables were run for all categorical variables with more than two levels to help with the selection of reference categories in the multiple regression analysis.

Table 14. Mainstream Pathway Bloemfontein Campus Success Rate by Province

Home Province	Success rate
EC	0.818425
FS	0.792929
GP	0.828238
KN	0.793045
LP	0.827239
MP	0.848007
NC	0.819054
NW	0.825688
WP	0.807884

The Free State was chosen as the reference category since students in this province had the lowest mean success rate.

Table 15. Mainstream Pathway Bloemfontein Campus Success Rate by Race

Race recoded	Success rate
African	0.779312
Coloured	0.807528
Other	0.883205
White	0.882952

African was chosen as the reference category since students in this racial category had the lowest mean success rate.

Table 16. Mainstream Pathway Bloemfontein Campus Success Rate by Faculty

Registered Faculty	Success rate
Economic and Management Sciences	0.815604
Education	0.820428
Health Science	0.937328
Humanities	0.764334
Law	0.738377
Natural and Agricultural Sciences	0.797336
Theology	0.715548

Theology was chosen as the reference category since students in this Faculty had the lowest mean success rate.

Standard multiple regression results

The results of the standard multiple regression can be seen below:

Table 17. Research Question 1 Mainstream Pathway Bloemfontein Multiple Regression – Full Model

Dep. Variable:	Success_rate	**R-squared:**	0.168
Model:	OLS	**Adj. R-squared:**	0.165
Method:	Least Squares	**F-statistic:**	80.13
No. Observations:	10774	**Prob (F-statistic):**	0.00

	coef	std err	t	P>|t|	[0.025	0.975]
Intercept	0.2238	0.050	4.495	0.000	0.126	0.321
EC	0.0163	0.008	1.990	0.047	0.000	0.032
GP	0.0446	0.009	5.236	0.000	0.028	0.061
KN	0.0100	0.009	1.101	0.271	-0.008	0.028
LP	0.0494	0.011	4.560	0.000	0.028	0.071
MP	0.0647	0.012	5.452	0.000	0.041	0.088
NC	0.0113	0.009	1.254	0.210	-0.006	0.029
NW	0.0526	0.011	4.906	0.000	0.032	0.074
WP	0.0062	0.013	0.482	0.630	-0.019	0.031

Economic and Management Sciences	-0.0297	0.044	-0.678	0.498	-0.115	0.056
Education	-0.0064	0.044	-0.147	0.883	-0.092	0.079
Health Science	-0.0256	0.044	-0.580	0.562	-0.112	0.061
Humanities	-0.0629	0.044	-1.440	0.150	-0.149	0.023
Law	-0.1242	0.045	-2.788	0.005	-0.211	-0.037
Natural and Agricultural Sciences	-0.1213	0.044	-2.769	0.006	-0.207	-0.035
African	-0.0493	0.007	-7.242	0.000	-0.063	-0.036
Coloured	-0.0573	0.010	-5.630	0.000	-0.077	-0.037
Other	-0.0309	0.018	-1.737	0.082	-0.066	0.004
Quintile	0.0261	0.002	11.148	0.000	0.021	0.031
Total modules enrolled	0.0337	0.001	27.250	0.000	0.031	0.036
AL Score	0.0011	0.000	4.430	0.000	0.001	0.002
Four Year Degree	-1.044e-18	2.18e-18	-0.478	0.632	-5.32e-18	3.23e-18
Female	0.0486	0.005	9.501	0.000	0.039	0.059
Has NSFAS award	-0.0025	0.006	-0.391	0.696	-0.015	0.010
NQF Level Sum	-0.0002	5.17e-05	-4.389	0.000	-0.000	-0.000
Academic year of registration	0.0027	0.001	2.088	0.037	0.000	0.005
AP Score	0.0040	0.001	7.483	0.000	0.003	0.005
QL Score	-0.0009	0.000	-3.501	0.000	-0.001	-0.000
ML Score	0.0009	0.000	6.126	0.000	0.001	0.001

The model was refined by dropping all non-significant predictor variables, and rerunning the regression analysis. The results can be seen in the tables below.

Table 18. Research Question 1 Mainstream Pathway Bloemfontein Multiple Regression – Refined Model

Dep. Variable:	Success_rate	**R-squared:**	0.168
Model:	OLS	**Adj. R-squared:**	0.166
Method:	Least Squares	**F-statistic:**	83.21
No. Observations:	10774	**Prob (F-statistic):**	0.00

	coef	**std err**	**t**	**P>|t|**	**[0.025**	**0.975]**

Intercept	0.2236	0.050	4.491	0.000	0.126	0.321
EC	0.0163	0.008	1.988	0.047	0.000	0.032
GP	0.0445	0.009	5.227	0.000	0.028	0.061
KN	0.0099	0.009	1.091	0.275	-0.008	0.028
LP	0.0495	0.011	4.568	0.000	0.028	0.071
MP	0.0646	0.012	5.447	0.000	0.041	0.088
NC	0.0114	0.009	1.260	0.208	-0.006	0.029
NW	0.0527	0.011	4.913	0.000	0.032	0.074
WP	0.0060	0.013	0.472	0.637	-0.019	0.031
Economic and Management Sciences	-0.0297	0.044	-0.678	0.498	-0.115	0.056
Education	-0.0065	0.044	-0.148	0.882	-0.092	0.079
Health Science	-0.0255	0.044	-0.578	0.563	-0.112	0.061
Humanities	-0.0629	0.044	-1.439	0.150	-0.149	0.023
Law	-0.1242	0.045	-2.788	0.005	-0.211	-0.037
Natural and Agricultural Sciences	-0.1211	0.044	-2.766	0.006	-0.207	-0.035
African	-0.0497	0.007	-7.387	0.000	-0.063	-0.037
Coloured	-0.0575	0.010	-5.665	0.000	-0.077	-0.038
Other	-0.0310	0.018	-1.741	0.082	-0.066	0.004
Quintile	0.0262	0.002	11.354	0.000	0.022	0.031
Total modules enrolled	0.0337	0.001	27.254	0.000	0.031	0.036
AL Score	0.0011	0.000	4.439	0.000	0.001	0.002
Female	0.0485	0.005	9.498	0.000	0.039	0.059
NQF Level Sum	-0.0002	5.17e-05	-4.406	0.000	-0.000	-0.000
Academic year of registration	0.0025	0.001	2.075	0.038	0.000	0.005
AP Score	0.0040	0.001	7.482	0.000	0.003	0.005
QL Score	-0.0009	0.000	-3.494	0.000	-0.001	-0.000
ML Score	0.0009	0.000	6.123	0.000	0.001	0.001

From the table above can be seen that, after dropping all non-significant variables, the following variables made statistically significant unique contributions to the prediction of student success rate after all other variables were controlled for: home province, faculty, race, quintile, sum of

modules enrolled in, AL score, gender, NQF level sum, academic year of registration, AP score, QL score, and ML score.

Students from all provinces except KwaZuluu-Natal, the Northern Cape and the Western Cape had statistically significantly higher success rates than students from the Free State. Compared to students coming from the Free State, students from the Eastern Cape showed an increase of 0.0163 units in the proportion of credits passed, students from Gauteng an increase of 0.0445 units, students from Limpopo an increase of 0.0495 units, students from Mpumalanga an increase of 0.0646 units, and students from North West an increase of 0.0527 units. When only the coefficients are considered and not statistical significance, the results show that students from the Free State had the lowest success rates, followed by students from the Western Cape (0.6% higher than Free State), KwaZulu-Natal (0.9% higher than Free State), Northern Cape (1.1% higher than Free State), Eastern Cape (1.6% higher than Free State), Gauteng (4.5% higher than Free State), Limpopo (5% higher than Free State), North West (5.3% higher than Free State), and finally Mpumlanaga (6.5% higher than Free State).

Students registered in the Faculties of Law and Natural and Agricultural Sciences had statistically significantly lower success rates when compared to students from the Faculty of Theology. Being registered in the Faculty of Law compared to the Faculty of Theology was associated with a 0.1242 units drop in the proportion of credits passed, while being registered in the Faculty of Natural and Agricultural Sciences compared to the Faculty of Theology was associated with a 0.1211 units drop in the proportion of credits passed. Stated differently, being registered in the Faculty of Law rather than the Faculty of Theology was associated with a 12.4% drop in the percentage of credits passed, while being registered in the Faculty of Natural and Agricultural Sciences rather than in the Faculty of Theology was associated with a 12.1% drop in the percentage of credits passed. When only the coefficients are considered without looking at statistical significance, the results show that students in the Faculty of Theology had the highest success rates, followed by students in the Faculty of Education (0.6% lower than Theology), Health Sciences (2.6% lower than Theology), Economic and Management Sciences (3% lower than Theology), Humanities (6.3% lower than Theology), Natural and Agricultural Sciences (12.1% lower than Theology), and Law (12.4% lower than Theology).

Students who were African or Coloured had statistically significantly lower success rates when compared to White students. Compared to being White, being African was associated with a 0.0497 unit decrease in the proportion of credits passed, while being Coloured rather than White was associated with a 0.0575 unit decrease in the proportion of credits passed. When only the coefficients are considered and statistical significance disregarded, the results show that White students showed the highest success rates, followed by students of other races (3.1% lower than White students), African students (5% lower than White students) and finally Coloured students (5.8% lower than White students).

A one unit increase in quintile was associated with a 0.0262 unit increase in the proportion of credits passed. Thus, going up one quintile was associated with the percentage of credits passed increasing by 2.6%. Likewise, being enrolled in more modules and having a higher AL score was associated with an increase in the proportion of credits passed. A one unit increase in the total number of modules enrolled in was associated with a 0.0337 unit increase in the proportion of

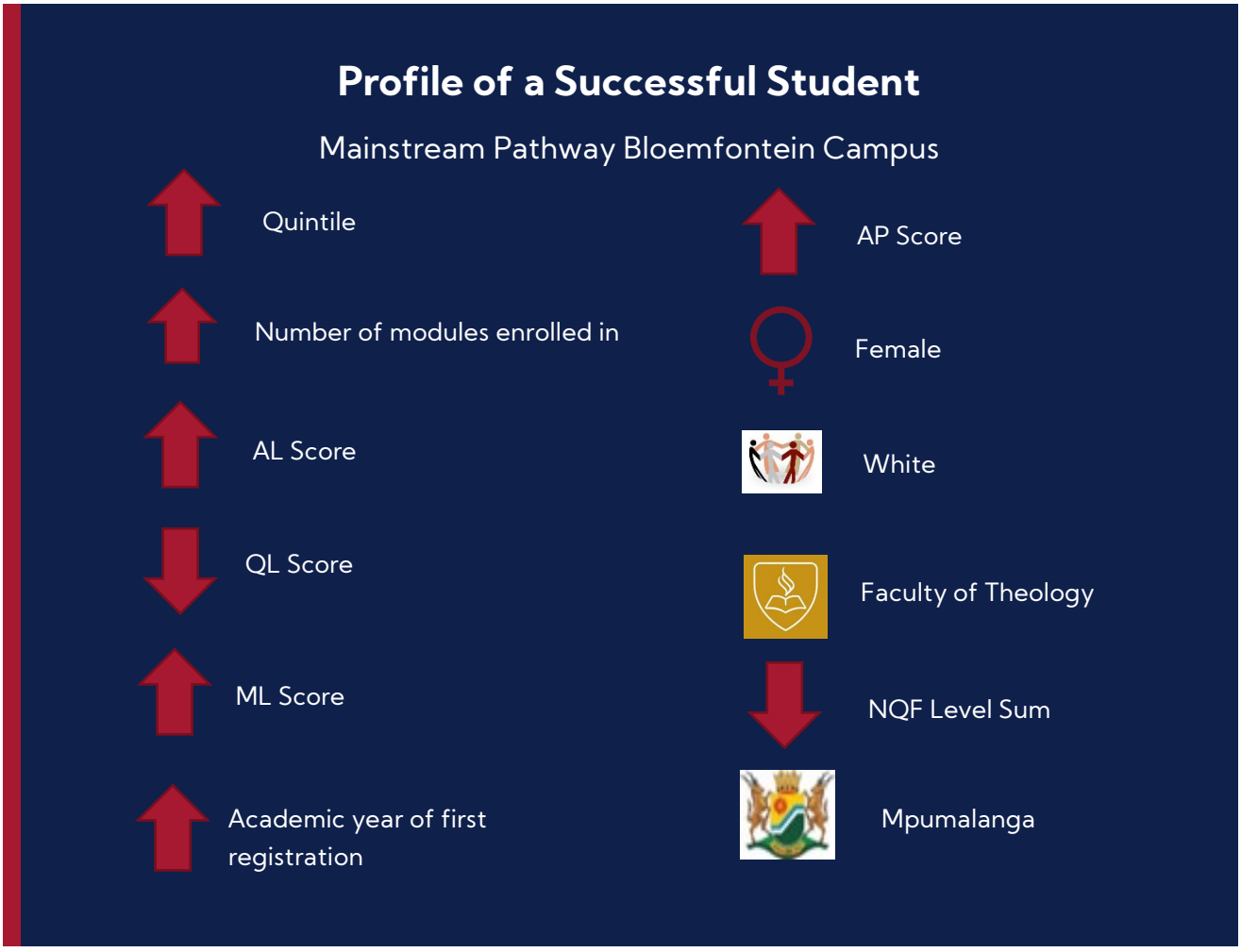
credits passed, while scoring one unit higher in AL score was associated with a 0.0011 unit increase in the proportion of credits passed.

In addition, in comparison to males, being female was associated with the proportion of credits passed (i.e., success rate) increasing by 0.0485 units. Stated differently, being female compared to male was associated with a 5% increase in the percentage of credits passed.

An increase in QL score and in the sum of the NQF level were both associated with a decrease in the proportion of credits passed (i.e., success rate). A one unit increase in QL score was associated with a 0.0009 units decrease in the proportion of credits passed, while a one unit increase in the sum of the NQF level was associated with a 0.0002 unit decrease in the proportion of credits passed.

Finally, being registered in a later academic year, and having higher AP and ML scores were associated with an increase in the proportion of credits passed (0.0025, 0.0040, and 0.0009 units increase in the proportion of credits passed, respectively).

In summary, students in the mainstream pathway on the Bloemfontein Campus tended to have higher success rates if they were from Mpumalanga rather than the Free State, registered in the Faculty of Theology, White, fell in a higher Quintile, were registered for more modules, had higher AL scores, AP scores and ML scores, were female, had lower QL scores and NQF level sum scores, and were registered for the first time in a later academic year.



Province	Percentage who graduated
MP	50.000000

Limpopo, the Eastern Cape, North West and the Western Cape were excluded from the analysis due to low student numbers. The Free State was chosen as the reference category since students in this province had the lowest graduation rate.

Table 20. Extended Pathway Qwaqwa Campus Graduation Rate by Faculty

Faculty	Percentage who graduated
Economic and Management Sciences	54.6917
Education	71.9298
Humanities	54.2627
Natural and Agricultural Sciences	42.5968

The Faculty of Natural and Agricultural Sciences was chosen as the reference category since students in this faculty had the lowest graduation rates.

Logistic regression results

The results of the logistic regression can be seen below:

Table 21. Research Question 2 Extended Pathway Qwaqwa Logistic Regression – Full Model

Dep. Variable:	Graduated	**No. Observations:**	343
Model:	Logit	**Df Residuals:**	326
Method:	MLE	**Df Model:**	16
Pseudo R-squ.:	0.1118	**Log-Likelihood:**	-209.40
LL-Null:	**-235.75**	**LLR p-value:**	**8.445e-06**

	coef	std err	z	P>|z|	[0.025	0.975]
Intercept	992.0915	350.392	2.831	0.005	305.336	1678.847
QUINTILE	0.1364	0.104	1.317	0.188	-0.067	0.339
GP	-0.2258	0.663	-0.340	0.733	-1.525	1.074
KN	0.1550	0.347	0.446	0.655	-0.526	0.836

MP	1.4330	1.157	1.238	0.216	-0.835	3.701
NQF_LVL_sum	-0.0072	0.008	-0.855	0.393	-0.024	0.009
acad_year	-0.4934	0.157	-3.134	0.002	-0.802	-0.185
Five_Year_Degree	0.3955	2.33e+15	1.7e-16	1.000	-4.57e+15	4.57e+15
FEMALE	0.8721	0.257	3.400	0.001	0.369	1.375
Total_modules_enrolled	0.4222	0.158	2.678	0.007	0.113	0.731
AP_SCORE	0.0115	nan	nan	nan	nan	nan
AL_SCORE	-0.0105	0.020	-0.519	0.604	-0.050	0.029
QL_SCORE	-0.0022	0.022	-0.099	0.921	-0.046	0.042
ML_SCORE	-0.0021	0.009	-0.232	0.817	-0.020	0.016
HUMANITIES	1.6157	0.465	3.476	0.001	0.705	2.527
ECONOMIC_AND_MANAGEMENT_SCIENCES	0.0258	0.368	0.070	0.944	-0.695	0.746
EDUCATION	0.3955	2.33e+15	1.7e-16	1.000	-4.57e+15	4.57e+15
No_NSFAS_award	-0.7972	0.280	-2.847	0.004	-1.346	-0.248

The model was refined by dropping all non-significant predictor variables, and rerunning the logistic regression analysis. The results can be seen in the tables below.

Table 22. Research Question 2 Extended Pathway Qwaqwa Logistic Regression - Refined Model

Dep. Variable:	Graduated	**No. Observations:**	2947
Model:	Logit	**Df Residuals:**	2939
Method:	MLE	**Df Model:**	7
Pseudo R-squ.:	0.04685	**Log-Likelihood:**	-1933.1
LL-Null:	-2028.1	**LLR p-value:**	1.475e-37

	coef	**std err**	**z**	**P>|z|**	**[0.025**	**0.975]**
Intercept	97.1003	86.945	1.117	0.264	-73.308	267.509
acad_year	-0.0490	0.043	-1.137	0.255	-0.134	0.035

FEMALE	0.6724	0.078	8.593	0.000	0.519	0.826
Total_modules_enrolled	0.2447	0.051	4.758	0.000	0.144	0.345
HUMANITIES	0.9693	0.162	5.981	0.000	0.652	1.287
ECONOMIC_AND_MANAGEMENT_SCIENCES	0.0858	0.117	0.732	0.464	-0.144	0.316
EDUCATION	0.8946	0.129	6.929	0.000	0.642	1.148
No_NSFAS_award	-0.3461	0.082	-4.236	0.000	-0.506	-0.186

From the table above can be seen that gender, the total number of modules enrolled in, the faculty of registration, and whether students had a NSFAS award or not all made statistically significant unique contributions to the prediction of graduation, after all other variables were controlled for.

To aid in the interpretation of the coefficients, average marginal effects were calculated. The results for the statistically significant variables can be seen in the table below.

Table 23. Marginal Effects for Logistic Regression to Predict Graduation – Extended Pathway Qwaqwa Campus

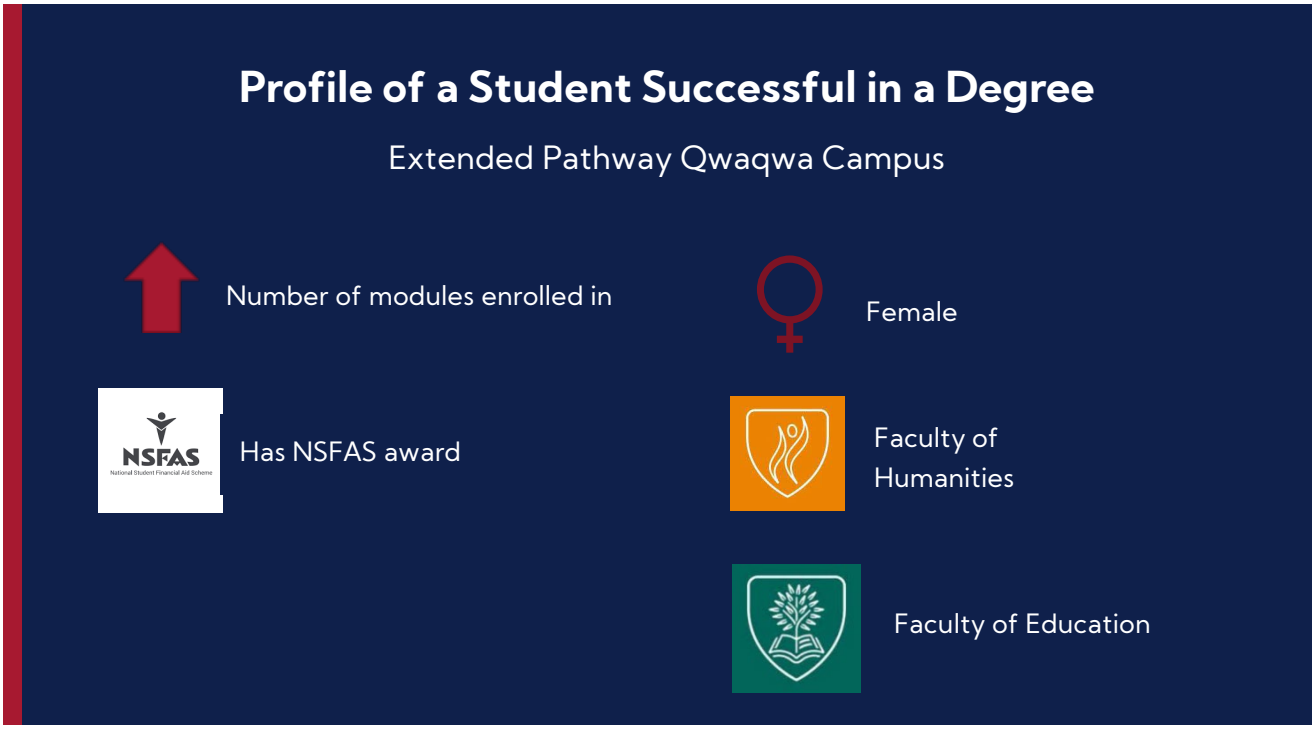
	Marginal effects (dy/dx)
FEMALE	0.1561
Total_modules_enrolled	0.0568
HUMANITIES	0.2250
ECONOMIC_AND_MANAGEMENT_SCIENCES	0.0199
EDUCATION	0.2077
No_NSFAS_award	-0.0803

From the table above can be seen that females were more likely to graduate than males, with an increased probability of 15.6%. In addition, a one unit increase in the total number of modules enrolled in was associated with a 5.7% increase in the probability to graduate.

Furthermore, being from the Faculty of Humanities rather than the Faculty of Natural and Agricultural Sciences was associated with a 22.5% increased probability to graduate, while being from the Faculty of Education rather than the Faculty of Natural and Agricultural Sciences was associated with a 20.7% increased probability to graduate. When only marginal effects are considered, students in the Faculty of Humanities were most likely to graduate (22.5% increased probability compared to Faculty of Natural and Agricultural Sciences), followed by the students in the Faculty of Education (20.7% increased probability compared to the Faculty of Natural and Agricultural Sciences), and students in the Faculty of Economic and Management Sciences (2% increased probability compared to the Faculty of Natural and Agricultural Sciences). Finally, students in the Faculty of Natural and Agricultural Sciences were least likely to graduate.

Students with no NSFAS award were less likely to graduate than students with an NSFAS award, with a decreased probability of 8%.

In summary, students in the extended pathway on the Qwaqwa Campus were more likely to graduate if they were female, if they were enrolled in more modules, if they were in Faculties other than the Faculty of Natural and Agricultural Sciences, but especially in the Faculties of Humanities or Education, and if they had an NSFAS award.



Extended pathway Bloemfontein Campus

Descriptive statistics for multilevel categorical variables to determine reference categories

Frequency tables were run for all categorical variables with more than two levels to help with the selection of reference categories in the logistic regression analysis.

Table 24. Extended Pathway Bloemfontein Campus – Graduation Rate by Province

Province	Percentage who graduated
EC	48.6056
FS	46.3636
GP	56.5068
KN	56.0185
LP	54.0541
MP	65.1163
NC	57.4627
NW	51.7986
WP	70.4918

The Free State was chosen as the reference category since students in this province had the lowest graduation rate.

Table 25. Extended Pathway Bloemfontein Campus – Graduation Rate by Race

Race	Percentage who graduated
African	49.4878
Coloured	46.9388
Other	66.6667
White	42.9348

White students were chosen as the reference category since this racial group had the lowest graduation rate.

Table 26. Extended Pathway Bloemfontein Campus – Graduation Rate by Faculty

Registered Faculty	Percentage who graduated
Education	49.0040
Humanities	49.2394
Law	47.6190

The Faculty of Law was chosen as the reference category since students in this faculty had the lowest graduation rate.

Logistic regression results

The results of the logistic regression can be seen below:

Table 27. Research Question 2 Extended Pathway Bloemfontein Logistic Regression – Full Model

Dep. Variable:	Graduated	**No. Observations:**	1095
Model:	Logit	**Df Residuals:**	1070
Method:	MLE	**Df Model:**	24
Pseudo R-squ.:	0.07539	**Log-Likelihood:**	-695.16
LL-Null:	-751.85	**LLR p-value:**	1.449e-13

	coef	std err	z	P>|z|	[0.025	0.975]
Intercept	218.6243	168.272	1.299	0.194	-111.182	548.431
QUINTILE	0.1741	0.067	2.593	0.010	0.043	0.306
EC	0.1027	0.237	0.433	0.665	-0.362	0.567
WP	-0.5634	0.424	-1.328	0.184	-1.395	0.268
GP	-0.0603	0.241	-0.250	0.802	-0.533	0.412
KN	0.3432	0.259	1.323	0.186	-0.165	0.852
LP	0.4841	0.379	1.277	0.202	-0.259	1.227
MP	0.5432	0.434	1.251	0.211	-0.308	1.394
NC	-0.3855	0.231	-1.670	0.095	-0.838	0.067
NW	-0.4523	0.347	-1.305	0.192	-1.131	0.227
NQF_LVL_sum	-0.0014	0.001	-1.449	0.147	-0.003	0.001

acad_year	-0.1104	0.083	-1.323	0.186	-0.274	0.053
Four_Year_Degree	-19.9425	1.18e+04	-0.002	0.999	-2.31e+04	2.31e+04
FEMALE	0.7264	0.146	4.970	0.000	0.440	1.013
African	-0.0513	0.188	-0.273	0.785	-0.419	0.317
Coloured	0.5604	0.279	2.008	0.045	0.013	1.108
Other	0.6962	0.550	1.265	0.206	-0.382	1.775
Total_modules_enrolled	0.3204	0.085	3.758	0.000	0.153	0.487
AP_SCORE	0.0290	0.021	1.367	0.172	-0.013	0.071
AL_SCORE	-0.0188	0.008	-2.387	0.017	-0.034	-0.003
QL_SCORE	-0.0064	0.009	-0.716	0.474	-0.024	0.011
ML_SCORE	0.0211	0.005	4.680	0.000	0.012	0.030
HUMANITIES	20.5008	1.18e+04	0.002	0.999	-2.31e+04	2.31e+04
EDUCATION	0.9950	0.380	2.620	0.009	0.251	1.739
No_NSFAS_award	0.2293	0.241	0.953	0.341	-0.242	0.701

The model was refined by dropping all non-significant predictor variables and rerunning the logistic regression analysis. The results can be seen in the table below.

Table 28. Research Question 2 Extended Pathway Bloemfontein Logistic Regression – Refined Model

Dep. Variable:	Graduated	**No. Observations:**	1095
Model:	Logit	**Df Residuals:**	1084
Method:	MLE	**Df Model:**	10
Date:	Tue, 05 Jul 2022	**Pseudo R-squ.:**	0.05971
Time:	14:47:19	**Log-Likelihood:**	-706.95
converged:	True	**LL-Null:**	-751.85
Covariance Type:	nonrobust	**LLR p-value:**	5.901e-15

	coef	**std err**	**z**	**P>|z|**	**[0.025**	**0.975]**
Intercept	-2.7139	0.811	-3.345	0.001	-4.304	-1.124
QUINTILE	0.1845	0.064	2.888	0.004	0.059	0.310
FEMALE	0.7431	0.140	5.326	0.000	0.470	1.017

African	0.0166	0.175	0.095	0.924	-0.326	0.359
Coloured	0.4294	0.258	1.661	0.097	-0.077	0.936
Other	0.6689	0.542	1.235	0.217	-0.393	1.731
Total_modules_enrolled	0.2816	0.076	3.709	0.000	0.133	0.430
AL_SCORE	-0.0205	0.007	-3.038	0.002	-0.034	-0.007
ML_SCORE	0.0204	0.004	4.716	0.000	0.012	0.029
HUMANITIES	0.3315	0.194	1.711	0.087	-0.048	0.711
EDUCATION	0.7758	0.349	2.224	0.026	0.092	1.460

From the table above can be seen that quintile, gender, total number of modules enrolled in, AL score, ML score, and faculty all made statistically significant unique contributions to the prediction of whether a student graduates or not, after all other variables are controlled for.

To aid in the interpretation of the coefficients, average marginal effects were calculated. The results for the statistically significant variables can be seen in the table below.

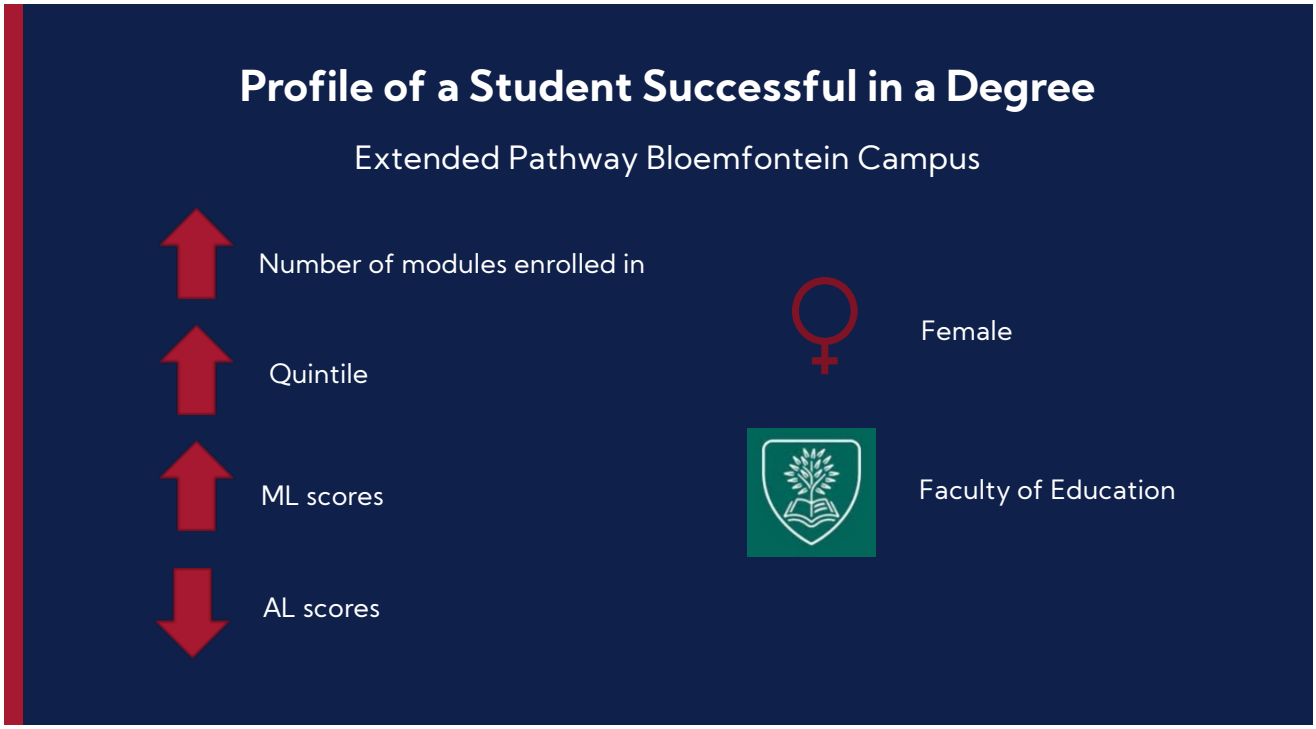
Table 29. Marginal Effects for Logistic Regression to Predict Graduation – Extended Pathway Bloemfontein Campus

	Marginal effects (dy/dx)
QUINTILE	0.0419
FEMALE	0.1688
Total_modules_enrolled	0.0640
AL_SCORE	-0.0047
ML_SCORE	0.0046
HUMANITIES	0.0753
EDUCATION	0.1762

From the table above can be seen that falling in a higher quintile was associated with an increased probability of 4.2% of graduating. Females, compared to males, were also more likely to graduate, with an increased probability of 16.9%. In addition, students who enrolled in more modules were more likely to graduate (increased probability of 6.4% for every additional module enrolled in). In contrast, a one unit increase in AL score was associated with the probability of graduating decreasing by 0.5%. Conversely, a one unit increase in ML score was associated with the probability of graduating increasing by 0.5%. Finally, being from the Faculty of Education rather than the Faculty of Law was associated with the probability of graduating increasing by

17.6%. If only the marginal effects are considered, students in the Faculty of Education had the highest likelihood of graduating (17.6% increased probability compared to the Faculty of Law), followed by the students in the Faculty of Humanities (7.5% increased probability compared to the Faculty of Law), and finally, students in the Faculty of Law had the lowest likelihood of graduating.

In summary, students in the extended pathway on Bloemfontein campus were more likely to graduate if they fell in a higher quintile, were female, were enrolled in more modules, had lower AL scores but higher ML scores, and if they were in faculties other than the Faculty of Law, and especially in the Faculty of Education.



Mainstream Pathway Qwaqwa Campus

Descriptive statistics for multilevel categorical variables to determine reference categories

Frequency tables were run for all categorical variables with more than two levels to help with the selection of reference categories in the logistic regression analysis.

Table 30. Mainstream Pathway Qwaqwa Campus – Graduation Rate by Province

Province	Percentage who graduated
FS	61.6162
GP	55.7377
KN	68.4159
MP	69.6970

The Limpopo, North West, Eastern Cape, and Northern Cape provinces were excluded from the analysis due to low student numbers. Gauteng was chosen as the reference category due to students from this province having the lowest graduation rate.

Table 31. Mainstream Pathway Qwaqwa Campus – Graduation Rate by Faculty

Registered Faculty	Percentage who graduated
Economic and Management Sciences	50.2994
Education	77.3800
Humanities	53.1373
Natural and Agricultural Sciences	40.4040

The Faculty of Natural and Agricultural Sciences was chosen as the reference category since the students from this faculty had the lowest graduation rates.

Logistic regression results

The results of the logistic regression can be seen below:

Table 32. Research Question 2 Mainstream Pathway Qwaqwa Logistic Regression – Full Model

Dep. Variable:	Graduated	**No. Observations:**	510
Model:	Logit	**Df Residuals:**	492

Method:	MLE	**Df Model:**	17
Pseudo R-squ.:	0.1739	**Log-Likelihood:**	-259.44
LL-Null:	-314.04	**LLR p-value:**	1.699e-15

	coef	std err	z	P>|z|	[0.025	0.975]
Intercept	-349.5981	228.669	-1.529	0.126	-797.780	98.584
QUINTILE	0.0989	0.103	0.958	0.338	-0.103	0.301
FS	-0.0608	0.480	-0.127	0.899	-1.002	0.880
KN	-0.1128	0.477	-0.237	0.813	-1.048	0.822
MP	-0.4643	0.907	-0.512	0.609	-2.242	1.313
NQF_LVL_sum	0.0036	0.009	0.379	0.705	-0.015	0.022
acad_year	0.1730	0.113	1.528	0.127	-0.049	0.395
Four_Year_Degree	1.1026	1.130	0.976	0.329	-1.112	3.317
FEMALE	0.6105	0.227	2.692	0.007	0.166	1.055
Total_modules_enrolled	0.1618	0.090	1.798	0.072	-0.015	0.338
AP_SCORE	-0.0472	0.030	-1.576	0.115	-0.106	0.011
AL_SCORE	-0.0073	0.016	-0.454	0.650	-0.039	0.024
QL_SCORE	-0.0102	0.018	-0.578	0.564	-0.045	0.024
ML_SCORE	-0.0048	0.009	-0.546	0.585	-0.022	0.012
ECONOMIC_AND_MANAGEMENT_SCIENCES	0.9126	0.448	2.037	0.042	0.034	1.791
EDUCATION	0.9198	1.221	0.753	0.451	-1.474	3.313
HUMANITIES	0.7961	0.471	1.691	0.091	-0.127	1.719
Has_NSFAS_award	0.3488	0.247	1.415	0.157	-0.134	0.832

The model was refined by dropping all non-significant predictor variables, and rerunning the logistic regression analysis. The results can be seen in the table below.

Table 33. Research Question 2 Mainstream Pathway Qwaqwa Logistic Regression – Refined Model

Dep. Variable:	Graduated	**No. Observations:**	2203
Model:	Logit	**Df Residuals:**	2198
Method:	MLE	**Df Model:**	4

Pseudo R-squ.:	0.09857	**LLR p-value:**	8.617e-60
Log-Likelihood:	-1289.0	**LL-Null:**	-1430.0

	coef	std err	z	P>|z|	[0.025	0.975]
Intercept	-0.7504	0.128	-5.843	0.000	-1.002	-0.499
FEMALE	0.8188	0.096	8.513	0.000	0.630	1.007
ECONOMIC_AND_MANAGEMENT_SCIENCES	0.3207	0.199	1.612	0.107	-0.069	0.711
EDUCATION	1.5191	0.139	10.916	0.000	1.246	1.792
HUMANITIES	0.3728	0.152	2.460	0.014	0.076	0.670

From the table above can be seen that gender and faculty made statistically significant unique contributions to the prediction of whether a student will graduate or not, when all other variables are controlled for.

To aid in the interpretation of the coefficients, average marginal effects were calculated. The results for the statistically significant variables can be seen in the table below.

Table 34. Marginal Effects for Logistic Regression to Predict Graduation – Mainstream Pathway Qwaqwa Campus

	Marginal effects (dy/dx)
FEMALE	0.1634
ECONOMIC_AND_MANAGEMENT_SCIENCES	0.0640
EDUCATION	0.3032
HUMANITIES	0.0744

From the table above can be seen that females were more likely than males to graduate, with an increased probability of 16.3%. Students in the Faculty of Education was also much more likely to graduate than students in the Faculty of Natural and Agricultural Sciences, with an increased probability of 30.3%. If only marginal effects are considered, students in the Faculty of Education were most likely to graduate (30.3% more likely than students in the Faculty of Natural and Agricultural Sciences), followed by students in the Faculty of Humanities (7.4% more likely than students in the Faculty of Natural and Agricultural Sciences), and finally, students in the Faculty of Natural and Agricultural Sciences were least likely to graduate.

In summary, students were more likely to graduate if they were female and registered in faculties other than the Faculty of Natural and Agricultural Sciences, and especially in the Faculty of Education.

Mainstream Pathway Bloemfontein Campus

Descriptive statistics for multilevel categorical variables to determine reference categories

Frequency tables were run for all categorical variables with more than two levels to help with the selection of reference categories in the logistic regression analysis.

Table 35. Mainstream Pathway Bloemfontein Campus – Graduation Rate by Province

Province	Percentage who graduated
EC	68.5665
FS	62.7319
GP	64.2265
KN	62.9412
LP	65.3409
MP	65.0099
NC	67.2253
NW	68.8761
WP	64.6489

The Free State was chosen as the reference category since students from this province had the lowest graduation rate.

Table 36. Mainstream Pathway Bloemfontein Campus – Graduation Rate by Race

Race	Percentage who graduated
African	57.4546
Coloured	59.7633
Other	71.0526
White	76.5524

African was chosen as the reference category since students in this racial category had the lowest graduation rate.

Table 37. Mainstream Pathway Bloemfontein Campus – Graduation Rate by Faculty

Faculty	Percentage who graduated
Economic and Management Sciences	64.3236
Education	68.0645
Health Science	79.7782
Humanities	63.7020
Law	48.7805
Natural and Agricultural Sciences	61.2108

The Faculty of Law was chosen as the reference category since students from this faculty had the lowest graduation rate.

Logistic regression results

The results of the logistic regression can be seen below:

Table 38. Research Question 2 Mainstream Pathway Bloemfontein Logistic Regression – Full Model

Dep. Variable:	Graduated	**No. Observations:**	7682
Model:	Logit	**Df Residuals:**	7654
Method:	MLE	**Df Model:**	27
Pseudo R-squ.:	0.1068	**LLR p-value:**	4.352e-193
Log-Likelihood:	-4177.4	**LL-Null:**	-4676.8

	coef	std err	z	P>|z|	[0.025	0.975]
Intercept	481.2689	46.140	10.431	0.000	390.835	571.702
QUINTILE	0.2176	0.026	8.378	0.000	0.167	0.269
EC	0.1481	0.101	1.462	0.144	-0.050	0.347
GP	0.0924	0.108	0.855	0.393	-0.119	0.304
KN	-0.0266	0.111	-0.241	0.810	-0.243	0.190
LP	0.2878	0.128	2.251	0.024	0.037	0.538
MP	0.0973	0.158	0.617	0.537	-0.212	0.406
NC	0.0252	0.105	0.241	0.809	-0.180	0.230

NW	0.3698	0.129	2.864	0.004	0.117	0.623
WP	-0.0367	0.156	-0.236	0.813	-0.342	0.268
NQF_LVL_sum	-0.0016	0.001	-2.749	0.006	-0.003	-0.000
acad_year	-0.2408	0.023	-10.521	0.000	-0.286	-0.196
Four_Year_Degree	-0.0848	0.130	-0.649	0.516	-0.341	0.171
FEMALE	0.5447	0.059	9.283	0.000	0.430	0.660
White	0.5474	0.080	6.865	0.000	0.391	0.704
Coloured	-0.2743	0.113	-2.423	0.015	-0.496	-0.052
Other	0.4765	0.246	1.934	0.053	-0.006	0.959
Total_modules_enrolled	0.1765	0.015	12.100	0.000	0.148	0.205
AP_SCORE	0.0295	0.006	5.111	0.000	0.018	0.041
AL_SCORE	0.0032	0.003	1.072	0.284	-0.003	0.009
QL_SCORE	-0.0044	0.003	-1.474	0.141	-0.010	0.001
ML_SCORE	0.0029	0.002	1.549	0.121	-0.001	0.006
NATURAL_AND_AGRICULTURAL_SCIENCES	0.2680	0.176	1.527	0.127	-0.076	0.612
ECONOMIC_AND_MANAGEMENT_SCIENCES	0.8745	0.185	4.718	0.000	0.511	1.238
EDUCATION	0.8292	0.146	5.661	0.000	0.542	1.116
HEALTH_SCIENCE	0.6506	0.166	3.930	0.000	0.326	0.975
HUMANITIES	0.7461	0.181	4.113	0.000	0.391	1.102
No_NSFAS_award	0.0295	0.081	0.364	0.716	-0.130	0.189

The model was refined by dropping all non-significant predictor variables, and rerunning the logistic regression analysis. The results can be seen in the tables below.

Table 39. Research Question 2 Mainstream Pathway Bloemfontein Logistic Regression – Refined Model

Dep. Variable:	Graduated	**No. Observations:**	11029
Model:	Logit	**Df Residuals:**	11006
Method:	MLE	**Df Model:**	22
Pseudo R-squ.:	0.1089	**Log-Likelihood:**	-6389.4

LLR p-value:	0.000	**LL-Null:**	-7169.9

	coef	std err	z	P>|z|	[0.025	0.975]
Intercept	437.5442	35.373	12.370	0.000	368.215	506.873
QUINTILE	0.1829	0.019	9.587	0.000	0.146	0.220
EC	0.2253	0.084	2.668	0.008	0.060	0.391
GP	0.1950	0.080	2.449	0.014	0.039	0.351
KN	0.1124	0.083	1.346	0.178	-0.051	0.276
LP	0.4483	0.106	4.235	0.000	0.241	0.656
MP	0.2252	0.120	1.876	0.061	-0.010	0.461
NC	0.0061	0.086	0.071	0.943	-0.162	0.175
NW	0.3572	0.102	3.491	0.000	0.157	0.558
WP	-0.0767	0.128	-0.599	0.549	-0.328	0.174
NQF_LVL_sum	-0.0017	0.000	-3.800	0.000	-0.003	-0.001
acad_year	-0.2191	0.018	-12.485	0.000	-0.254	-0.185
FEMALE	0.6143	0.045	13.669	0.000	0.526	0.702
White	0.5815	0.061	9.471	0.000	0.461	0.702
Coloured	-0.1193	0.090	-1.322	0.186	-0.296	0.058
Other	0.4215	0.191	2.205	0.027	0.047	0.796
Total_modules_enrolled	0.1821	0.011	16.396	0.000	0.160	0.204
AP_SCORE	0.0216	0.004	5.572	0.000	0.014	0.029
NATURAL_AND_AGRICULTURAL_SCIENCES	0.6495	0.098	6.598	0.000	0.457	0.843
ECONOMIC_AND_MANAGEMENT_SCIENCES	1.1544	0.102	11.352	0.000	0.955	1.354
EDUCATION	1.0058	0.108	9.356	0.000	0.795	1.217
HEALTH_SCIENCE	1.0823	0.126	8.582	0.000	0.835	1.329
HUMANITIES	1.0053	0.106	9.506	0.000	0.798	1.213

From the table above can be seen that quintile, province, the sum of the NQF level, academic year of first registration, gender, race, total number of modules enrolled in, AP score and faculty all made statistically significant unique contributions to the prediction of whether a student graduates or not, after all other variables are controlled for.

To aid in the interpretation of the coefficients, average marginal effects were calculated. The results for the statistically significant variables can be seen in the table below.

Table 40. Marginal Effects for Logistic Regression to Predict Graduation – Mainstream Pathway Bloemfontein Campus

	Marginal effects (dx/dy)
QUINTILE	0.0362
EC	0.0445
GP	0.0386
KN	0.0222
LP	0.0886
MP	0.0445
NC	0.0012
NW	0.0706
WP	-0.0152
NQF_LVL_sum	-0.0003
acad_year	-0.0433
FEMALE	0.1214
White	0.1149
Coloured	-0.0236
Other	0.0833
Total_modules_enrolled	0.0360
AP_SCORE	0.0043
NATURAL_AND_AGRICULTURAL_SCIENCES	0.1284
ECONOMIC_AND_MANAGEMENT_SCIENCES	0.2282
EDUCATION	0.1988
HEALTH_SCIENCE	0.2139
HUMANITIES	0.1987

From the table above can be seen that a one unit increase in quintile was associated with a 3.6% increase in the probability of graduation.

Students being from the Eastern Cape, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, the Northern Cape, and North West was associated with an increased probability of graduating compared to students from the Free State. In contrast, being from the Western Cape was associated with a decreased probability of graduating when compared to being from the Free State, although this finding was not statistically significant. If only marginal effects are considered, students from Limpopo had the greatest likelihood of graduating (8.9% increased probability compared to the Free State), followed by students from North West (7.1% increased probability compared to the Free State), the Eastern Cape and Mpumalanga (4.5% increased probability compared to the Free State), Gauteng (3.9% increased probability compared to the Free State), KwaZulu Natal (2.2% increased probability compared to the Free State), the Northern Cape (0.12% increased probability compared to the Free State), the Free State, and finally, students from the Western Cape were least likely to graduate (1.5% decreased probability compared to the Free State).

An increase in the NQF level sum was associated with a decrease in the probability to graduate, although this decrease was small at only 0.03%. Likewise, students who were registered in later years were less likely to graduate, with a one year increase in year of registration being associated with a 4.3% decrease in the probability to graduate.

Females were considerably more likely to graduate than males, with an increased probability of 12.1%. Furthermore, being White instead of African was associated with the probability of graduating increasing by 11.5%, whereas being coloured instead of African was associated with the probability of graduating decreasing by 2.4%, although this finding was not statistically significant. When compared to African students, falling in a racial category other than White, Coloured, or African was associated with an 8.3% increase in the probability to graduate. If only marginal effects are considered, White students were most likely to graduate, followed by students in the other racial categories, African students, and finally, Coloured students.

A one unit increase in the total number of modules enrolled in was associated with the probability of graduating increasing by 3.6%. Likewise, an increase in AP score was associated with the probability of graduating increasing by 0.4%.

Finally, when compared to students in the Faculty of Law, students in all other faculties were more likely to graduate. When only marginal effects are considered, students in the Facuty of Economic and Management Sciences were most likely to graduate (22.8% increased probability compared to the Facult of Law), followed by students in the Faculty of Health Science (21.4% increased probability compared to the Faculty of Law), students in the Faculties of Education and Humanities (19.9% increased probability compared to the Faculty of Law), students in the Faculty of Natural and Agricultural Sciences (12.8% increased probability compared to the Faculty of Law), and finally, students from the Faculty of Law were least likely to graduate.

In summary, students in the mainstream pathway on the Bloemfontein Campus were more likely to graduate if they fell in a higher quintile, were from Limpopo, had a lower NQF level sum, registered in earlier years, were female, fell in the White racial category, were enrolled in more modules, and were registered in faculties other than the Faculty of Law, especially the Faculties of Economic and Management Sciences and Health Science.

Profile of a Student Successful in a Degree

Mainstream Pathway Bloemfontein Campus

- Quintile
- NQF Level Sum
- Limpopo
- Academic year of first registration
- Female
- White
- Number of modules enrolled in
- Faculty of Economic and Management Sciences
- Faculty of Health Sciences

Research Question 3: How does the profile of a student look that graduates in time (within N plus one years)?

For Research Question 3, the outcome variable was whether a student graduated in time or not (i.e., within N plus one years). Only students who have already graduated were selected for the analysis. Logistic regression analyses were run to determine which of the indicator variables significantly predicted whether a student graduated in time or not.

Extended Pathway Qwaqwa Campus

Descriptive statistics for multilevel categorical variables to determine reference categories

Frequency tables were run for all categorical variables with more than two levels to help with the selection of reference categories in the logistic regression analysis.

Table 41. Extended Pathway Qwaqwa Campus – Percentage who Graduate in Time by Province

Province	Percentage who graduated in time (within N + 1 years)
FS	87.154150
GP	87.301587
KN	92.725410
MP	89.285714

The Limpopo, Eastern Cape, North West and Western Cape provinces were excluded from analysis due to the low number of students from these provinces.

The Free State was chosen as the reference category since students from this province had the lowest rate of graduating in time.

Table 42. Extended Pathway Qwaqwa Campus – Percentage who Graduated in Time by Faculty

Faculty	Percentage who graduated in time (within N + 1 years)
Economic and Management Sciences	87.7451
Education	98.2578
Humanities	91.7197
Natural and Agricultural Sciences	77.5401

The Faculty of Natural and Agricultural Sciences was chosen as the reference category since students in this faculty had the lowest rate of graduating in time.

Logistic regression results

The results of the logistic regression can be seen below:

Table 43. Research Question 3 Extended Pathway Qwaqwa Logistic Regression – Full Model

Dep. Variable:	Graduated_in_Nplus1	**No. Observations:**	190
Model:	Logit	**Df Residuals:**	173
Method:	MLE	**Df Model:**	16
Pseudo R-squ.:	0.4302	**LL-Null:**	-66.047
Log-Likelihood:	-37.635	**LLR p-value:**	1.778e-06

	coef	**std err**	**z**	**P>|z|**	**[0.025**	**0.975]**
Intercept	-4996.0682	1103.534	-4.527	0.000	-7158.955	-2833.182
QUINTILE	0.5263	0.288	1.825	0.068	-0.039	1.091
GP	19.4956	1.67e+04	0.001	0.999	-3.27e+04	3.27e+04
KN	-0.3747	0.703	-0.533	0.594	-1.752	1.003
MP	-1.3547	1.596	-0.849	0.396	-4.482	1.773
NQF_LVL_sum	0.1644	0.341	0.482	0.630	-0.504	0.833
acad_year	2.4732	0.546	4.528	0.000	1.403	3.544
Five_Year_Degree	19.2086	4.03e+22	4.76e-22	1.000	-7.9e+22	7.9e+22
FEMALE	-0.1835	0.718	-0.256	0.798	-1.591	1.224
Total_modules_enrolled	0.1588	nan	nan	nan	nan	nan
AP_SCORE	0.1204	0.109	1.105	0.269	-0.093	0.334
AL_SCORE	0.0583	0.043	1.360	0.174	-0.026	0.142
QL_SCORE	-0.1170	0.045	-2.571	0.010	-0.206	-0.028
ML_SCORE	0.0320	0.031	1.036	0.300	-0.029	0.093
HUMANITIES	2.1483	0.933	2.302	0.021	0.319	3.977
ECONOMIC_AND_MANAGEMENT_SCIENCES	4.8107	2.069	2.325	0.020	0.755	8.867
EDUCATION	19.2086	4.03e+22	4.76e-22	1.000	-7.9e+22	7.9e+22
Has_NSFAS_award	0.7036	0.748	0.941	0.347	-0.762	2.170

The model was refined by dropping all non-significant predictor variables, and rerunning the logistic regression analysis. The results can be seen in the tables below.

Table 44. Research Question 3 Extended Pathway Qwaqwa Logistic Regression - Refined Model

Dep. Variable:	Graduated_in_Nplus1	**No. Observations:**	232
Model:	Logit	**Df Residuals:**	226
Method:	MLE	**Df Model:**	5
Pseudo R-squ.:	0.2219	**LL-Null:**	-74.979
Log-Likelihood:	-58.338	**LLR p-value:**	3.308e-06

	coef	**std err**	**z**	**P>|z|**	**[0.025**	**0.975]**
Intercept	-2242.7367	554.607	-4.044	0.000	-3329.746	-1155.728
acad_year	1.1136	0.275	4.046	0.000	0.574	1.653
QL_SCORE	-0.0021	0.040	-0.052	0.958	-0.081	0.077
HUMANITIES	0.1036	0.565	0.183	0.855	-1.003	1.210
ECONOMIC_AND_MANAGEMENT_SCIENCES	2.2634	1.099	2.059	0.039	0.109	4.418
EDUCATION	23.6421	6.07e+04	0.000	1.000	-1.19e+05	1.19e+05

From the table above can be seen that the year of first registration and the faculty made statistically significant unique contributions to the prediction of whether a student will graduate within N plus one years or not, after all other variables were controlled for.

To aid in the interpretation of the coefficients, average marginal effects were calculated. The results for the statistically significant variables can be seen in the table below.

Table 45. Marginal Effects for Logistic Regression to Predict Graduating in time - Extemded Pathway Qwaqwa Campus

	Marginal effects (dy/dx)
acad_year	0.0820
HUMANITIES	0.0076
ECONOMIC_AND_MANAGEMENT_SCIENCES	0.1666
EDUCATION	1.7401

From the table above can be seen that a one unit increase in the year of first registration was associated with a 8.2% increase in the probability of graduating within N plus one years.

Being registered in the Faculty of Economic and Management Sciences rather than the Faculty of Natural and Agricultural Sciences was associated with a 16.6% increase in the probability to graduate within N plus one years. Being from the Faculties of Humanities and Education rather than the Faculty of Natural and Agricultural Sciences were also associated with an increase in the probability to graduate in time although these findings were not statistically significant.

In summary, students in the extended pathway on Qwaqwa Campus were most likely to graduate within N plus one years if they registered in a later academic year, and were registered in faculties other than the Faculty of Natural and Agricultural Sciences, and especially in the Faculty of Economic and Management Sciences.

Extended Pathway Bloemfontein Campus

Descriptive statistics for multilevel categorical variables to determine reference categories

Frequency tables were run for all categorical variables with more than two levels to help with the selection of reference categories in the logistic regression analysis.

Table 46. Extended Pathway Bloemfontein Campus – Percentage who Graduated in Time by Province

Province	Percentage who graduated in time (within N + 1 years)
EC	82.7869
FS	83.6601
GP	89.6970
KN	79.3388
LP	85.0000
MP	91.0714
NC	79.8246
NW	88.0597

The Western Cape was excluded from the analysis due to the low number of students coming from this province.

KwaZulu-Natal was chosen as the reference category since students from this province had the lowest rates of graduating within N plus one years.

Table 47. Extended Pathway Bloemfontein Campus – Percentage who Graduated in Time by Race

Race	Percentage who graduated in time (within N + 1 years)
African	84.3384
Coloured	79.1304
White	87.9747

The race category for students of other races was excluded due to the low number of students falling in this group.

The Coloured race category was chosen as the reference category since students in this racial group had the lowest rate of graduating within N plus one years.

Table 48. Extended Pathway Bloemfontein Campus – Percentage who Graduated in Time by Faculty

Faculty	Percentage who graduated in time (within N + 1 years)
Education	0.983740
Humanities	0.811213
Law	0.872500

The Faculties of Theology and Natural and Agricultural Sciences were excluded from the analysis due to the low number of students registered in these faculties.

The Faculty of Humanities was chosen as the reference category since the students in this faculty had the lowest rate of graduating within N plus one years.

Logistic regression results

The results of the logistic regression can be seen below:

Table 49. Research Question 3 Extended Pathway Bloemfontein Logistic Regression – Full Model

Dep. Variable:	Graduated_in_Nplus1	**No. Observations:**	610
Model:	Logit	**Df Residuals:**	587
Method:	MLE	**Df Model:**	22
Pseudo R-squ.:	0.1568	**LL-Null:**	-278.57
Log-Likelihood:	-234.88	**LLR p-value:**	9.566e-10

	coef	std err	z	P>|z|	[0.025	0.975]
Intercept	-1724.5782	319.543	-5.397	0.000	-2350.871	-1098.285
QUINTILE	0.1190	0.131	0.907	0.364	-0.138	0.376
EC	0.0314	0.532	0.059	0.953	-1.012	1.074
GP	-0.3953	0.525	-0.752	0.452	-1.425	0.634
FS	-0.0523	0.403	-0.130	0.897	-0.843	0.738
LP	-0.6832	0.637	-1.073	0.283	-1.931	0.565
MP	-0.2406	0.754	-0.319	0.750	-1.718	1.237
NC	-0.2131	0.515	-0.414	0.679	-1.223	0.797
NW	-0.9191	0.715	-1.286	0.198	-2.320	0.481
NQF_LVL_sum	0.0006	0.001	0.438	0.661	-0.002	0.004

acad_year	0.8551	0.158	5.396	0.000	0.544	1.166
Five_Year_Degree	18.4237	6496.761	0.003	0.998	-1.27e+04	1.28e+04
FEMALE	0.4445	0.284	1.567	0.117	-0.111	1.000
African	-0.1039	0.390	-0.266	0.790	-0.869	0.661
White	0.5058	0.471	1.073	0.283	-0.418	1.430
Total_modules_enrolled	0.1971	0.172	1.146	0.252	-0.140	0.534
AP_SCORE	-0.0028	0.038	-0.075	0.940	-0.076	0.071
AL_SCORE	-0.0149	0.014	-1.042	0.297	-0.043	0.013
QL_SCORE	0.0222	0.017	1.273	0.203	-0.012	0.056
ML_SCORE	0.0231	0.009	2.683	0.007	0.006	0.040
LAW	-17.6071	6496.761	-0.003	0.998	-1.28e+04	1.27e+04
EDUCATION	-15.8655	6496.761	-0.002	0.998	-1.27e+04	1.27e+04
Has_NSFAS_award	1.0044	0.773	1.299	0.194	-0.511	2.520

The model was refined by dropping all non-significant predictor variables and rerunning the logistic regression analysis. The results can be seen in the table below.

Table 50. Research Question 3 Extended Pathway Bloemfontein Logistic Regression - Refined Model

Dep. Variable:	Graduated_in_Nplus1	**No. Observations:**	769
Model:	Logit	**Df Residuals:**	766
Method:	MLE	**Df Model:**	2
Pseudo R-squ.:	0.08562	**LL-Null:**	-351.00
Log-Likelihood:	-320.95	**LLR p-value:**	8.873e-14

	coef	**std err**	**z**	**P>|z|**	**[0.025**	**0.975]**
Intercept	-1538.0407	217.615	-7.068	0.000	-1964.557	-1111.524
acad_year	0.7639	0.108	7.074	0.000	0.552	0.976
ML_SCORE	0.0134	0.007	2.031	0.042	0.000	0.026

From the table above can be seen that the year of first registration and the ML score made statistically significant unique contributions to the prediction of students graduating within N plus one years, after all other variables were controlled for.

To aid in the interpretation of the coefficients, average marginal effects were calculated. The results for the statistically significant variables can be seen in the table below.

Table 51. Marginal Effects for Logistic Regression to Predict Graduating in time – Extended Pathway Bloemfontein Campus

	Marginal effects (dy/dx)
acad_year	0.0993
ML_SCORE	0.0017

From the table above can be seen that a one unit increase in the year of first registration was associated with the probability of graduating within N plus one years increasing by 9.9%. The probability of graduating within N plus one years also increased with an increase in ML score (0.17% increased probability with a one unit increase in ML score).

In summary, students in the extended pathway on the Bloemfontein Campus were more likely to graduate within N plus one years if they registered in a later academic year, and if they had higher ML scores.

Mainstream Pathway Qwaqwa Campus

Descriptive statistics for multilevel categorical variables to determine reference categories

Frequency tables were run for all categorical variables with more than two levels to help with the selection of reference categories in the logistic regression analysis.

Table 52. Mainstream Pathway Qwaqwa Campus – Percentage who Graduated in Time by Province

Province	Percentage who graduated in time (within N + 1 years)
FS	90.9836
GP	100.0000
KN	95.1705
MP	91.3043

North West, Limpopo, the Eastern Cape, and the Northern Cape were excluded from the analysis due to low student numbers in these provinces.

The Free State was chosen as the reference category since students in this province had the lowest rate of graduating within N plus one years.

Table 53. Mainstream Pathway Qwaqwa Campus – Percentage who Graduated in Time by Faculty

Faculty	Percentage who graduated in time (within N + 1 years)
Economic and Management Sciences	90.4762
Education	97.3712
Humanities	88.9299
Natural and Agricultural Sciences	75.8333

The Faculty of Natural and Agricultural Sciences was chosen as the reference category since students in this faculty had the lowest rate of graduating within N plus one years.

Logistic regression results

The results of the logistic regression can be seen below:

Table 54. Research Question 3 Mainstream Pathway Qwaqwa Logistic Regression – Full Model

Dep. Variable:	Graduated_in_Nplus1	**No. Observations:**	354
Model:	Logit	**Df Residuals:**	336
Method:	MLE	**Df Model:**	17
Pseudo R-squ.:	0.4019	**LL-Null:**	-74.053
Log-Likelihood:	-44.291	**LLR p-value:**	1.259e-06

	coef	**std err**	**z**	**P>|z|**	**[0.025**	**0.975]**
Intercept	-2622.0594	764.110	-3.432	0.001	-4119.688	-1124.431
QUINTILE	0.0713	0.300	0.237	0.812	-0.517	0.660
GP	23.7367	1.02e+05	0.000	1.000	-2e+05	2e+05
KN	0.7079	0.744	0.952	0.341	-0.749	2.165
MP	23.6405	4.41e+05	5.37e-05	1.000	-8.64e+05	8.64e+05
NQF_LVL_sum	0.3455	0.330	1.047	0.295	-0.301	0.992
acad_year	1.3004	0.379	3.431	0.001	0.558	2.043
Four_Year_Degree	12.5323	1510.027	0.008	0.993	-2947.065	2972.130
FEMALE	-0.5035	0.646	-0.780	0.435	-1.769	0.762
Total_modules_enrolled	-1.7714	1.775	-0.998	0.318	-5.250	1.707
AP_SCORE	-0.0315	0.072	-0.437	0.662	-0.173	0.110
AL_SCORE	-0.0959	0.045	-2.117	0.034	-0.185	-0.007
QL_SCORE	0.1092	0.054	2.035	0.042	0.004	0.214
ML_SCORE	0.0509	0.034	1.500	0.134	-0.016	0.117
ECONOMIC_AND_MANAGEMENT_SCIENCES	3.2276	1.374	2.349	0.019	0.535	5.920
EDUCATION	-8.0988	1510.027	-0.005	0.996	-2967.698	2951.501
HUMANITIES	3.2347	1.365	2.370	0.018	0.559	5.910
Has_NSFAS_award	0.0651	0.668	0.098	0.922	-1.243	1.373

The model was refined by dropping all non-significant predictor variables, and rerunning the logistic regression analysis. The results can be seen in the table below.

Table 55. Research Question 3 Mainstream Pathway Qwaqwa Logistic Regression – Refined Model

Dep. Variable:	Graduated_in_Nplus1	**No. Observations:**	412
Model:	Logit	**Df Residuals:**	405
Method:	MLE	**Df Model:**	6
Pseudo R-squ.:	0.1829	**LL-Null:**	-102.31
Log-Likelihood:	-83.601	**LLR p-value:**	1.456e-06

	coef	**std err**	**z**	**P>|z|**	**[0.025**	**0.975]**
Intercept	-1407.1903	409.381	-3.437	0.001	-2209.563	-604.817
acad_year	0.6988	0.203	3.442	0.001	0.301	1.097
AL_SCORE	-0.0417	0.030	-1.375	0.169	-0.101	0.018
QL_SCORE	0.0357	0.036	0.986	0.324	-0.035	0.107
ECONOMIC_AND_MANAGEMENT_SCIENCES	1.1683	0.825	1.417	0.157	-0.448	2.785
EDUCATION	2.3521	0.515	4.570	0.000	1.343	3.361
HUMANITIES	1.2707	0.628	2.025	0.043	0.041	2.501

From the table above can be seen that the year of first registration and faculty made statistically significant unique contributions to the prediction of whether a student will graduate in time or not, after all other variables are controlled for.

To aid in the interpretation of the coefficients, average marginal effects were calculated. The results for the statistically significant variables can be seen in the table below.

Table 56. Marginal Effects for Logistic Regression to Predict Graduating in time – Mainstream Pathway Qwaqwa Campus

	Marginal effects (dx/dy)
acad_year	0.0380
ECONOMIC_AND_MANAGEMENT_SCIENCES	0.0636
EDUCATION	0.1280
HUMANITIES	0.0692

From the table above can be seen that being registered for the first time one year later was associated with a 3.8% increase in the probability of graduating within N plus one years.

Being registered in the Faculties of Economic and Management Sciences, Education, and Humanities were all associated with an increase in the probability of graduating in time if compared to being registerd in the Faculty of Natural and Agricultural Sciences. If only marginal effects are considered, students were most likely to graduate in time if they were registered in the Faculty of Education (12.8% increased probability compared to the Faculty of Natural and Agricultural Sciences), followed by the Faculty of Humanities (6.9% increased probability compared to the Faculty of Natural and Agricultural Sciences), the Faculty of Economic and Management Sciences (6.4% increased probability compared to the Faculty of Natural and Agricultural Sciences) and, finally, students in the Faculty of Natural and Agricultural Sciences were least likely to graduate in time.

In summary, students in the mainstream pathway on the Qwaqwa Campus were more likely to graduate within N plus one years if they registered for the first time in a later year, and if they were registered in a faculty other than the Faculty of Natural and Agricultural Sciences, but especially in the Faculty of Education.

Mainstream pathway Bloemfontein Campus

Descriptive statistics for multilevel categorical variables to determine reference categories

Frequency tables were run for all categorical variables with more than two levels to help with the selection of reference categories in the logistic regression analysis.

Table 57. Mainstream Pathway Bloemfontein Campus – Percentage who Graduated in Time by Province

Province	Percentage who graduated in time (within N + 1 years)
EC	89.9244
FS	86.4957
GP	89.4624
KN	87.2274
LP	84.7826
MP	92.9664
NC	87.8116
NW	89.7490
WP	88.3895

The Limpopo Province was chosen as the reference category since students from this province had the lowest rate of graduating within N plus one years.

Table 58. Mainstream Pathway Bloemfontein Campus – Percentage who Graduated in Time by Race

Race_recoded	Percentage who graduated in time (within N + 1 years)
African	85.8052
Coloured	84.6535
Other	80.2469
White	90.7488

Students who fell in racial categories other than White, African or Coloured were chosen as the reference category since this group had the lowest rate of graduating within N + 1 years.

Table 59. Mainstream Pathway Bloemfontein Campus – Percentage who Graduated in Time by Faculty

Faculty	Percentage who graduated in time (within N + 1 years)
Economic and Management Sciences	85.0722
Education	94.1548
Health Science	89.6257
Humanities	88.1862
Law	87.8947
Natural and Agricultural Sciences	85.4701

The Faculty of Theology was excluded from the analysis due to the low number of students from this faculty. The Faculty of Economic and Management Sciences was chosen as the reference category since students in this faculty had the lowest rate of graduating within N plus one years.

Logistic regression results

The results of the logistic regression can be seen below:

Table 60. Research Question 3 Mainstream Pathway Bloemfontein Logistic Regression – Full Model

Dep. Variable:	Graduated_in_Nplus1	**No. Observations:**	5396
Model:	Logit	**Df Residuals:**	5368
Method:	MLE	**Df Model:**	27
Pseudo R-squ.:	0.07681	**LL-Null:**	-1924.4
Log-Likelihood:	-1776.6	**LLR p-value:**	5.406e-47

	coef	std err	z	P>|z|	[0.025	0.975]
Intercept	-896.3254	76.775	-11.675	0.000	-1046.802	-745.849
QUINTILE	0.0012	0.047	0.026	0.979	-0.090	0.092
EC	0.0810	0.207	0.391	0.696	-0.325	0.487
GP	0.2696	0.225	1.200	0.230	-0.171	0.710
KN	0.0997	0.218	0.457	0.648	-0.328	0.528

FS	0.0422	0.156	0.270	0.787	-0.264	0.349
MP	0.3791	0.327	1.159	0.246	-0.262	1.020
NC	0.1688	0.219	0.773	0.440	-0.259	0.597
NW	0.3774	0.248	1.520	0.128	-0.109	0.864
WP	-0.0176	0.285	-0.062	0.951	-0.576	0.541
NQF_LVL_sum	0.0029	0.001	3.286	0.001	0.001	0.005
acad_year	0.4452	0.038	11.692	0.000	0.371	0.520
Four_Year_Degree	1.3984	0.270	5.174	0.000	0.869	1.928
FEMALE	0.2535	0.097	2.605	0.009	0.063	0.444
White	0.7697	0.294	2.615	0.009	0.193	1.347
Coloured	-0.1359	0.333	-0.408	0.683	-0.789	0.517
African	0.0727	0.300	0.242	0.809	-0.515	0.661
Total_modules_enrolled	-0.0117	0.026	-0.458	0.647	-0.062	0.038
AP_SCORE	0.0129	0.009	1.449	0.147	-0.005	0.030
AL_SCORE	-0.0018	0.005	-0.366	0.714	-0.012	0.008
QL_SCORE	0.0043	0.005	0.884	0.376	-0.005	0.014
ML_SCORE	-0.0041	0.003	-1.320	0.187	-0.010	0.002
NATURAL_AND_AGRICULTURAL_SCIENCES	-0.4365	0.121	-3.621	0.000	-0.673	-0.200
EDUCATION	-0.8593	0.332	-2.588	0.010	-1.510	-0.209
HEALTH_SCIENCE	-1.2615	0.311	-4.059	0.000	-1.871	-0.652
HUMANITIES	-0.3698	0.162	-2.280	0.023	-0.688	-0.052
LAW	-1.0803	0.357	-3.023	0.003	-1.781	-0.380
Has_NSFAS_award	-0.0618	0.148	-0.417	0.676	-0.352	0.228

The model was refined by dropping all non-significant predictor variables, and rerunning the logistic regression analysis. The results can be seen in the tables below.

Table 61. Research Question 3 Mainstream Pathway Bloemfontein Logistic Regression – Refined Model

Dep. Variable:	Graduated_in_Nplus1	**No. Observations:**	9167
Model:	Logit	**Df Residuals:**	9154

Method:	MLE	**Df Model:**	12
Pseudo R-squ.:	0.08235	**LL-Null:**	-3432.6
Log-Likelihood:	-3150.0	**LLR p-value:**	2.646e-113

	coef	std err	z	P>|z|	[0.025	0.975]
Intercept	-1008.2038	54.560	-18.479	0.000	-1115.139	-901.269
NQF_LVL_sum	0.0026	0.001	4.473	0.000	0.001	0.004
acad_year	0.5007	0.027	18.499	0.000	0.448	0.554
Four_Year_Degree	0.8944	0.184	4.864	0.000	0.534	1.255
FEMALE	0.3033	0.069	4.420	0.000	0.169	0.438
White	0.8505	0.213	3.998	0.000	0.433	1.267
Coloured	0.0161	0.237	0.068	0.946	-0.449	0.481
African	0.1707	0.211	0.810	0.418	-0.242	0.584
NATURAL_AND_AGRICULTURAL_SCIENCES	-0.1414	0.085	-1.659	0.097	-0.309	0.026
EDUCATION	-0.0035	0.228	-0.015	0.988	-0.451	0.444
HEALTH_SCIENCE	-0.5966	0.218	-2.732	0.006	-1.025	-0.169
HUMANITIES	-0.0713	0.102	-0.702	0.483	-0.270	0.128
LAW	-0.4556	0.235	-1.937	0.053	-0.917	0.005

From the table above can be seen that the sum of the NQF level, year of first registration, the length of degree, gender, race, and faculty all made statistically significant unique contributions to the prediction of whether a student will graduate in time or not, after all other variables are controlled for.

To aid in the interpretation of the coefficients, average marginal effects were calculated. The results for the statistically significant variables can be seen in the table below.

Table 62. Marginal Effects for Logistic Regression to Predict Graduating in time – Mainstream Pathway Bloemfontein Campus

	Marginal effects (dy/dx)
NQF_LVL_sum	0.0003
acad_year	0.0506
Four_Year_Degree	0.0904

FEMALE	0.0307
White	0.0860
Coloured	0.0016
African	0.0173
NATURAL_AND_AGRICULTURAL_SCIENCES	-0.0143
EDUCATION	-0.0004
HEALTH_SCIENCE	-0.0603
HUMANITIES	-0.0072
LAW	-0.0461

From the table above can be seen that a one unit increase in the sum of the NQF level was associated with a slight increase (0.03%) in the probability to graduate in time. Likewise, a one unit increase in the year of first registration was also associated with an increase in the probability (5.1%) to graduate within N plus one years.

Being registered for a four year degree rather than a three year degree was associated with a 9% increase in the probability to graduate within N plus one years, while being female instead of male was associated with a 3.1% increase in the probability to graduate in time.

Furthermore, when compared to students in the other racial category, White students were 8.6% more likely to graduate in time. Coloured and African students were also more likely than students in the other racial category to graduate in time, but these results were not statistically significant. If only marginal effects are considered, White students were most likely to graduate in time (8.6% more likely than students in the other racial category), followed by African students (1.7% more likely than students in the other racial category), Coloured students (0.16% more likely than students in the other racial category), and lastly, students in the other racial category were least likely to graduate in time.

Students in the Faculty of Health Science had a 6% decreased probability to graduate within N plus one years when compared to students in the Faculty of Economic and Management Sciences. Students in the other faculties were also less likely than students in the Faculty of Economic and Management Sciences to graduate in time, although these findings were not statistically significant. If only marginal effects are considered, students in the Faculty of Economic and Management Sciences were most likely to graduate on time, followed by students in the Faculty of Education (0.04% decreased probability to graduate in time compared to students in the Faculty of Economic and Management Sciences), the Faculty of Humanities (0.7% decreased probability to graduate in time compared to students in the Faculty of Economic and Management Sciences), the Faculty of Natural and Agricultural Sciences (1.4% decreased probability to graduate in time compared to students in the Faculty of Economic and Management Sciences), the Faculty of Law (4.6% decreased probability to graduate in time compared to students in the Faculty of Economic and Management Sciences), and finally, the

Faculty of Health Science (6.0% decreased probability to graduate in time compared to students in the Faculty of Economic and Management Sciences).

In summary, students in the mainstream pathway on the Bloemfontein Campus were more likely to graduate within N plus one years if they had a higher sum of their NQF levels, if they were registered in a later year and for a four-year degree, if they were female, white, and registered in the Faculty of Economic and Management Sciences or the Faculty of Education.